



STUDY ON PLASTICS VALUE-CHAIN IN NIGERIA



J U L Y 2 0 2 1



STUDY ON PLASTICS VALUE-CHAIN IN **NIGERIA**

UNDER THE PROJECT

STUDY ON AVAILABLE SUSTAINABLE ALTERNATIVE
MATERIALS TO PLASTICS AND INNOVATIVE PACKAGING
AND RECYCLING TECHNOLOGIES THAT MEET MARKET
NEEDS IN AFRICA TO REDUCE PLASTICS LEAKAGES TO
THE ENVIRONMENT

J U L Y 2 0 2 1



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



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ABBREVIATIONS AND ACRONYMS

3Rs	Reduce, Reuse and Recycle
ABU	Ahmadu Bello University
ACCI	Abuja Chamber of Commerce and Industry
AEPB	Abuja Environmental Protection Board
AMAC	Abuja Municipal Area Council
AOL	American Online
ATWAP	Association of Table Water Producers
BAU	Business as Usual
BEST	Best Environmental Solution Tools Limited, Nigeria
BFFP	Break Free From Plastic
CBO	Community Based Organization
COVID-19	Corona Virus Disease, '2019 Novel Coronavirus' or '2019-nCoV.'
DDT	Dichlorodiphenyltrichloroethane
DG	Director General
DIL	Deagbo Industries Limited
ECCC	Environment and Climate Change Canada
ECOWAS	Economic Community of West African States
EPR	Extended Producer Responsibility
EPS	Expanded Polystyrene
EU	European Union
FBRA	Food and Beverage Recycling Alliance
FCDA	Federal Capital Development Authority
FCT	Federal Capital Territory
FEPA	Federal Environmental Protection Agency
FGN	Federal Government of Nigeria
FMARD	Federal Ministry of Agriculture and Rural Development
FME _{Env}	Federal Ministry of Environment
FTIR	Fourier Transform Infrared Spectroscopy
GDP	Gross Domestic Product
GPA	Global Partnership Action
HDPE	High-density Polyethylene
IMO	International Maritime Organization

ISWM	Integrated Solid Waste Management
ISWA	International Solid Waste Association
LASEPA	Lagos State Environmental Protection Agency
LASG	Lagos State Government
LAWMA	Lagos Waste Management Authority
LASWA	Lagos State Waterways Authority
LASPARK	Lagos State Parks and Gardens
LCCI	Lagos Chamber of Commerce and Industry
LDPE	Low-density Polyethylene
LGA	Local Government Area
LRI	Lagos Recycle Initiative
MAN	Manufacturers Association of Nigeria
MD	Managing Director
MDA	Ministry, Department, Agency
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
Mt	Million tonnes
NAFDAC	National Agency for Food and Drug Administration and Control
NACCIMA	Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture
NCS	Nigeria Customs Service
NESREA	National Environmental Standards and Regulations Enforcement Agency
NGO	Non-Governmental Organization
NIMASA	Nigerian Maritime Administration and Safety Agency
NIWA	Nigeria Inland Waterways Authority
NURTW	National Union of Road Transport Workers
PAH	Polycyclic Aromatic Hydrocarbon
PBAT	Polybutylene Adipate Terephthalate
PBS(A)	Polybutylene Succinate
PCB	Polychlorinated Biphenyl
PCL	Polycaprolactone
PE	Polyethylene
PEP	Politically Exposed Person
PEF	Polyethylene furanoate
PET	Polyethylene Terephthalate
PHA	Polyhydroxyalkanoate
PLA	Poly(lactic Acid)
PP	Polypropylene
PP&A	Polyphthalamide
PPE	Personal Protective Equipment
PRI	Principles of Responsible Investment
PRO	Producers Responsibility Organization
PS	Polystyrene
PSP	Private Sector Participants in Waste Management
PTF	Presidential Task Force

PTT	Polytrimethylene Terephthalate
PVA	Polyvinyl Alcohol
PVC	Polyvinyl Chloride
R&D	Research and Development
RAN	Recyclers Association of Nigeria
RESWAYE	Recycling Scheme for Women and Youth Empowerment
RMRDC	Raw Materials Research and Development Council
SDG	Sustainable Development Goal
SON	Standards Organization of Nigeria
SPI	Society of the Plastics Industry
SUP	Single-Use Plastic
SWEEP	Statewide Waste and Environmental Education Foundation
SWM	Solid Waste Management
TCCF	The Coca-Cola Foundation
TLS	Transfer Loading Station
TOR	Terms of Reference
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VOA	Voice of America
WAMASON	Waste Management Association of Nigeria
W.A.S.T.E AFRICA	Initiative for the Advancement of Waste Management in Africa
WCO	World Customs Organization
WED	World Environment Day
WEF	World Economic Forum
WHO	World Health Organization
WRI	World Resources Institute

FORWARD

The plastic industry is very important to the Nigeria economy as it contributes significantly to the country's GDP and employs thousands of people. However the misuse of plastics and poor management of the wastes pose great dangers to health and the environment. Plastic wastes are currently disposed in ways that are harmful and potentially hazardous to man and his environment. The million tonnes of plastic wastes that litter our streets clog up our rural and urban drains leading to flooding incidents, contamination of the soil affecting crop yield, littering the oceans and other water bodies threatening biodiversity and human health, inadvertent release of dioxins and furans when openly burnt thus increasing public health challenges and greenhouse gas emissions.

The problem of plastic pollution can be addressed through implementing circular economy practices and providing sustainable alternatives. It is in realization of this that the United Nations Industrial Development Organization (UNIDO) in collaboration with Federal Ministry of Environment with funding from the Government of Japan implemented the “Study on available sustainable alternative materials to plastics, and innovative packaging and recycling technologies that meet market needs in Africa to reduce plastics leakages to the environment”

The study which was carried out by a team of consultants with the assistance and guidance of a Project Steering Committee (PSC) commenced with the inauguration of the committee on 25th February, 2020 to review and provide comments and recommendations on the draft study report, participate at the study report validation meetings, provide assistance to facilitate the search of willing companies in Abuja and Lagos for adopting alternative materials and/or package and recycling technologies amongst others.

In the course of the study, consultations with stakeholders, surveys and workshops were organized which were tailored towards information gathering and awareness creation for the purpose of enriching the report of the study towards reduction and eventual elimination of plastic pollution both on land and the marine environment.

It is my belief that the study which has culminated into this robust report will enable Nigeria to address the issues of plastic waste and marine litter pollution and strengthen the country's capacity in advancing alternatives to plastic.

The Federal Ministry of Environment therefore wishes to express its profound gratitude to the Government of Japan for supporting the country's effort in the issue of plastic waste pollution by funding this study. The Ministry also appreciates the United Nations Industrial Development Organization (UNIDO) through which this study was implemented for their unrelenting effort in their quest to support the country in sustainable environmental management and effective utilization of resource.

Our gratitude also goes to the project consultants, Mr Bosun Oladimeji (Best Environmental Solutions Tools Limited), Mitsubishi Ufj Research and Consulting Co., members of the Project Steering Committee (PSC), and all other relevant national stakeholders especially those in Abuja and Lagos for their cooperation in making the study a success.



Dr. Mohammad Mahmood Abubakar
Honorable Minister of Environment



PREFACE

The world is rapidly changing and facing a number of major challenges. Sustainability is becoming a key pre-requisite of development and an imperative approach to be integrated in human life models aiming to preserve the human wellbeing and well-balanced eco-systems for the future generations. Gone are the days when prosperity was only attributed to economic and social parameters. Today environmental factors have become increasingly relevant. Environmental and climatic challenges are transforming the way the world supplies, processes and uses natural resources. Consumption patterns, resource efficiency and environmental sustainability are critical factors and that must be considered in production and manufacturing of products.

The global community, particularly G20 members mobilized to put a stop to the global marine plastic litter challenge. This challenge comprises of an estimated stock of 83 Mt of plastic waste that has already accumulated in oceans and an estimated 8 Mt of additional, mismanaged plastic wastes entering the oceans annually; at least 80% of which originates directly from land-based sources. In 2017, the G20 Leaders' Summit in Hamburg agreed on the G20 Action Plan on Marine Litter and discussions continued in 2018 at the G20 meeting in Argentina. The 2019 Japan Presidency for G20 has prioritized the global marine litter challenge and aims to implement a concerted action. At the G20 Osaka Summit held in June 28-29, 2019 which Nigeria was in attendance, "Osaka Blue Ocean Vision" to reduce additional pollution by marine plastic litter to zero by 2050 was shared.

As UNIDO, we are proud to have been involved in the sustenance of Nigeria's environment for more than thirty years. This partnership with the Federal Government has spanned over a wide array of environmental issues and recorded notable achievements.

Having the highest population in Africa and one of the highest in the world, Nigeria is classified as a middle-income earning country and projected to be one of the highest generators of plastic wastes in the world. Therefore, victory for responsible consumption and production of plastics in Nigeria is a victory for Africa and the world. UNIDO embarked on plastics study in Nigeria, Egypt and Kenya, some of the leading economies in the region with funding from the Government of Japan. The successful implementation of plastics management in these three countries will go a long way for Africa. This study on “available sustainable alternative materials to plastics, and innovative packaging and recycling technologies that meet market needs in Africa to reduce plastics leakages to the environment” is expected to contribute to the reduction of the amount of virgin plastic usage in packaging and single-use products in the target African countries, by providing an overview of available technology options with corresponding local contexts and needs.

UNIDO will continue to effectively collaborate with the Government of Nigeria especially the Federal Ministry of Environment and other national and state bodies to safeguard the environment for sustainable development in Nigeria and in Africa.



Mr. Jean Bakole

Representative to ECOWAS and Regional Director,
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The funding by the Government of Japan was provided in line with G20 Osaka Blue Ocean Vision, which was shared as a common global vision in June 2019 at G20 Osaka Summit under Japan's G20 presidency. The vision aims to reduce additional pollution by marine plastic litter to zero by 2050 through a comprehensive life-cycle approach that includes reducing the discharge of mismanaged plastic litter by improved waste management and innovative solutions while recognizing the important role of plastics for society.

Appreciation goes to National Steering Committee which was established under the project. The Committee provided valuable advices and comments to the assessment process and helped to steer the project appropriately. The Committee, chaired by the Federal Ministry of Environment and co-chaired by UNIDO, was composed of a wide range of representation from Nigeria: Federal Ministry of Industry, Trade and Investment (FMITI), Federal Ministry of Science and Technology, National Environmental Standards Regulation and Enforcement Agency (NESREA), Nigeria Customs Service, National Agency for Food and Drugs Administration (NAFDAC), Federal Capital Development Authority (FCDA), Standards Organization of Nigeria (SON), Nigeria Maritime Administration and Safety Agency (NIMASA) at national level; Lagos State Environmental Protection Agency (LASEPA), Lagos State Waste Management Authority (LAWMA) at

State level; and Manufacturers Association of Nigeria (MAN), Waste Management Association of Nigeria (WAMASON), Food and Beverage Recycling Alliance (FBRA), Raw Materials Research and Development Council (RMRDC) and University of Abuja.

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EXECUTIVE SUMMARY

I Waste Management in Nigeria

Nigeria generates an estimated 32 million tonnes of solid waste yearly, one of the highest in Africa, from that figure, plastic constitutes 2.5 million tonnes. Nigeria is among the top 20 nations that contribute 83 per cent of total volume of land-based plastic waste that end up in the oceans. An estimate of over 200,000 metric tonnes of plastic waste from land-based sources in Nigeria is discharged into the Atlantic Ocean annually.

Solid waste management remains one of the most daunting environmental sanitation challenges facing Nigeria today and it has continually remained at its lowest ebb despite huge investments in the sector. The management of solid waste is far from being satisfactory in Nigeria. Many parts of the cities and towns do not benefit from any organized waste management services and therefore wastes are unattended to, buried, burnt or disposed haphazardly. In areas where the authorities do the collection, it is often irregular and sporadic. Waste when left unattended for a long time constitutes serious health hazard, causes offensive odour, pollutes underground water sources and decreases environmental aesthetics and quality.

Plastics, particularly single-use plastics pollution is visible in all cities of Nigeria due to inefficiency of waste management system. Marine litter causes environmental, economic, health and aesthetic problems. Solutions to these endemic problems include reduction, reuse, increased recycling, tough litter abatement laws and well-run municipal waste management systems.

II UNIDO Plastics Assessment Project

UNIDO as a leading UN agency promoting circular economy and resource efficiency in

industry is implementing this project SAP 190137, with funding from the Government of Japan, to support Nigeria in dealing with plastic waste leaking to the environment. The study is designed to identify and disseminate information, regarding the currently available sustainable alternative materials to plastics, and innovative packaging and recycling technologies to meet market needs in order to reduce plastic leakage to the Nigerian environment. This project is to compile information on currently available, sustainable environmentally-friendly alternative materials to plastics, and innovative packaging and recycling technologies that would be appropriate for Nigeria.

III Study Area

Lagos and Abuja are the selected areas of study for this project. Lagos is the largest city in Nigeria and Sub-Saharan Africa. It is one of the fastest growing cities in the World and one of the most populous urban areas. The latest reports estimate its population to be more than 21 million making it the largest city in the entire African continent. With per capita waste generation of more than 0.5 kg per day, the state now generates more than 13,500 tons of urban waste every day. There are 20 LGAs and 37 LCDAs in Lagos State. The waste in Lagos State is managed by Lagos Waste Management Agency (LAWMA).

Nigeria's capital city, Abuja, is in the Federal Capital Territory (FCT) located in the north central region of the country, with a land area of 7,753.9 square kilometres. The city is bounded on the North by Kaduna State, on the West by Niger State, on the East and South-East by Nasarawa State, and on the South-West by Kogi State. The Federal Capital City consists of six municipalities; AMAC, Bwari, Gwagwalada, Kuje, Kwali and Abaji. The waste in Abuja is managed by the Abuja Environmental Protection Board (AEPB).

IV Scope of Work

The general services that were carried out in order to collect information on current status of single-use plastic products' value-chain in these study areas are:

- Policy and regulatory framework on waste management systems relevant to the single-use plastic waste stream;
- Sector overview/industry/market information of single-use plastic products including, major stakeholders in the value-chain and their business data/market size including products and technologies; and
- Survey conduct of residents in Lagos and FCT on waste management, in particular plastic litters.

V Methodology of Assessment

The study was carried out through extensive literature review from international and national sources and expert contribution, complemented by consultations with officials in charge of the respective issues and major stakeholders such as associations and companies in plastic value-chain.

There were two study teams; one in FCT and the other in Lagos. KoBoCollect data collection system was used for instant administration and analysis of the data. The survey

covered companies in plastic value-chain, including raw material producers, polymer producers, compounders, packaging/product producers, distributors, retailers/supermarkets/brand owners, waste collectors, and recyclers using an eight-set questionnaires. The survey questionnaire was first provided electronically to the companies, followed up by face-to-face interviews, virtual meetings and/or telephone interviews.

The field survey and interview was conducted for residents in Lagos and FCT Abuja. Field survey was carried out in accordance with national and international sampling and analytical protocols, at commercial complexes, supermarkets, open markets, and streets with enumerator's assistance. Interviews were conducted by visiting homes/places and in strict adherence to COVID-19 protocols.

Administration of questionnaire was also done for the steering committee members as important stakeholders in this assessment. The various questionnaires were administered using electronic (via emails, virtual meetings, etc., face-to-face and telephone calls.

VI Questionnaires Administered

A total of 4,132 questionnaires were successfully administered and analyzed in this study. This was made up of 59 value chain players in Lagos and 40 in FCT including 1,985 Lagos residents and 2,034 residents in FCT as well as 6 steering committee members in Lagos and 2 in FCT. Five PVC companies in Lagos and one in FCT were actively involved in two categories.

VII LAWMA

Two municipalities nominated for pilot recycling project by LAWMA are Ajegunle in Ajeromi LGA and Yaba in Yaba LCDA of Mainland Lagos. Proposed Waste Collection System in Lagos Recycle Initiative is to be managed by private sector, registered and monitored by LAWMA. Two Collection Centres in each of the 57 LGAs/LCDAs, each collection centre will be managed by a registered recycler. As at March 2021, LAWMA has registered over 50 Recyclers into the Lagos Recycle Initiative.

LAWMA requires the following, for implementation of the Lagos Recycle programme; 114 No. of 40-feet Portakabins for 2 collection centres in each of the 57 LGAs/LCDAs, 114 No. Bailers, one in each portakabin collection centre and 746 No. Cycle Bikes, two in each of the 373 wards in Lagos State.

VIII Government and Stakeholders' Interventions

Some activities by government and related organizations targeted towards reduction of plastics pollution in Nigeria include:

- FEC approved National Policy on Solid Waste Management on 15 July 2020;
- January 2020 National Policy on Plastic Waste Management approved by FEC on 21 October 2020;

- Lagos State government now has a Plastic Waste Management Policy 2021;
- LASEPA's 3-month in-house advocacy and awareness program in November 2019, ban placed on single-use nylons and plastic bags in LASEPA offices January 2020, now extends to the ban of PET bottles;
- LASEPA commissioned green projects, 6 Air Quality Monitoring Stations on 26 March 2021;
- LASG's Lagos Recycle Initiative;
- LASG provided over 7,000 branded uniforms for about 417 PSP operators in the state;
- LAWMA's Lagos Recycle proposal for 2 collection centres in each of 57 LGAs/LCDAs, bailer, 2 cycle bikes in each of 373 wards and use of PAKAM App;
- LAWMA's test-running of locally fabricated smokeless medical waste incinerator at Agege TLS on 17 March 2021;
- NESREA, registered operators (producers, PROs, recyclers, collectors) in the EPR programme;
- RMRDC developing cassaplastic, conversion of EPS waste to sensor device, PP waste to liquid fuel using ahoko kaolin, upgrading technology interlocking tiles production from plastic waste.

Interventions by concerned stakeholders include the following:

- FBRA NGO PRO involved in buy-back schemes, circular economy, advocacy, strategic plan 2021, waste collection hub in Lagos;
- TCCF supports 'Cash 4 Trash' Initiative by W.A.S.T.E Africa, inaugurated on 20 August 2020 in Nyanyan, FCT, 'Waste in the City' Initiative by SWEEP Foundation, African Clean-Up Initiative, etc.;
- 'Waste in the City' Initiative by SWEEP Foundation, funded by TCCF, unveiled 25 February 2021;
- FBRA involved in buy-back schemes, circular economy, advocacy, waste collection hub;
- BASF's Waste-2-Chemicals Nigeria Project for recycling of 1,300mt/year of plastic waste in Lagos, launched August 2019, to provide 15,000 jobs by 2025 - 60% of the jobs to women;
- BASF Waste-2-Chemicals Nigeria Project for recycling of 1,300mt/year of plastic waste in Lagos;
- Planet 3R converts waste 'pure water' nylon sachets into clothes, bags, shoes, etc.;
- Project ReflexNG inaugurated by DOW on 14 July 2020;
- RecyclePoints, Unilever, Fair Plastic Alliance engage thousands of workers, franchisees;
- Wecyclers franchisees make comfortable living by being engaged in plastic waste collection;
- 'NURTW NO-PLASTIC-WASTE DAY' on 21 August 2020;
- Youths participation in plastic reduction;

- Houses have been built in Nigeria using waste PET bottles, Engr. Yahaya Ahmed, used 14,800 plastic bottles to build a 3-bedroom house;
- Interlocking tiles produced from waste plastics stronger than conventional ones;
- Christmas Tree made from waste PET bottles; and
- Several recyclers/waste collectors, franchisees, waste pickers make money from waste plastics.

IX Plastics Value-Chain Survey

Plastic value chain players indicated from the survey carried out on the alternative to sustainable and innovative packaging materials that:

- They are enthusiastic about the project outcomes for necessary funding on plastic waste management programmes, particularly single-use plastics in the study areas;
- Majority of the plastic value-chain players have heard about bio plastics and want to know more about it, so as to know how well it can improve their business products;
- Respondents are aware of environmental impacts caused by plastics, particularly single-use plastics on the environment and are ready to cooperate with the authority that will be charged with the responsibility of reducing the usage of plastics;
- They have clear vision on protecting their businesses in line with global green economic practices;
- They want to be fully involved in all policy measures targeting plastic pollution but with no adverse economic returns;
- There is need for continuous education and awareness campaign for customers and consumers on the benefit of environmental friendly plastic products to our environment;
- Value chain players in the plastic industry are aware of the Extended Producer Responsibility (EPR) but afraid of the implications it will have on their businesses..

X Specific Findings

Some findings that are specific to each of the value-chain categories are:

- Plastic products in the value-chain in Nigeria include PET bottles/caps/lids, light weight plastic carrier bags, plastic bin bags, food containers, food packets, cups for beverage, straws, plastic chairs and tables, drums and waste bins;
- Product quality of recycled plastic is the major challenge discouraging its use for food contact;
- The cost of raw materials, availability of technology and lack of knowledge on production are the major challenges discouraging availability of alternative raw materials in Nigeria;
- Most retailers provide plastic bags for free, feasibility for charging of bag is generally negative;
- Majority of retailers perceive alternative bag to plastic to be feasible for provision to customers;

- Most retailers in FCT suggested bio-based material as against paper material put forward by most retailers in Lagos;
- Most waste collectors conduct manual sorting with possible mechanization requiring training of workers for better sorting knowledge;
- Bioplastic is not well known among single-use plastic value-chain companies;
- There is high level of interest in bioplastic and available options;
- Awareness raising and promotional activities are needed for PVC players;
- Most retailers do not sell products from recycled plastic nor consider selling alternative plastic products;
- There is a wide gap between retailer wares and consumer needs;
- Most of the plastics value-chain companies are aware of environmental impacts of plastic wastes;
- Policy measures considered to be effective in reducing usage of single-use plastics include laws and acts mandating the producers for waste recovery, ban of use and sales of certain SUP, etc.;
- Most companies in FCT and Lagos know about EPR;
- Most of the companies in FCT and Lagos can cope with EPR, if it becomes a regulation;
- Almost all companies in Lagos consider redesigning their products if EPR becomes a regulation, whereas, in FCT just above average of them are in the affirmative;
- There is need to circulate NESREA's EPR Guidance among all the plastic value-chain actors

XI Residents' Survey

It was gathered from the residents' survey carried out in the study areas (FCT and Lagos) that in Nigeria:

- Most residents in FCT and Lagos are ready to choose a more environmentally-friendly alternative to single-use plastics and are even willing to pay more for such products and services;
- Residents' level of education and awareness on impacts of the plastic wastes on the environment and campaign against inappropriate disposal of plastic wastes is impressive;
- Residents are now more concerned about their environment, so they ensure wastes are disposed in an environmentally sound manner;
- There is the need to improve on the waste management services at market places, waste sites with effective cleaning of sewage, gutter and drainage;
- Most residents do not know that marine plastic litter is a serious global environmental challenge;
- Residents strongly believe in the enactment of laws and acts mandating the responsibility of plastic waste management to a designated authority; and
- There is the need to implement and enforce policies developed for solid waste management and plastic waste management in Nigeria.

XII Measures to Reduce Plastic Litters in the Environment

Mitigation measures to be put in place to reduce plastic litters in our environment are as follows:

- Education and awareness campaign is required in Nigeria to sensitize the populace on the importance and hazards of plastics, particularly single-use plastics on the environment;
- Plastic recycling plants should be procured and installed at localities with large plastics particularly single-use plastics, to recycle already existing plastics waste;
- In order to establish plastic waste data bank in Nigeria, there is need for concerned authorities to ease access to data in their domain in future plastic waste or waste projects;
- Plastic production should be in line with the provisions of the National Plastic Waste Policy; and
- Workshops and capacity training programmes should be organized to improve and educate the plastic value-chain players on plastic value-chain management.

XIII Policy Recommendations

The following policy recommendations are presented for action by appropriate authorities:

- Awareness raising and promotional activities for adequate sensitization of the plastic value-chain players;
- Producers should be encouraged to bridge the gap between retailers and consumers in provision of alternatives to plastics;
- Authorities should institute adequate publicity and awareness programmes on plastics alternatives and environmental impacts of plastic wastes;
- All stakeholders must be involved in reducing plastic waste pollution;
- Most significant policy measures considered effective in reducing use of SUP include laws and acts mandating the producers for waste recovery and ban on use and sales of certain SUP;
- Government should make EPR a regulation after dealing with fears and concerns of the operators in redesigning their products;
- Gradual implementation of the national policy on plastics waste management;
- Provision of infrastructures for plastic waste management across the cities;
- Capacity building, training of personnel in current trends in waste management; and
- It is high-time Nigeria joined in the global fight of reducing plastic pollution with alternatives and environment-friendly technologies.

XIV Recommendations for Further Studies

Based on the findings of this study and as funds become available through budgetary allocations and interventions by multilateral agencies, we recommend:

- Inventory of all plastic value-chain players throughout Nigeria;

- Detailed inventory of activities and interventions by various stakeholders and youth organizations involved in plastic reduction in Nigeria;
- Plastic waste data bank should be carried out for Nigeria in future plastic waste or waste projects;
- Residents' survey should be extended to all the six geopolitical zones in the country.

XV Conclusion

Education and outreach programmes, strong laws and policies, governmental and private enforcement activities are the building blocks for a successful single-use plastics pollution prevention initiative in Nigeria. The stakeholders' validation meeting of 19 May 2021 has approved this report.

CHAPTER ONE

INTRODUCTION

1

INTRODUCTION

1.1 Solid and Plastic Waste Problems in Nigeria

1.1.1 Solid Waste

Nigeria has a population of about 201 million in 2019 (UN)¹ and produces large volume of solid waste, which is projected to increase along with the economic expansion. Waste generation is an integral part of human activity influenced by social dynamics and economic development. An increase in per capita income, consumption, urbanization and population in the last two decades, combined with a lack of sufficient waste management infrastructure has led to increase in waste generation and environmental pollution, posing one of the most pressing environmental challenges in the country.

Solid waste is generated as a result of industrial, commercial, mining and agricultural operations and from community activities. Majority of wastes are composed of organic matter, plastics, paper, textiles, metals, rubber and glass. It is estimated that a total of 45.7 Mt per year, or 0.79 kg/person/day, of municipal solid waste was generated in Nigeria as at year 2010² with then population of 158 million. The common waste management option in the country involves the collection of mixed waste materials, without segregating them, which are subsequently dumped at designated dumpsites. Less than 20% of solid waste generated is collected through a formal system³. Although the exact figures are difficult to be obtained in the absence of authorities' waste collection and disposal record keeping, the existing estimates suggest detrimental pressure to the environment.

¹ <https://data.un.org/>

² J.R. Jambeck et al., *Plastic waste inputs from land into the ocean*, Science vol 347, 13 Feb 2015

³ Federal Republic of Nigeria (2018), *National Policy on Solid Waste Management*

1.1.2 Plastic Waste

a) Negative Impact of Mismanaged Plastic Waste

Plastic waste, most of which are single-use plastic, is of a particular concern for its negative impact on environment and human health. Conventional plastic contains a large number of chemical additives which can be carcinogenic, endocrine disruptors or provoke other toxic reactions and can migrate into the environment. Toxic chemicals like persistent organic pollutants (POPs) used as pesticides, solvents, and industrial chemicals (e.g. DDT and PCB) can be attached to plastic fragments and enter the food chain via land and marine environment and accumulate in body tissue. Microplastics, which are small and fine particles that results from decades of photo degradation and mechanical abrasion of plastics, are ubiquitous and reach soils, sediments and freshwater, then finally to the marine environment and threaten ecosystems and human health through food chain.

As plastic requires hundreds of years to be fully decomposed and remains in the environment for a long time, poor waste management on land will aggravate the plastic marine pollution, which is one of major global environmental concerns. It is estimated that 80 percent of marine plastic is originated from land-based sources⁴.

The mismanaged solid and plastic wastes are also causing manmade natural disasters. The dumped wastes over canal or river bank clog up drainage/sewage systems, further increases flood risk and creates environmental and health problems. Nigeria, like many other countries, is increasingly suffering from annual flooding during the rainy seasons caused by increased precipitation linked to climate change. It is pointed out that Nigeria's flooding is mainly human induced, with poor urban planning practices and inadequate to non-existent environmental infrastructure exacerbating the incidence of flooding. The non-challant attitude of the people in throwing wastes all over any available space contributes to clogging of drainage patterns and waterways, another cause could also be due to lack of drainages. As there is little open soil that can be used for water storage nearly all the precipitation needs to be transported to surface water or the sewage system. The poor waste management system is one of the major factors⁵.

b) Mismanaged Plastic Wastes in Nigeria

Globally, plastics production has dramatically increased over the past 50 years, from 15 Mt in 1964 to 311 Mt in 2014. It is expected to increase further by two-fold over the next 20 years. The largest application of plastic is packaging, representing 26% of the total volume of plastic used, 95% of material value of which are lost to the economy after a first use. It is estimated that 40% of plastic packaging is landfilled and 32% leaks out of the collection system⁶. An estimate shows that 275 million metric tons of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million metric tons entering the ocean (Jambeck et al., 2015).

⁴ MacKinsey Center for Business and Environment (2015), *Stemming the Tide: Land-based strategies for a plastic-free ocean*

⁵ Adaku Jane Echendu (2020), The impact of flooding on Nigeria's sustainable development goals (SDGs), Ecosystem Health and Sustainability, <https://doi.org/10.1080/20964129.2020.1791735>

⁶ World Economic Forum (2016), *The New Plastic Economy*

Nigeria is ranked as the 9th top country out of 192 countries having coasts generating mass of mismanaged plastic waste by the population living within 50km of the coast, accounting to 0.85 million metric tons, or 2.7% of global mismanaged plastic waste (Jambeck et al., 2015). In Nigeria, it is estimated that plastic accounts for 13% of total solid waste. This means about 6 Mt of plastic waste was generated in 2010, the amount of mismanaged plastic wastes will be increased by the same magnitude or more if no effective countermeasures and actions are taken.

c) Sachet Water and Plastic Problems in Nigeria

Access to safe potable water is a fundamental human right and core to sustainable development. Globally, 2.2 billion people lack access to safely managed drinking water services (WHO/UNICEF 2019). In Nigeria, it is estimated that 63 million people do not have access to improved source of drinking water as of 2013⁷.

Given the inadequate public infrastructure to supply drinking water, the private sector started to produce plastic or nylon packed sachet water, popularly known as 'pure water', in the late 1990s and the business has grown as one of the leading industries in Nigeria. The sachet water has since diffused among the population as a source of potable drinking water, with 70% of Nigerians individually consuming an average of one bag of sachet water daily during the dry season.

While sachet water is an important source of potable water, it is estimated that about 50-60 million used water sachet are thrown into the streets of Nigeria on a daily basis⁸. Another estimate show that the total surface area of plastic wrappers discarded daily in Nigeria-nearly 1 million km², exceeds the area of the entire nation⁹. The environmental risks of sachet water disposal have become serious concerns for reasons such as drainage obstruction/blockage, water pollution and air pollution (from burnt plastic sachet – a common practice in Nigeria)¹⁰.

1.2 UNIDO Project

The United Nations Industrial Development Organization (UNIDO) supports African countries' challenges to deal with plastic waste leaking to the environment as a leading UN agency promoting circular economy and resource efficiency in industry.

With funding from the Government of Japan, UNIDO implements “Study on available sustainable alternative materials to plastics, and innovative packaging and recycling technologies that meet market needs in Africa to reduce plastics leakages to the environment (SAP190137)” in line with international efforts, in particular G20's “Osaka Blue Ocean Vision” which aims to reduce additional pollution by marine plastic litter to zero by 2050.

⁷ UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water, https://www.who.int/water_sanitation_health/monitoring/investments/nigeria-10-nov.pdf?ua=1

⁸ M.O. Edoga, et al (2008), Achieving Vision 20:2020 Through Waste Produce Candle, Journal of Engineering and Applied Sciences 3(8): 642-646, 2008

⁹ Justin Stoler, From curiosity to commodity: a review of evolution of sachet drinking water in West Africa: Sachet drinking water in West Africa, WIREs Water 2017, 31206. Doi: 10.1002/wat2.1206

¹⁰ Emeka W. Dumbili and Lesley Henderson (2020), The Challenge of Plastic Pollution in Nigeria, in Plastic Waste and Recycling-Environmental Impact, Social Issues, Prevention, and Solutions, Doi: 10.1016/B978-0-12-817880-5.00022-0

The project aims to equip stakeholders in target African countries with an overview of available technological options matching with local contexts and needs in order for them to take actions to reduce the amount of virgin plastic usage in packaging and single-use products.

The project is composed of two study streams that will merge into one at country levels on:

1. Identification of sustainable alternative materials to plastics, and innovative packaging and recycling technologies; and
2. Plastics value-chain in the target countries and their regulatory frameworks. The two studies are to be linked to each other to identify the gaps between needs and supplies as well as opportunities and challenges in target countries.

The target countries are Egypt, Nigeria, and Kenya.

1.3 The Study

1.3.1 Objectives of the Study

The overall objective of this study is “to provide stakeholder in Nigeria with an overview of available technological options matching with local contexts and needs so that they could take necessary actions to reduce the amount of virgin plastics usage in packaging and single-use products in the country”.

The specific objectives of this study is to “carry out local studies in Nigeria to collect information on current status of single-use plastics products' value-chain”. This is to take place through the following:

- Information gathering and analysis of “policy and regulatory framework on waste management systems and data relevant to plastic waste stream”.
- Provide detailed “sector overview/industry/market information of single-use plastics products including major stakeholders in the value-chain and their business data/ market size including products and technologies”.
- Conduct “survey of residents in FCT/FCC and Lagos on waste management, in particular plastic litter”.

1.3.2 Area of the Study

FCT and Lagos are the two target areas of study for this project.

a) FCT Abuja

Located in the centre of the country, Abuja is the capital city of Nigeria within the Federal Capital Territory (FCT), Abuja replaced Lagos as Capital of Nigeria in 1991. The Federal Capital City consists of six municipalities; Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje, Kwali and Abaji. The municipalities can further be subdivided into districts and areas. FCT has a land area of 7,753 km² (0.84% of Nigeria's total area) with 3,278,000 residents (1.6% of total population).

The waste in Abuja is managed by Abuja Environmental Protection Board (AEPB).

b) Lagos

Lagos State is located in South-West Nigeria and includes 20 local government areas (LGAs) and 37 local council development areas (LCDAs). Although it is the smallest State of the country with a land area of 3,577 km² (0.39 % of Nigeria), it is the most populous city with 14,368,332 residents (7.2 % of Nigeria). Lagos is the main commercial, financial and maritime nerve-centre of Nigeria with seaports at Apapa, Tin Can Island, Roro Terminal Ports and Ijora Container Terminal. As the economic capital and major port of Africa's most populous nation, Lagos has attracted immigrants from all over Nigeria and beyond, as well as commercial entrepreneurs and industries from Africa, Europe, Asia and the Americas. Today, Lagos is an emerging megacity and one of the fastest growing cities in the world.

The Lagos State Environmental Protection Agency (LASEPA) is responsible for safeguarding environmental quality of Lagos State, including function of monitoring and controlling disposal of solid, gaseous and liquid wastes generated in the State, amongst others. Lagos State Waste Management Authority (LAWMA) is responsible for the collection, transportation and disposal of municipal and industrial wastes.

1.3.3 Study Methodology

a) Information, Data Collection and Analysis

The study is conducted through extensive literature review from international and national sources and expert contribution, complemented by consultations with officials in charge of the respective issues and major stakeholders such as associations and companies in plastic value-chain.

b) Survey Conduct and Analysis

For Chapters Three and Four, two surveys were conducted. There were two study teams; one in FCT and the other in Lagos. KoBoCollect data collection system was used for instant administration and analysis of the data.

• Survey Questionnaire for Companies within Plastic Value-Chain

The survey covers companies in plastic value chain, including raw material producers, polymer producers, compounders, packaging/product producers, distributors, retailers/supermarkets/brand owners, waste collectors, and recyclers. The questionnaire is divided into different sections allocated for each value-chain role. If a company is performing two or more value-chain roles, all the relevant sections are answered.

Value-chain survey questions included elements such as:

- Information on production, business, and challenges;
- Awareness, attitude towards environment, alternative materials to plastic, policies including Extended Producer Responsibility (EPR);

- Gender-related questions included, where necessary.

The survey questionnaire was first provided electronically to the companies, then followed up by face-to-face interviews, virtual meetings and/or telephone interviews. The survey questions touch some elements which are not subject to public disclosure of information under Nigerian regulation (e.g. company capital, revenue, sales, production technologies), hence considered as highly sensitive. In order to secure a reasonable number of respondents, such questions are left unanswered if not wanted (otherwise companies will not participate in the survey).

The survey covered a total of 99 companies and the result is presented in Chapter Three.

- **Survey for Residents in Target Study Areas**

The field survey and interview was conducted for residents in Lagos and FCT Abuja. Field survey was carried out in accordance with national and international sampling and analytical protocols^{11,12}, at commercial complex, supermarkets, open markets, and streets with enumerator's assistance when necessity arose (e.g. the survey includes wide range of residents including illiterate). Interviews were conducted by visiting homes/places and in strict adherence to COVID-19 protocols.

There were a total of 4,019 respondents; 2,034 in FCT and 1,985 in Lagos. The survey result is presented in Chapter Four.

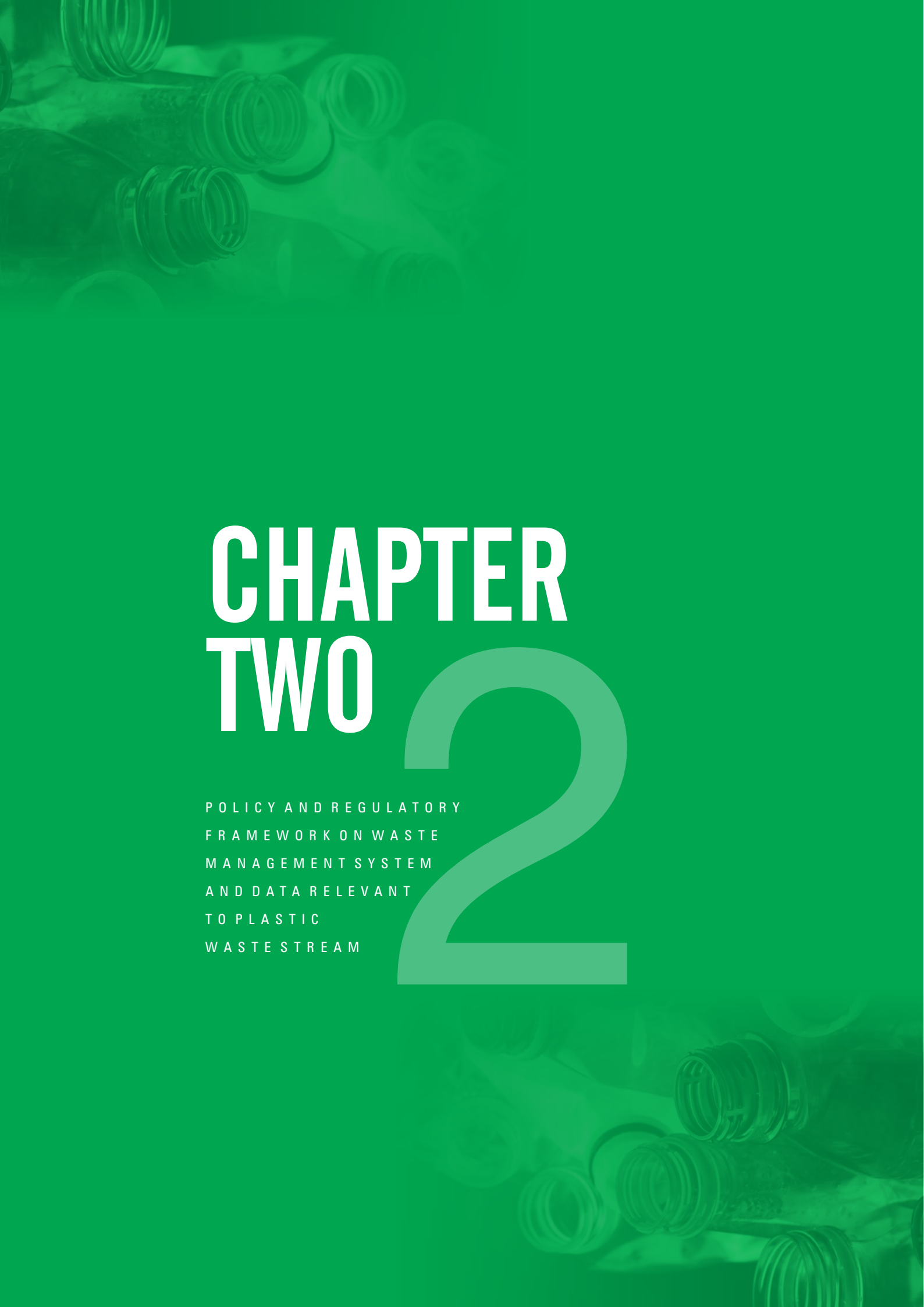
1.4 Structure of this Final Report

This final report is presented in six chapters:

- Chapter One: Introduction;
- Chapter Two: Policy and Regulatory Framework on Waste Management System;
- Chapter Three: Survey of Plastics Value-Chain Players;
- Chapter Four: Residents' Survey on Single-use Plastic Products in FCT and Lagos;
- Chapter Five: Interventions to Reduce Plastic Pollution in Nigeria; and
- Chapter Six: Conclusion and the Way Forward.

¹¹ OECD (2012), *Good Practices in Survey Design Step-by-Step*, in *Measuring Regulatory Performance: A Practitioner's Guide to Perception Surveys*, OECD Publishing, Paris

¹² World Health Organization (2005), *Quality assurance in surveys: standards, guidelines and procedures*, Chapter X of *Household Sample Surveys in Developing and Transition Countries* published by United Nations, ST/ESA/STAT/SER.F/96



CHAPTER TWO

POLICY AND REGULATORY
FRAMEWORK ON WASTE
MANAGEMENT SYSTEM
AND DATA RELEVANT
TO PLASTIC
WASTE STREAM

2

POLICY AND REGULATORY FRAMEWORK ON WASTE MANAGEMENT SYSTEM AND DATA RELEVANT TO PLASTIC WASTE STREAM

2.1. Existing Policies, Regulatory Framework and Enforcement System in Nigeria

2.1.1 Existing Policies, Laws and Regulations related to Solid Waste and Plastic Lifecycle Management in Nigeria

The constitution of Nigeria (1999), as the national legal order, recognizes in Section 20 the importance of protecting and improving the environment and safeguarding the water, air, land, forest and wild life of Nigeria. Pursuant to section 20 of the Constitution, the State is empowered to protect and improve the environment and safeguard the water, air, land, forest and wildlife of Nigeria.

The Federal Ministry of Environment administers and enforces environmental laws in Nigeria, while each State and local government may set up its own environmental protection body and empower them to make laws for the protection and improvement of the environment within the State/jurisdiction.

The summary of the existing relevant policies and regulations are listed in the list below:

Table 2.1: NATIONAL POLICIES

Policy	Year	Brief Description
National Policy on Environment	1989 Rev1999 Rev2016	<p>Policy Goal: to 'ensure environmental protection and the conservation of natural resources for sustainable development'.</p> <p>Strategic Objectives:</p> <ul style="list-style-type: none"> i) securing a quality of environment adequate for good health and wellbeing; ii) promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems; iii) promoting an understanding of the essential linkages between the environment, social and economic development issues; iv) encouraging individual and community participation in environmental improvement initiatives; v) raising public awareness and engendering a national culture of environmental preservation; and vi) building partnership among all stakeholders, including government at all levels, international institutions and governments, non-governmental agencies and communities on environmental matters. <p>Waste related: Chapter 5 concerns waste and environmental pollution, with subsections on (solid) waste, environmental pollution, and industry and environment. In Ch.5.3, it provides to ensure cleaner production and waste minimization through material recovery, reuse and recycling and prescribing strict adherence to the polluter-pay principle.</p> <p>Plastic related: Secure and enforce a legislative ban on plastic bags (Chapter 5.1 Policy Statements 7), Restrict and/or tax the use of polluting non-biodegradable consumer products including plastic shopping bags (Chapter 7.8 Policy Statement 12)</p>

Policy	Year	Brief Description
National Environmental Sanitation Policy	2005	<p>The policy seeks to simulate, promote and strengthen all government regulations concerned with housing and urban development, food security, water supply, sanitation related endemic diseases and illnesses, flood and erosion control, drought control, school health services and environmental education.</p> <p>The policy ensures sound environmental sanitation practices that promotes sustainable development, public health and good quality of life.</p> <p>The policy is intended to put Nigeria on the map of clean nations of the world, ensure good health and environment for its people, give major environmental responsibilities to state and local governments as major custodians, institute sanitary inspection of public places, check cattle rearing in urban centres</p> <p>Increase access to toilet facilities and increase school sanitation and programmes</p> <p>WASTE RELEVANT</p> <p>The policy focuses on sanitary inspection of premises, solid waste extraction, excreta and sewage management, market and abattoir sanitation, pest and vector control, school sanitation, food sanitation, adequate potable water supply</p> <p>PLASTIC RELEVANT</p> <p>Strategies include:</p> <ul style="list-style-type: none"> (i) Waste minimization at household/community levels through reduce, reuse, recycle and resource recovery. (ii) Promotion of appropriate technologies for recycling waste components like plastics, bottles, glass, metals, paper, organic matter, etc. (iii) Establishment of small-scale waste recycling plants at household/community levels (plastics inclusive, action party not listed but not LGA because of lack of capacity, Federal/State Governments could make provision in annual budgets in addition to grants from donor partners). (iv) Develop technical capacity of public and private organizations involved in solid waste management. (v) Conduct research to determine per capita waste generation database, amongst others

Policy	Year	Brief Description
National Policy on Chemical Management	2010	<p>The goal of the National Policy on Chemicals Management is to integrate the management of chemicals for the protection of human and animal health and the environment. The policy covers extensive international conventions and agreements that govern chemicals and waste management to which Nigeria is signatory. The agreements regulate production, handling, transportation, storage, use and disposal of chemicals and wastes, requiring extensive record keeping and a 'cradle to grave' tracking system from generation to disposal</p>
National Policy on Municipal and Agricultural Waste (MAW) Management Draft (National Policy)	2012	<p>The policy aims at providing framework for all aspects of MAW management process, namely; generation, sorting, storage, collection, transportation, resource recovery, treatment and final disposal with attendant minimization of the release of unintentional Persistent Organic Pollutants (UPOPs). It also provides a framework for development, coordination, management, supervision and regulation of the MAW sector.</p> <p>It will guide MAW managers, policy makers, enforcement authorities on best environmental practices for MAW management in Nigeria MAW policy will ensure development of a sustainable community which seeks a better quality of life for present and future generations by maintaining nature's ability to function over time.</p>
National Healthcare Waste Management Policy	2013	<p>The goal of the Policy is to create an enabling environment that contributes to effective and efficient healthcare waste management practices with minimal harmful environmental impact.</p> <p>The policy supports operational research and provides mechanism for effective coordination and mobilization of resources for sustainable implementation of best practices in healthcare waste management in all health care institutions in Nigeria</p> <p>Thematic items under the policy include:</p> <ul style="list-style-type: none"> • Safe healthcare waste management

Policy	Year	Brief Description
National Healthcare Waste Management Policy	2013	<ul style="list-style-type: none"> • Collection, storage, transportation, treatment and disposal of healthcare waste • Treatment and disposal options for healthcare waste • Protection of staff, patients, healthcare waste handlers and environment from risks associated with healthcare waste • Operational guidelines with institutional framework for policy implementation • Setting up of infection prevention and control committees with healthcare waste management committees as subsets in all healthcare facilities (HCFs) with national steering committee (NSC) under the Federal Ministry of Environment • Infrastructural and human capacities development • Resource mobilization through annual budgetary allocations, ecological funds office, donor agencies • Public-Private Partnership • Greenhouse Effect • Research • Monitoring and Evaluation • Legislation
National Policy on Solid Waste Management	2018	<p>The policy treats solid waste as a resource to promote economic growth and managed as to improve the quality of human and environmental health. The policy is aimed amongst others at:</p> <ul style="list-style-type: none"> • Promoting a clean and healthy environment for sustainable socioeconomic development of the nation; • Reducing and eventually eliminating heaps of solid waste and reduction in associated public health problems; • Development of waste management infrastructures; • Promoting private sector investments in SWM; • Promoting the Reuse, Reduce, Recycle and Recovery initiative; • Restoring and conserving natural resources; • Creating wealth and employment from waste management.

Policy	Year	Brief Description
National Policy on Solid Waste Management	2018	<p>The policy follows 13 principles, amongst others: Proximity principle and self-sufficiency; Polluter pays principle; Extended producer responsibility; The precautionary principle; Separation at source; Life cycle.</p> <p>Plastic relevant: 6.1.1 Categories for sorting should include glass, paper, plastics etc for reuse and promote technologies for recycling of waste components including plastic; 6.1.3 National Waste Management Resource Action Program, Producers' Responsibility for plastic, plastic as business opportunities in waste to wealth; ANNEX 3 Promotion of plastic recycling, especially PET bottles.</p>
National Policy on Plastic Waste Management	2020	<p>The overall goal of the policy is to promote sustainable use of plastic as a resource through its life cycle management. The policy introduces new measures such as the following:</p> <ul style="list-style-type: none"> • Bans single use plastic bags and styrofoam (Micron > 30 μ) and levy on thicker plastic bags and promote the use of alternatives to plastics (e.g. jute bags, leaves, paper, etc.) effective May 2020. • Ensure that all plastic packaging in the market are recyclable or biodegradable or compostable and reusable by 2025. • Sets national and state-wide targets for 65% recycling rate for municipal waste, 75% recycling of packaging waste, reduce landfill to maximum of 10% of municipal waste, 50% recycling of all plastic waste, and use of plastic bags per person reduced to 50% by 2030. • Requires mandatory EPR schemes most notably on all packaging items and introduces by law a nationwide bottle deposit requirement, a 5% deposit refund schemes for beverage containers; 5% charge on all single use grocery bag by 2021. • Alternatives are exempted from fines, no mention of bio-based plastics but biodegradables being exempted from fines <p>Presently, there has not been any pronouncement on the implementation but there are signals that it will soon receive priority attention, it was approved in October 2020</p>

Table 2.2: NATIONAL REGULATIONS

Policy	Year	Brief Description
Federal Environmental Protection Agency Act	1992	FEPA regulates the collection, treatment and disposal of solid and hazardous waste from municipal and industrial sources, and makes Environmental Impact Assessment (EIA) mandatory for any major development project likely to have adverse impact on the environment. FEPA Act has been repealed and replaced by National Environmental Standards and Regulations Enforcement Agency.
National Environmental Protection (Pollution Abatement in Industries and facilities generating wastes) Regulations S.1.9	1991	Prohibits industry or facility to release hazardous or toxic substances into the air, water or land of Nigeria's ecosystems and imposes to have a pollution monitoring unit within its premises and to control the pollution, further detailed chemical information should be submitted to the Federal Environmental protection Agency. Industry and facility wastes should be disposed of in an environmentally safe manner and none of them be disposed of in any municipal landfill.
The National Environmental Protection Management of solid and Hazardous Waste Management Regulations S.I.15	1991	Provides with respect to the handling and management of solid, dangerous, radioactive and hazardous waste. Defines the objectives of management of solid and hazardous waste, the functions of appropriate Governmental agencies and the obligations of industries. It also classifies waste and make provision for contingency plan and emergency procedure, ground water protection, ground water monitoring requirement.
Environmental Impact Assessment Act	1992	Sets out the procedures and methods to enable the prior consideration of environmental impact assessment on certain public and private projects. Gives specific powers to the Federal Environmental Protection Agency to facilitate environmental assessment on the projects. It consists of 64 sections divided into 3 parts: i) General principles of environmental impact assessment; ii) Environmental assessment of projects; iii) Miscellaneous.

Policy	Year	Brief Description
Harmful waste (Special Criminal Provisions) Act CAP HI LFN	2004	It is essentially a penal legislation and was enacted with the specific objective of prohibiting the carrying, depositing and dumping of hazardous wastes on any land, territorial waters, and matters relating thereto.
National Agency for Food and Drug Administration and Control Act No.15 of 1993 Cap NI LFN 2004	1993 2004	Mandates NAFDAC to regulate and control the manufacture, importation, exportation, distribution, advertisement, sale and use of food, drugs, cosmetics, chemicals, detergents, medical devices and packaged water (known as regulated products).
Import (Prohibition) Act CAP 13 LFN	2004	Prohibition of importation of certain goods including foodstuffs, polypropylene materials, nylon tyre, fabrics, plastic bags, fishing nets, plastic plates, knives, spoons, forks, cups, buckets, bowls, bins, containers, and hangers, corrugated boards and cartons, etc. Offenders are liable on conviction to imprisonment as stipulated in Section 2 of the Export (Prohibition) Act with goods, vehicle, vessel, aircraft used in importation and other assets forfeited to the Federal Government
National Environmental Standards and Regulations Enforcement Agency (NESREA) Act No. 25	2007	Establishes the National Environmental Standards and Regulations Enforcement Agency as a corporate body and provides rules relative to the protection of the environment in Nigeria. The Agency shall be responsible for the effective enforcement of standards, regulations and all national agreements and international agreements on environment to which Nigeria is a signatory.

Policy	Year	Brief Description
National Environmental (Sanitation and Wastes Control) Regulation S.I.28	2009	<p>The purpose is the adoption of sustainable and environmentally friendly practice in environmental sanitation and waste management to minimize pollution in Nigeria.</p> <p>Consists of seven parts: Part1 (provisions of application, object, purpose); Part 2 (environmental sanitation matters); Part 3 (provisions on the control of solid waste, effluent discharge and hazardous and health care wastes); Part 4 (institutional roles and responsibilities of the Federal, State and Local Governments); Part 5 (effective implementation of the regulations, promotion of stakeholder involvement); Part 6 (effective coordination of Agency's Strategic Alliance Programme on Environmental Sanitation and Waste Control); and Part 7 (key terms such as specific guidelines including waste water, hazardous wastes and others).</p> <p>Plastics related: Section 13(1) Every household or dwelling unit shall have safe and adequate waste collection bins for storage of domestic wastes; Section 13(2) All vehicle owners shall provide appropriate litter for the use of occupants or passengers; Section 13(3) Relevant authorities shall provide appropriate and adequate litter bins in public places; Section 13(4) A person in care, management or control of any commercial business premises or construction sites shall: a) provide adequate litter bins and receptacles for recyclable materials in appropriate and easily accessible locations; b) service and maintain the receptacles regularly, keep the premises and all public or private lands, streets, lanes, walkways, beaches or docks within 5 meters of the boundary of the property free from litter at all times; c) ensure that wastes are collected and disposed of; and d) ensure that all recyclable materials are neatly packaged and stacked before disposal; Section 13(5) A custodian of a venue or person</p>

Policy	Year	Brief Description
<p>National Environmental (Sanitation and Wastes Control) Regulation S.I.28</p>	<p>2009</p>	<p>who organizes a public, private recreational or religious event shall: a) provide adequate number of waste receptacles in appropriate and easily accessible locations to prevent littering; b) ensure that such wastes are appropriately segregated; c) service, maintain and empty the waste receptacles as required; and d) ensure that the venue where an event takes place and all public or private lands, streets, lanes, passageways, beaches or docks within at least 15 meters of the boundary of the venue or property are free from all litter within 24 hours after the conclusion of the event;</p> <p>Section 18(1)The use of the following specification of plastic bags is banned in the country: a) the manufacture, trade and commercial distribution of plastic bags, made of plastic film, with a wall thickness of less than 80 micrometers; b) notwithstanding paragraph (a) of this regulation, bread bags, made of plastic films, with a wall thickness of between 25 and 80 micrometers may be manufactured, traded and commercially distributed for use within the country and, unless otherwise required by law, have printings or marks of any kind;</p> <p>Section 66(c) In order to ensure effective implementation of Regulations and promote stakeholder involvement in environmental sanitation, the following Plastic film Phase-out Programme shall be implemented by governments in collaboration with the public and the private sector among other Programme including waste minimization, Extended Producers Responsibility, etc.</p>

Policy	Year	Brief Description
National Environmental (Food, Beverages and Tobacco Sector) Regulations, S. I. No. 33	2009	<p>The purpose of the regulation is to prevent and minimize pollution from all operations and ancillary activities of relevant companies to the Nigerian environment.</p> <p>It is divided into nine parts and thirteen schedules;</p> <p>Part1 (environmental governance, planning, emergency response plan, installation of anti-pollution equipment, polluter pays principle, best practices, pollution control organizational system, buy back or extended products stewardship programme, chemical usage, banned or restricted chemicals, permit, management of oil station and fuel dumps site, equity, community relations, effluent limitation standard, restriction on the release of toxic effluent, treatment of effluent, sludge disposal standards and abatement, hearing conservation program and noise monitoring);</p> <p>Part2 (sampling procedures);</p> <p>Parts3-9 (procedures for licensing and permit, industrial affluent or air emission monitoring and reporting requirements; duty of the Agency to ensure compliance with conditions or enforce the regulations, nature and scope of offences and penalty, incentives, interpretation and citation)</p> <p>Plastic related: Section 6 (3) All recyclable, damaged and disused packaging materials such as glass, plastics, metals, paper, wood, nylon, etc., shall be recycled.</p>
National Environmental (Chemicals, Pharmaceuticals, Soap and Detergent Manufacturing Industries) Regulations, S. I. No. 36 of 2009	2009	<p>The purpose of the Regulations is to prevent and minimize pollution from all operation and ancillary activities from the sector in the Nigerian environment.</p> <p>It is divided into nine parts with structure similar to the Regulations on Food, Beverage and Tobacco Sector.</p> <p>Plastic relevant: Section 6 (3) All recyclable, damaged and disused packaging materials such as glass, plastics, metals, paper, wood, nylon, etc., shall be recycled.</p>

Policy	Year	Brief Description
National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, S. I. No. 17	2011	<p>The principal goal is to prevent and minimize pollution from all operations and ancillary activities of domestic and Industrial Plastic, Rubber and Foam Sector to the Nigerian environment. The regulations also require every facility or corporation to prepare a voluntary action programme for global warming control measures and such measures shall take into account energy- saving and best available technology in their production processes.</p> <p>Plastic relevant: Section 6(2) The collection, treatment, transportation and final disposal of wastes shall be the responsibility of the facility generating the wastes within the specified standards and guidelines. Section 7(3) All recyclables, demand and disused packaging materials (e.g. glass, plastics, metals, paper, wood, nylon, etc.) shall be recycled. 7(4) Where applicable, the 5Rs namely – Reduce, Repair, Re-use, Recycle and Recover shall be encouraged. Schedule VII (Pollution Prevention and Control Techniques) *Scraps from thermoplastic polymers should be reground and mixed with virgin materials</p>
National Environmental (Construction Sector) Regulations, S. I. No. 19	2011	<p>The objective or purpose of preventing or minimizing pollution from 'Construction, Decommissioning and Demolition Activities' to the Nigerian environment.</p> <p>Plastic relevant: Section 6(1) The operator/facility shall submit a Site Waste Management Plan (SWMP) to the Agency for all new construction projects that will require mandatory Environmental Impact Assessment (EIA) or such projects that may generate significant waste. Section 6(2) A SWAMP shall contain: a) types of waste to be generated on site; b) identity of the waste manager/contractor and the registration number; c) waste destination; and d) environmental permit held for the site where the waste is to be managed.</p>

Policy	Year	Brief Description
National Environmental (Electrical/Electronic Sector) Regulations, S. I. No 23	2011	<p>Regulations to prevent and minimize pollution from all operations and ancillary activities of the Electrical/Electronic sector of the Nigerian environment. They cover both new and used Electrical/Electronic equipment (EEE/UEEE).</p> <p>Plastic relevant: Section 8(4) All damaged and disused equipment including wires, Cathode Ray Tubes (CRTs), metals, motors, transformers, plastics etc, shall be amenable for recovery under Extended Producer Responsibility Program by NESREA accredited Recyclers in an environmentally sound manner; Section 8(5) All waste from Electrical Electronic product assembly or manufacturing with hazardous properties shall be clearly labeled and stored separately from the general waste and contained in storage areas that are chemically resistant before disposal in an environmentally sound manner.</p>
National Environmental (Base Metal, Iron and Steel Manufacturing/Recycling Industries Sector) Regulations	2011	<p>Regulations to prevent and minimize pollution from all operations and ancillary activities of the sector in the Nigerian environment. They also provide for polluter-pay principle, where there is pollution in the course of operation of any facility.</p> <p>Plastic relevant: Section 11(1a) Every facility, corporation or organization shall have Pollution prevention and control measures and shall further include: a) Separating metal dust or scrap by type to promote recovery and recycling. Schedule V (Global Warming and the Steel Industry's Voluntary Action Programme) b) reduce its energy consumption by establishing an effective logistics system through utilizing waste plastics in blast furnaces.</p>

Table 2.3: REGULATIONS IN FCT

Policy	Year	Brief Description
National Environmental (Control of Bush/Forest Fire and Open Burning) Regulations, S. I. No. 15	2011	Prevention and minimization of destruction of ecosystem through fire outbreak and burning of any material that may affect the health of the ecosystem through the emission of hazardous air pollutants. Applies to person/corporate body engaging in bush/forest/open burning of plastics, rubber products, tyres, amongst others
Abuja Environmental Protection Board (Solid Waste Control/Environmental Monitoring) Regulations	2005	<p>The organization responsible for waste management and sanitation in Abuja Metropolis (AMAC) is Abuja Environmental Protection Board (AEPB)</p> <p>Decree No. 10 of 1997, the Abuja Environmental Protection Board Act, 1997 formally established the Abuja Environmental Protection Board and it functions with the aim of achieving sustainable development in the FCT, securing a quality of environment adequate for the health and well-being of residents</p> <p>AEPB principally governs solid waste control in Abuja, directly provides SWM services in sweeping, collection, and final disposal, as well as collection of waste including healthcare waste from communal collection centres.</p> <p>Some SWM operations are contracted out to private sector companies for sweeping of city centre, public areas and residential areas, collection service, final disposal and recycling including litter and vegetation control services.</p> <p>AEPB is responsible for developing the strategic solid waste management plan 2011-2015 and 2017-2021 and is also proposing a solid waste management road map</p>

Policy	Year	Brief Description
Abuja Waste Management Regulations	2012	<p>Regulation on gazette fees/charges for waste management services payable by all residents</p> <p>AEPB responsibilities:</p> <ul style="list-style-type: none"> • Remove, transport and dispose of domestic, commercial and industrial waste • Clear and maintain public drainage facilities, street cleaning and clearing of abandoned vehicles • Register private waste collection companies • Prepare and periodically up-date the master plan of waste collection and disposal in the city • Approve and monitor all disposal systems in the city • Assess recycling as a waste management option for industries and government agencies • Establish and recommend the basic standard requirements for solid, liquid, gaseous or toxic waste management • Establish and recommend acceptable safe methods of collection and disposal of hazardous and toxic waste products in the FCT • Educate the general public on the various disposal methods acceptable for domestic and industrial waste products • Initiate environmental protection legislation and keep existing legislations under constant review to reflect the latest discoveries and observations on waste • Organize and mobilize the public to participate actively in regular clean-up exercises and beautification of their environments.

Table 2.4: REGULATIONS IN LAGOS STATE

Policy	Year	Brief Description
Lagos State Environmental Protection Agency Law	2017	Establishes the Lagos State Environmental Protection Agency (LASEPA). LASEPA advises Lagos State on all environmental management policies. Enlighten public on sound environmental sanitation and management. Monitor and control all forms of environmental degradation from agricultural, Industrial and government operations. Cooperate with Federal, State and Local Governments, statutory bodies and research agencies on environmental protection matters and facilities
Lagos State Environmental Pollution Control Law	2007	Provides control of pollution and protection of the environment from abuse due to poor waste management. The Law requires the Ministry of Environment to educate the general public on the types of disposal methods acceptable by the State Government for domestic and Industrial wastes
Lagos State Plastic Waste Management policy	2021	The main goals are to: Achieve sustainable plastic waste management in Lagos State that will protect public health; Develop sustainable legislative instruments, administrative, trade measures and systems that will support plastic waste management while boosting economic growth; Ensure that all plastic packaging in Lagos will be recyclable and reusable by a targeted year 2030; Support efforts to reduce our dependence on single-use plastics; Incorporate informal sector into the plastic waste management approach; Delineate roles and responsibilities of the public sector, the private sector, and individuals in plastic waste management and aim at harnessing the capacities of all to achieve best practices; Target to achieve approximately 50% plastic waste recovery by 2035 and 70% by 2050 and establish realistic timeline for zero plastic pollution; Encourage companies and individuals to embrace alternatives to plastics; Encourage participatory approach that involves all stakeholders, including communities CBOs, NGOs and relevant MDAs at State and LG levels; and Establish compliance (monitoring, evaluation and enforcement) measures to ensure attainment of set goals and objectives.

2.1.2 Policy and Legislative Framework for Solid Waste Management

The framework for solid waste management is provided in the National Policy on Solid Waste Management adopted in 2018 and approved by the Federal Government in July 2020.

The policy and legislative framework for solid waste management encompasses the executive, legislative and judiciary at the Federal, State and Local Governments level and down to communities' structure.

The Senate Committee on the Environment and Ecology and the House Committee on the Environment have the legislative power at Federal level and are institutionally responsible for legislating and making laws, guiding effective and sustainable waste management practices as well as plastic lifecycle management in Nigeria.

The State and Local Government legislatures have the right to introduce more stringent legislations in their areas of jurisdiction, but the standards must not be lower than that stipulated at the Federal level. They have the right to determine solid waste management taxes and fees to enforce Waste Management activities.

The judiciary system is responsible for the interpretation of principles, protocols, rules and legislations, and the trial of SMW legislations defaulters, while the Federal Ministry of Environment is responsible for the articulation of policy regulations and national guidelines on solid waste management and plastic lifecycle management.

Multilateral Waste Management Agreements

Nigeria is a signatory of international conventions, protocols and agreements, together with amendments, including:

- ILO Convention No. 170 concerning safety in the use of chemicals at work;
- Vienna Convention on Substances that Deplete the Ozone Layer;
- Montreal Protocol on Substances that Deplete the Ozone Layer;
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal;
- Stockholm Convention on Persistent Organic Pollutants;
- Minamata Convention on Mercury;
- Johannesburg Plan of Implementation;
- International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978;
- International Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matters;
- Agenda 21 Chapter 19 of Rio Declaration on Environment and Development by United Nations Convention on Environment and Development; and
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The ILO Convention No. 170 concerning safety in the use of chemicals at work, moving from a single chemical to all chemicals affecting workers.

The Montreal Protocol on Substances that Deplete the Ozone Layer, which addresses a class of substances rather than individual substances.

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which provides for prior notification of exports and imports of toxic and hazardous chemicals in global trade.

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal, which addresses environmentally sound management of chemical wastes and waste streams that involve thousands of chemicals and considers life-cycle management of substances as they pertain to prevention, minimization and environmentally sound management of wastes.

Recent amendments adopted by the 188 Parties to the Basel Convention, as of January 1, 2021 require that mixtures of plastic waste, consisting of polyethylene (PE), polypropylene (PP) and/or polyethylene terephthalate (PET), are banned from export except they are destined for separate recycling of each material and in an environmentally sound manner and almost free from contamination and other types of wastes.

The Stockholm Convention on Persistent Organic Pollutants, which emphasizes life-cycle management for listed persistent organic pollutants.

The Minamata Convention is for prevention of emissions and releases of mercury, aims at controls and reductions in a range of products, processes and industries where mercury is used, released or emitted and also requires governments to devise national plans to reduce the use of mercury in artisanal and small-scale gold mining operations.

The 2002 Johannesburg Plan of Implementation of the WSSD renewed the comprehensive commitment to the sound management of chemicals throughout their life cycle and of hazardous wastes for sustainable development and for the protection of human health and the environment.

2.1.3 Institutional Framework for Plastic Waste Management

The framework for plastic waste management in Nigeria is provided in the National Policy on Plastic Waste Management. It was established in January 2020 and adopted by the Federal Government in October 2020.

The policy goals of the approved National Policy on Plastic Waste Management are to:

- Limit the impact of littering of single-use plastic packaging product and waste materials;
- Reduce plastic waste generation by 50% of its baseline figure of 2020 by year 2025;

- Phase out single-use plastic bags and Styrofoam, effective December 2028;
- Ban plastic bags, cutlery, styrofoam and straws, effective January 2025;
- Transform all plastic products, packaging materials and its waste to resource materials;
- Ensure that all plastic packaging in the market meet at least two criterion of being recyclable or biodegradable or compostable or reusable by 2030;
- Promote sustainable use of alternatives to single use plastics including jute bags, leaves, paper, glass bottles, etc. from May 2020; and
- Generate a database on plastics, amongst others.

The policy has shown political will and commitment to address the inaction of past years with a strong determination to beat plastic pollution, if followed to the letter.

The regulatory institutional framework for achieving coordination on the overall goals and primary objectives for plastic Waste management stems inter alia from the Constitution of the Federal Republic of Nigeria, National Policy on Environment, National Environmental Sanitation Policy and the National Policy on Solid Waste Management as well as other relevant establishment laws of the Federation. The framework is effectuated at the national level and cascaded down to all other levels of governance.

The institutional framework for Plastic Waste Management in Nigeria is as follows:

- Federal Level Institutions: Federal Government of Nigeria (Executive and Legislative), Federal Ministry of Environment (lead agency overseeing implementation of National Policy on Plastic Waste Management), Relevant Stakeholder Ministries, Departments and Agencies (MDAs);
- State Level Institutions: State Government, State Ministries of Environment, State Waste Management Authorities, State Environmental Protection Agencies/Boards, Stakeholder MDAs' at States level;
- Local Government Institutions: L.G Authority, Environmental Health Departments in LGAs;
- Community Level Institutions: Town Unions, Rulership institutions, Age Grades;
- Private Sector Participants: Manufacturer Association of Nigeria, Organized Private Trade Sector (OPTS), Service Industries Groups, Construction sector groups, Waste Management firms, Waste "Scavengers", Transportation companies, all Waste Generators (Industries, Manufacturers, Hotels, Educational institutions, etc.);
- Civil Society Organizations: CBOs/NGOs/ Faith based organizations;
- International Organizations/Donor Agencies;
- All Waste Generators Including Households;
- Public and Private Places

Legislative Framework

The Federal government of Nigeria is responsible and charged with establishing institutional and legal frameworks for waste management taking cognizance of applicable environmental management principles. The legislative framework for plastic

waste management in Nigeria consists of the executive, legislative and judiciary at all levels of governance.

Executive

The Federal Government of Nigeria through the FMEEnv is charged with establishing institutional frameworks for waste management (plastic waste inclusive), by empowering organizations at all levels (Federal, State and LG) of governance with the necessary authority, powers and capabilities for effective and sustainable waste management. The executive has the overarching responsibility for ensuring effective waste management sector performance and coordination. They also provide a platform for liaisons among the FMEEnv and the Executive, Waste management stakeholders and the legislative institutions.

Legislature

The Federal legislature consists of The Senate Committee on the Environment and Ecology; and, The House Committee on the Environment that is responsible for the policy and regulatory matters on waste management (plastic waste inclusive) and environment in general. These committees play a vital role at the Federal level.

State and LG Legislature

The State and L.G legislatures at their different levels of governance have the right to introduce more complementary legislations in their areas of jurisdiction while ensuring there are standards that must not be lower than that stipulated at the Federal level. The legislative discretion is required to ensure the burden of Waste taxes is not too high as to become a dis-incentive to effective and sustainable plastic waste management.

The Judiciary

The judiciary system interprets the principles, protocols, rules and legislations and trial of waste management defaulters in relation to the management of plastic through its lifecycle. The Judiciary has jurisdiction and power over all Plastic waste matters taking cognizance of its lifecycle as specified under any environmental protection law, regulations or sanitation and waste management laws of the country (Federal, State and Local Government levels)

2.2 Waste Management Structure at Federal and Local Levels of Governance

2.2.1 Introduction

Nigeria is a federation of 36 states and one Federal Capital Territory (FCT), which are divided into 774 Local Government Areas (LGAs) in total and has a three-tiered government structure: Federal Government, State Governments and Local Governments. Each entity has different roles and responsibilities:

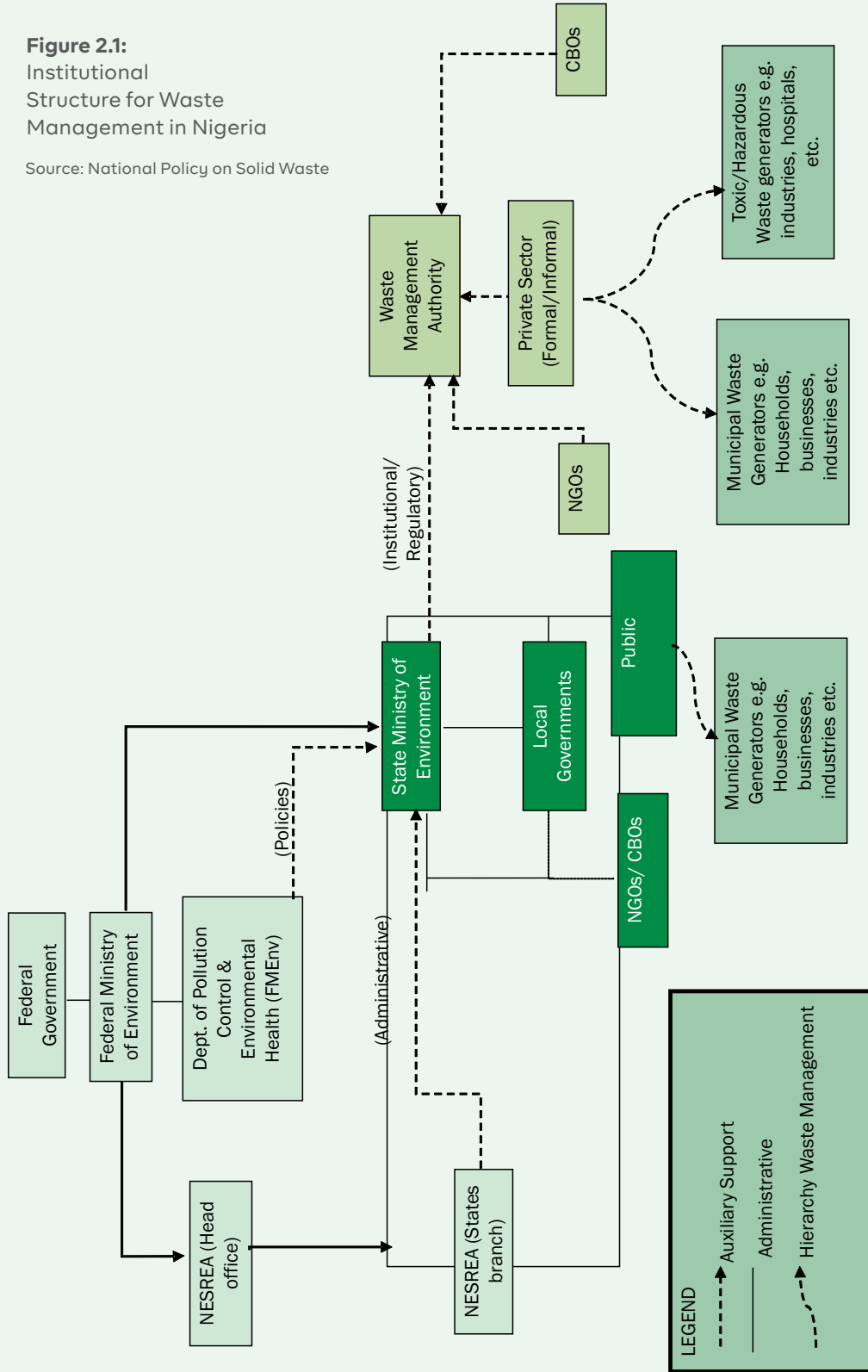
- The Federal Government of Nigeria: through the FMEEnv, is responsible for establishing institutional and legal frameworks for solid waste management and plastic lifecycle management.

- The Federal Ministry of Environment (FMEnv): provides overarching guidance including policies, legal and regulatory framework for waste management, national guidelines and plans, etc.
- The State Ministries of Environment: provide overarching guidance including policies, legal and regulatory framework for waste management, state guidelines and plans, etc.
- The Local Government Authorities: in charge of direct responsibility for the management of refuse within their domains.

The institutional structure for waste management in Nigeria is illustrated in Figure 2.1.

Figure 2.1:
Institutional
Structure for Waste
Management in Nigeria

Source: National Policy on Solid Waste



2.2.2 Organization of Waste Management at National Level

Federal Government

In 1988, the Federal Government of Nigeria took steps to safeguard the environment by establishing the Federal Environmental Protection Agency (FEPA) Act; thereby making Nigeria the first African country to establish a national institutional framework for environmental protection. However, FEPA was unable to enforce its own regulations and was merged with other relevant ministries' departments to form the Federal Ministry of Environment in 1999. To address the need for effective enforcement of environmental laws and regulations, the Federal Government of Nigeria in 2007 repealed the FEPA Act and created the National Environmental Standards and Regulations Enforcement Agency (NESREA) as a parastatal organization under the Federal Ministry of Environment.

Federal Ministry of Environment (FMEnv)

The FMEnv being the apex organization responsible for the articulation of policy regulations and guidelines for general waste management in Nigeria, was established to ensure environmental protection, natural resources conservation and sustainable development. Its mandates are to secure a quality environment conducive for good health and well-being of flora and fauna; promoting sustainable use of natural resources; restoring and maintaining the ecosystem, ecological process and preserve biodiversity; raising public awareness and promoting understanding of linkages of the environment; cooperating with relevant MDAs, the private sector, NGOs, and international organizations on environmental matters.

The Federal Ministry of Environment (FMEnv) is responsible for:

- Formulation of environmental laws, policies, and regulations;
- In charge of environmental assessment of trans-boundary projects;
- Relate and liaise with State environmental protection agencies for the implementation of environmental laws and regulations;
- Responsible for all ecological controls in Nigeria;
- Responsible for all international donor coordination in Nigeria;
- Responsible for the development of the SWM infrastructure in Nigeria.

Organizational chart for the Federal Ministry of Environment operations is presented in Figure 2.2.



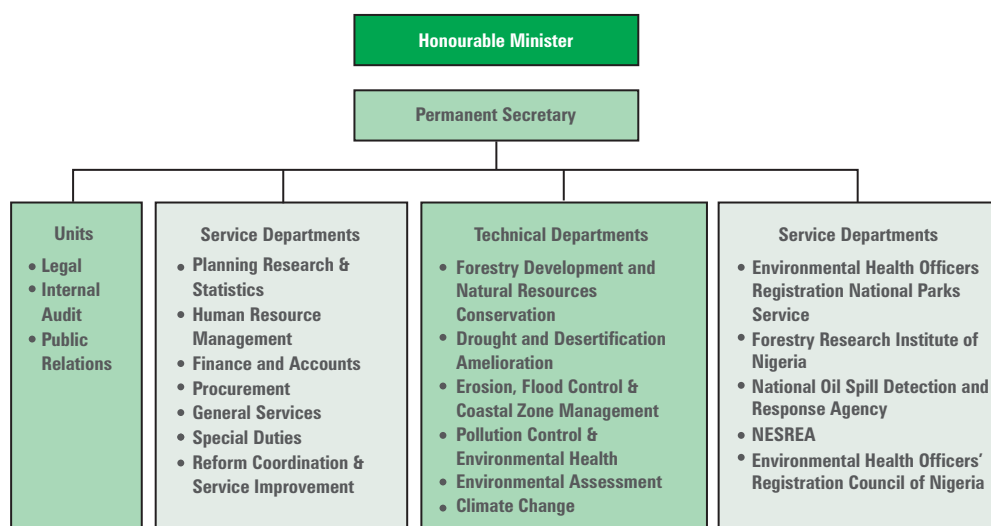


Figure 2.2: Organizational Chart for Federal Ministry of Environment

National Environmental Standards and Regulations Enforcement Agency (NESREA)

National Environmental Standards and Regulations Enforcement Agency (NESREA), is a parastatal of the FMEnv established by NESREA Act 2007 and is the enforcement arm of FMEnv. NESREA is responsible for all pollution control standards and the enforcement of environmental standards, including SWM legislation, standards, and policies

Specific roles of FMEnv regarding solid management in Nigeria include:

- Study the most reliable systems that are appropriate for local, domestic and industrial wastes;
- Specify waste disposal and treatment methods that take into consideration the geological and environmental setting and encourage recycling;
- Specify waste disposal sites that guarantee the safety of surface and underground water systems;
- Set up and enforce standards for adequate sanitary facilities for the disposal of human and other solid wastes in dwellings, housing estates and public facilities in both urban and rural areas;
- Establish monitoring programs including periodic surveillance of approved waste disposal sites and their surroundings and waste water systems;
- Establish monitoring stations for the control of the disposal of leachate from landfills into surface and groundwater systems;

Committees established under Policy on Solid Waste Management & Plastic Waste Management

Two committees were established for National Policy on Plastic Lifecycle Management:

National Steering Committee on Plastic Lifecycle Management (NSCPLM)

The Committee is to promote and coordinate a coherent, coordinated, continuous and cost-efficient approach to plastic lifecycle management and a plastic economy hinged on circular approach. It provides advices to the Federal Government on action plans, programmes, and policy implementation as well as capacity building needs and development of institutional and human capacity requirements. The Committee consists of representatives from Federal Ministries of Agriculture and Rural Development, Commerce and Industry, Environment, Health and Labour, the State Ministry of Environment from each geopolitical zone, manufacturers association of Nigeria, academia, research institutions, professional bodies and civil society.

The Technical Coordinating Committee (TCC)

The TCC advises the National Steering Committee on plastic lifecycle management and on all technical matters relating to environmentally sound management of waste. The TCC is made up of representative from participating agencies and organizations. The Committee is co-chaired by the Directors in charge of plastic lifecycle management in the Federal Ministries of Environment and Health.

2.2.3 Organization of Waste Management at State and Local Levels

In order to complement the efforts at the Federal level, environmental protection commissions were established for each state of the federation, the tasks and responsibilities concerning solid waste management are to:

- Advise the State Government on policies and priorities;
- Formulate and enforce policies, statutory environmental rules and regulations on waste collection and disposal;
- Render advisory services and support to all Local Governments;
- Prepare master plans on solid waste collection and disposal;
- Monitor discharges and the environmental impact of these discharges;
- Enforce applicable laws on activities related to the environment; and
- Establish environmental criteria, guidelines, specifications or standards for environmental protection.

State Governments

The State Government is charged with the management of waste in their jurisdiction by establishing Ministries of Environment, environmental protection and special purpose technical agencies amongst others. The State Government through the State Ministry of environment prepares and provides waste management plans and infrastructure for the State. The State Government in her environmental and waste management programme encourages participation of private sector in Plastic Waste management and also encourages social inclusion (public awareness, recycling and other related services)

State Ministries of Environment

The State Ministries of Environment make bye-laws to regulate activities taking place within its territory, aimed at maintaining health, well-being and safety of its inhabitants;

environmental protection and pollution prevention, improved aesthetic value of the natural environment and preventing nuisances, including indiscriminate disposal of plastic waste. The State Ministries of environment ensure development of proper sorting at source and segregation of different constituents of the waste stream and thus encourage recovery, re-use and recycling activities. They also provide technical support to the Local Government areas through training and manpower development programmes for capacity building and institutional strengthening.

2.2.4 Federal Capital Territory (FCT)

Improper disposal of waste has become an environmental and health hazard in areas around the suburbs of Abuja, the Federal Capital of Nigeria. Abuja like other cities in Nigeria generates enormous municipal solid waste, which is not adequately managed. Municipal solid waste management has therefore emerged as one of the greatest challenges facing environmental agencies in the city. Solid waste management is simply reduced to waste transfer with overflowing dumpsites causing serious environmental pollution. Waste management practices are characterized by inefficient collection and poor disposal methods.

Inadequate finances, lack of institutional arrangement, insufficient information on the quantity and quality of waste as well as inappropriate technologies are the main constraints militating against effective solid waste management in Abuja. To maintain a clean municipal environment in Abuja, urban waste must be effectively managed through appropriate reduction, reuse and or recycle practices. Waste management generally involves the collection, transfer, treatment, recycling, resources recovery and disposal of waste in any location. The goals of integrated waste management are, to promote a quality environment, generate employment, and thus, support the efficiency and productivity of the economy.

The Abuja Environmental Protection Board (AEPB) is responsible for solid waste management in the FCT.

The organizational structure of the Federal Capital Territory is shown in Figure 2.3, while that relating to waste management in the FCT is presented in Figure 2.4.



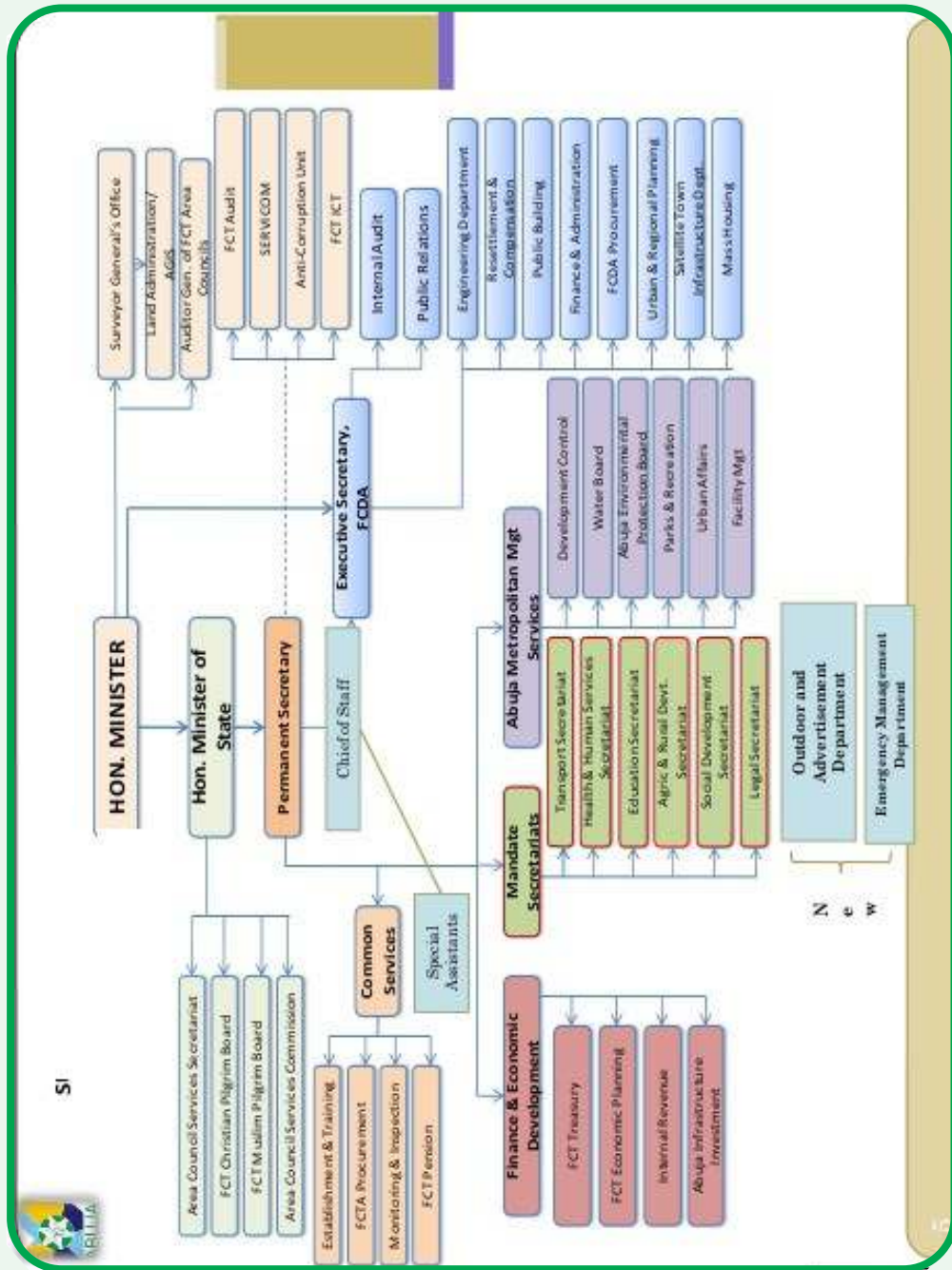


Figure 2.3: Organization Structure of the Federal Capital Territory

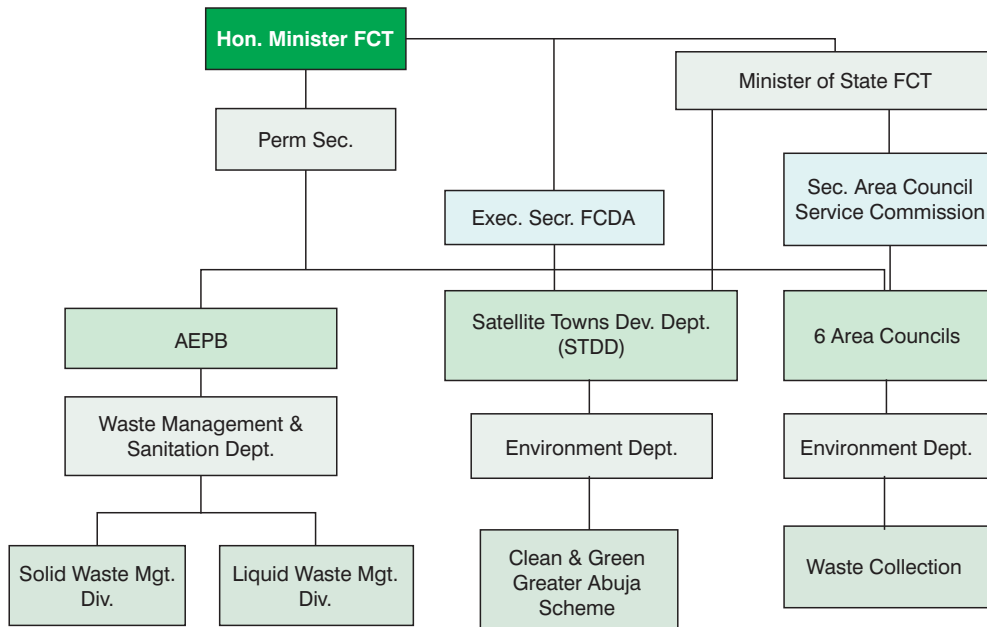


Figure 2.4: Organizational Structure related to Waste management in FCT

2.2.5 Lagos

The Lagos State Refuse Disposal Board (LSRDB) was instituted under Edict No.9 of 1977, which was the first of its kind in West Africa. The Board was given the responsibilities of environmental sanitation and domestic refuse collection and disposal in Lagos State. The Board was renamed the Lagos State Waste Management Authority via the enactment of a new Law–Edict No.55 of 1991, which conferred on the authority, additional responsibilities for the collection and disposal of municipal and industrial wastes as well as provision of commercial waste services to the State and Local Governments of Lagos State. The Board metamorphosed over the years into the agency known today as the Lagos Waste Management Authority (LAWMA) by virtue of the LAWMA Law 2007, and accrued added responsibilities ranging from management of commercial, industrial and medical waste streams, highway sanitation, cleaning of drainages and other water bodies, to construction and demolition waste management, among others. LAWMA works closely with the Lagos State Ministry of Environment and has initiated reforms regarding collection of waste bills and also aims to increase waste recycling.

The bulk of the solid waste generated in Lagos is the municipal solid waste from residential and commercial locations in the state. The first major attempt at resource recovery from solid waste in Lagos was initiated in 1981. The government built 5 incinerating plants around the state. The target was to build one incinerating plant in each local government area. The program never took off due to lack of logistic analysis and the unwillingness, mostly on the part of the municipal authorities to deviate from the existing processes.

The Lagos Waste Management Authority is a Lagos State Government body responsible for managing wastes generated in Lagos state through a waste collection, transportation and disposal structure. The target of LAWMA is to improve unprecedented waste management services and bring about cleaner and aesthetic environment indicated by clean environment, free flow of drainage water, reduced incidences of flooding, enhanced free flow of vehicular movement, reduced cart pushing activities and indiscriminate dumping. LAWMA seeks to attract foreign direct investment in construction of additional transfer loading stations and solve issues of poor infrastructure provision, including road network and power supply.

Figure 2.5 shows the organogram of Lagos State Environment sector.

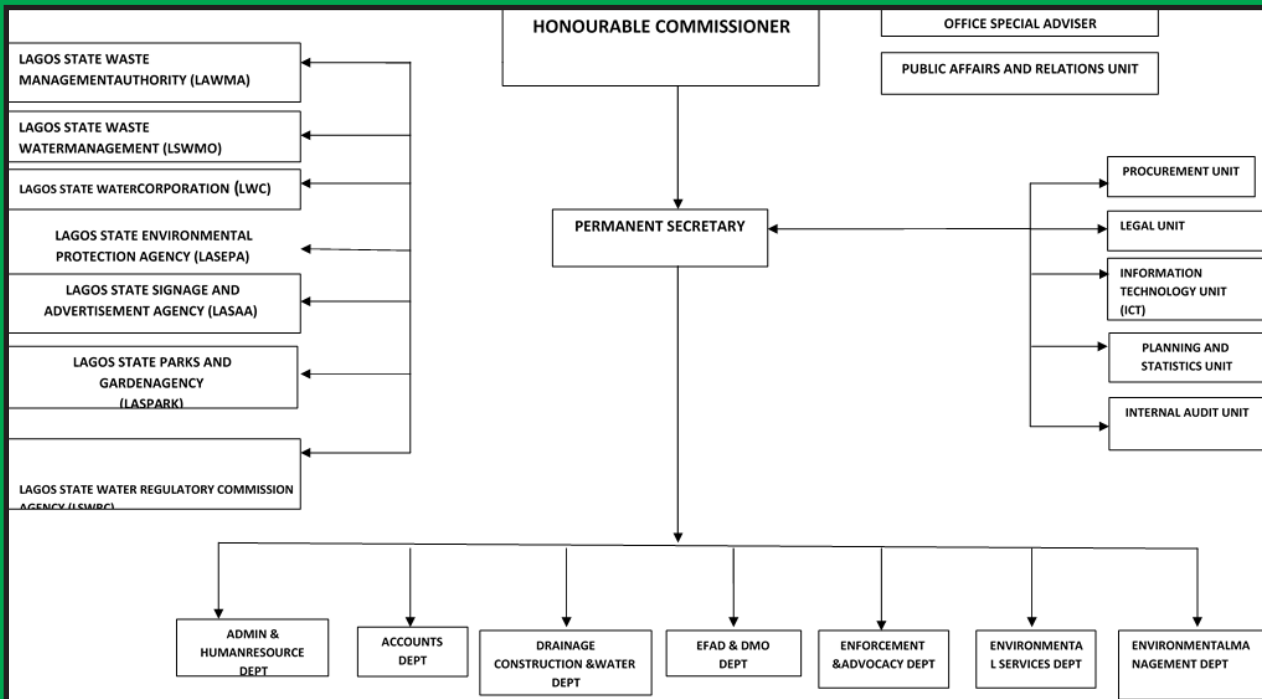


Figure 2.5: Organogram of Lagos State Environment Sector

Lagos State Plastic Waste Management policy (February 2021)

The main goals of Lagos State Plastic Waste Management policy (2021) are to:

- Achieve sustainable plastic waste management in Lagos State that will protect public health;
- develop sustainable legislative instruments, administrative, trade measures and systems that will support plastic waste management while boosting economic growth;
- ensure that all plastic packaging in Lagos will be recyclable and reusable by a targeted year 2030;
- support efforts to reduce our dependence on single-use plastics;
- Incorporate informal sector into the plastic waste management approach;
- delineate roles and responsibilities of the public sector, the private sector, and individuals in plastic waste management and aim at harnessing the capacities of all to achieve best practices;
- target to achieve approximately 50% plastic waste recovery by 2035 and 70% by 2050 and establish realistic timeline for zero plastic pollution;
- encourage companies and individuals to embrace alternatives to plastics;
- encourage participatory approach that involves all stakeholders, including communities CBOs, NGOs and relevant MDAs at State and LG levels; and
- establish compliance (monitoring, evaluation and enforcement) measures to ensure attainment of set goals and objectives.

The following established guiding principles are central to the attainment of the strategic objectives of the policy: environmental right, circular plastic economy, zero waste, EPR, the pollution prevention pays principle (PPPP), the polluter pays principle (PPP), the user pays principle (UPP), the precautionary principle (PP), the principle of participation (PoP), the integrated ecosystem approach and the duty of care.

The policy notably provides that:

- Lagos LGAs and LCDAs shall enact appropriate legislative instruments, establish necessary sanctions and enforcement mechanisms and make adequate annual budgetary provisions for plastic waste management interventions;
- LAWMA shall harmonize and appropriate waste licensing fees for each category of sector players;
- LASG shall offer incentives to local authorities that recycle the maximum proportion of their wastes;
- LASG shall provide technical assistance to informal waste reuse and recycling operations;
- LASG shall implement deposit/refund systems as incentives for reuse and recycling;
- Plastic-waste/EPR fund shall be established for a sustainable plastic waste management process, LAWMA shall be responsible for supervising the PRO as shown in the organogram in Figure 2.6.

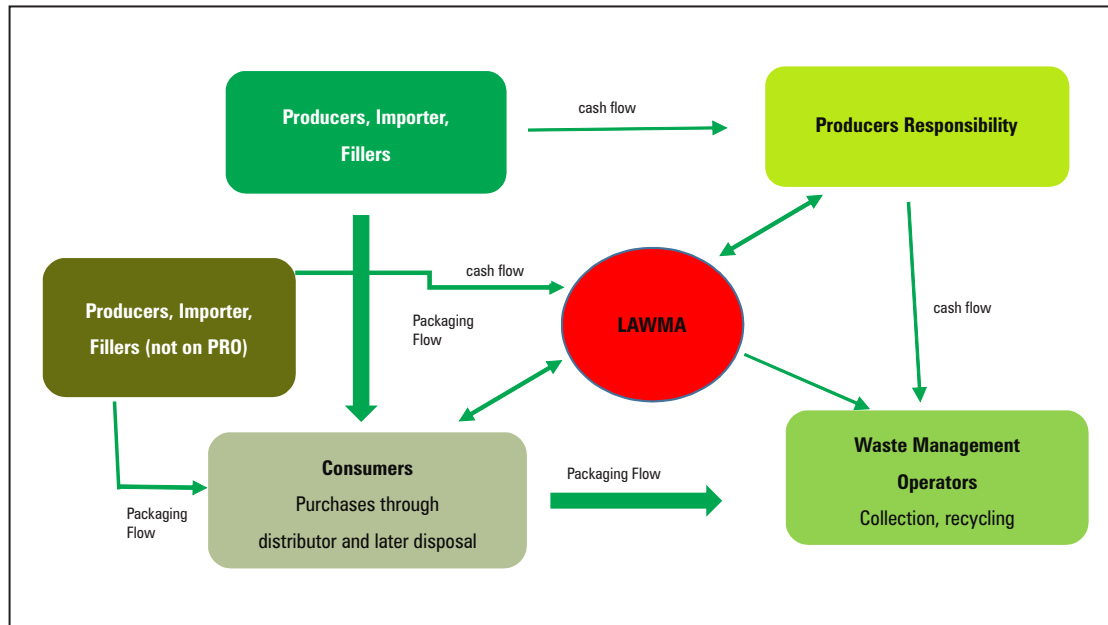


Figure 2.6: Organogram of LAWMA as PRO in Proposed Lagos Plastic Waste/EPR Fund

2.3 Waste Management Systems in FCT and Lagos

2.3.1 Federal Capital Territory (FCT)

The FCT is a pre-planned city consisting of six area councils; Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje, Kwali and Abaji. The area councils can further be subdivided into districts. According to the master plan, Abuja is divided into three phases. The five areas covered by the Phase 1 include Central, Garki, Wuse, Maitama, and Asokoro. In the Phase 2, we have areas such as Kado, Durumi, Gudu, Utako and Jabi. In the Phase 3, the areas covered are Mabuchi, Katampe, Wuye and Gwarimpa. Besides, there are also five sub-urban districts, which are Nyanyan, Karu, Gwagwalada, Kubwa and Jikwoyi. Along the Airport Road are clusters of satellite settlements, namely Lugbe, Chika, Kuchigworo and Pyakassa. Other satellite settlements are Idu (the main Industrial Zone), Mpape, Karimu, Gwagwa, Dei-Dei (housing the International Livestock market and also international building materials market). Map of the Federal Capital Territory (FCT) is shown in Figure 2.7.

Each area council is responsible for waste management within its individual jurisdiction. Each area council has an environment and sanitation/public health unit in which waste management and public cleansing is one of the major responsibilities. AMAC which acts as the headquarters of the other five area councils is located in the centre of Abuja city. Abuja Environmental Protection Board (AEPB) is a parastatal under the Federal Capital Territory for waste management and public cleansing of FCT.

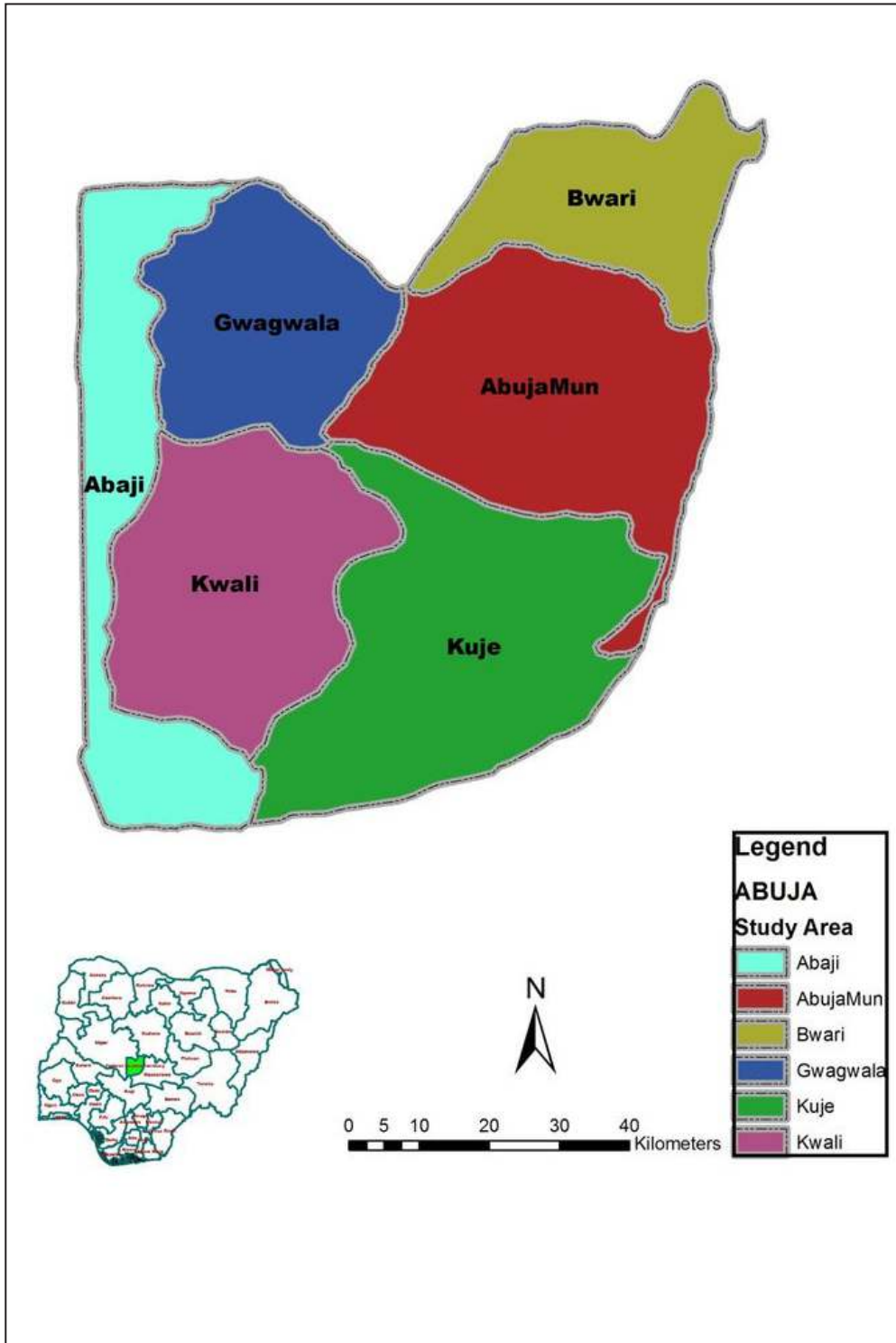


Figure 2.7: Map of the Federal Capital Territory Abuja

2.3.1.1 The Abuja Environmental Protection Board (AEPB)

AEPB is responsible for waste management and sanitation in Abuja. AEPB responsibilities are to:

- Remove, transport and dispose of domestic, commercial and industrial waste;
- Clear, maintain public drainage facilities, street cleaning, clearing of abandoned vehicles;
- Register private waste collection companies;
- Prepare, periodically up-date the master plan of waste collection and disposal in the city;
- Approve and monitor all disposal systems in the city;
- Assess recycling as a waste management option for industries and government agencies;
- Establish and recommend the basic standard requirements for solid, liquid, gaseous or toxic waste management;
- Establish and recommend acceptable safe methods of collection and disposal of hazardous and toxic waste products in the Federal Capital Territory (FCT);
- Educate the general public on the various disposal methods acceptable for domestic and industrial waste products;
- Initiate environmental protection legislation and keep existing legislations under constant review to reflect the latest discoveries and observations on the subject; and
- Organize and mobilize the public to participate actively in regular clean-up exercises and beautification of their environments.

Legal System in AEPB includes:

- Abuja Environmental Protection Board Act, 1997 established AEPB and its functions;
- Waste Management Regulations 2012, fees/charges for waste management services payable by FCT residents;
- Guideline and Requirements for Waste Recycling in the FCT (draft).

AEPB Policy/Plan include:

- Solid Waste Management Policy Guideline for FCT;
- Strategic Solid Waste Management Plan 2017-2021;
- FCT Solid Waste Management Road Map.

In terms of environmental and social considerations, there is a policy to provide job opportunities for informal sector and there are Rules and Regulation guiding the scavenger's activities in FCT. The community is informed on how to separate and discharge waste through public consultations, through schools, and through print and electronic media. General Monthly Sanitation and Community Sanitation Forums are also held for the communities.

2.3.1.2 Collection of Solid and Plastic Wastes in FCT

AEPB is directly providing SWM services in sweeping, collection, and final disposal, as well as collection of healthcare waste and waste from communal collection centres. Some SWM operations are contracted out to private sector companies (e.g. the sweeping of city centre, public areas and residential areas, the collection services, final disposal and recycling as well as litter and vegetation control services). Private sector operation/supervision is working well. Estimated waste collection rate in Abuja is 45.1%.

AEPB operated 15 legal open dumps which are referred to as collection points. In Abuja, households and businesses get their waste collected by AEPB, private collectors who go door to door collecting waste for a fee. For area councils outside AMAC, waste collection is available via using collecting point in the case of residential non-gated communities, office and market areas. The residential areas consisting of gated communities, community bins are placed in central areas where the residents are responsible for bringing their waste. The area council collects this waste for a fee. In areas covered by the area council, the collection points consist of open dumps within the residential area which are periodically evacuated by the area council.

The waste composition in FCT is heterogeneous and mixed; non-degradable materials and degradable components. Waste is not segregated at the source and comprises of hazardous and non-hazardous waste. The hazardous components usually consist of household cleaning agents and left over chemicals from renovations. Some of the waste stream comprises of compostable materials, plastics, paper, metal, textile, glass and other recyclable components. The degradable portions of the waste consist of food and yard wastes.

Most households generate high quantities of wastes, mostly organic waste from food waste and yard waste. High quantities of plastics waste particularly single-use plastics is generated from food containers; beverages and packaging. There is a high correlation between income level and waste generation quantities, as shown by different studies. The waste composition in FCT, Abuja is quite the same as any other developing country. Organic and plastic wastes make up the highest composition in terms of quantity in the waste stream.

FCT waste generation and collection data include the following:

- About three-quarters (72%) of the city's population receive waste collection service twice a week;
- There are sweeping services in the city centre, public areas, and residential areas;
- There is no transfer station in the city;
- Waste generation rate is 0.42 kg/person/day;
- Waste generation amount is 1,191.9 tons/day;
- Composition of waste: food waste 43.43%, plastic 15.27%, papers 7.76%, textile 1.39%, wood 3.36%, rubber and leather 0.081%, metals 2.02%, glass 2.39%, others 24.18% (soil, ceramics, etc.).

- A waste collection fee is charged (Independently charge waste collection service fee)
- Household waste NGN 1,200 – 45,000/year.
- Commercial waste NGN 7,800 – 14,400,000/year.
- Institutional waste NGN 240,000 – 21,600,000/year.
- Educational and Religious Institutions NGN 120,000 – 180,000/year.
- A disposal site fee (tipping fee) of 3% of company contract fee is charged.
- Liquid waste services are charged in the city centre only.

2.3.1.3 Recycle and Reuse System

The system in use in FCT is not organized. Approximately 2,000 people in the city are involved in recycling activities: over 1,000 people involved in collection of recyclable materials on the streets, and more than 600 people involved in recovery of recyclables in the central disposal site. There is no formal recycling facility, except those owned by private enterprises. Separation of household waste at source is practiced as a pilot scheme in Life Camp, some few kilometres away from Gwarimpa in the FCT. Self-disposal is practiced (open burning, recyclable materials to recyclers and the illegal dumping of waste on undeveloped lands).

2.3.1.4 Needs of AEPB

The management of wastes in FCT is still poorly implemented and unorganized. There is therefore the need to overhaul the whole system and make it sustainable through:

- Capacity development of an integrated SWM system;
- Overseas training programs about best practice in SWM;
- Improvement of waste disposal operations, semi-aerobic landfill operation;
- Establishment and operation of engineered landfill;
- Improvement in waste collection and transportation services and improvement;
- Development of policies and legal framework on SWM:
- Preparation of basic laws and regulations on SWM;
- Waste collection and transportation improvement plan: Best practices in collection and transportation of waste using the right sets of tools and routes for maximum efficiency and effectiveness in service delivery;
- Proper ways of compacting waste using bulldozers and landfill compactors, improvement in data collection about vehicles, daily scheduling of dumping area, and control of scavenging operations.

2.3.1.5 Local Plastic Recycling Companies in FCT

Some local plastic recycling companies in Abuja include:

- RichBol Environmental Services Limited;
- Chanja Datti Company Limited;
- Higenepus Integrated Services;
- Total Facilities Management Limited;
- Qix Waste Management & Recycling Services Limited;
- Mezzager Environmental Services;

- Capagate Group;
- Dapper Exclusive Style Limited;
- Engineering & Environmental Management Services Limited;
- Afordezt Services Limited; and
- Multiple Axxexx Services Limited.

2.3.1.6 Challenges

FCT is faced with the challenge of adequately handling the increasing quantum of solid waste particularly single-use plastics generated from anthropogenic activities. The challenges facing the waste sector can be capped under the following major issues:

- Weak enforcement of available enabling laws, regulations, and applicable sanctions;
- Uncoordinated institutional functions/overlapping functions of existing institutions;
- Inadequate funding and inappropriate technologies for sustainable and effective MSWM;
- Poor data availability and assessment techniques;
- Very limited private sector investment;
- Lack of clear roles and responsibility for the various tiers of government;
- Inadequate waste infrastructure in the country;
- Lack of cost recovery mechanisms for waste management services;
- Lack of incentives for private sector participation in service delivery of solid waste management - in terms of loans, and availability of jobs to be undertaken by private sector participants;

2.3.2 Lagos

Lagos, though the smallest state geographically in Nigeria, is an emerging megacity in the world and has the highest population in Nigeria with a growth rate of 6 - 8%. The location of Lagos State in the map of Nigeria is shown in Figure 2.8. It is a central hub for industrial, commercial and economic activities in Nigeria, extending to West Africa. Lagos generates a very high amount of waste, of which about 15% is plastic waste.

The study area consisting of the twenty local government areas in Lagos State is shown in Figure 2.9. Lagos State is bounded on the north and east by Ogun State. In the west, it shares boundaries with the Republic of Benin. Behind its southern borders lies the Atlantic Ocean. 22% of its 3,577 km² are lagoons and creeks.

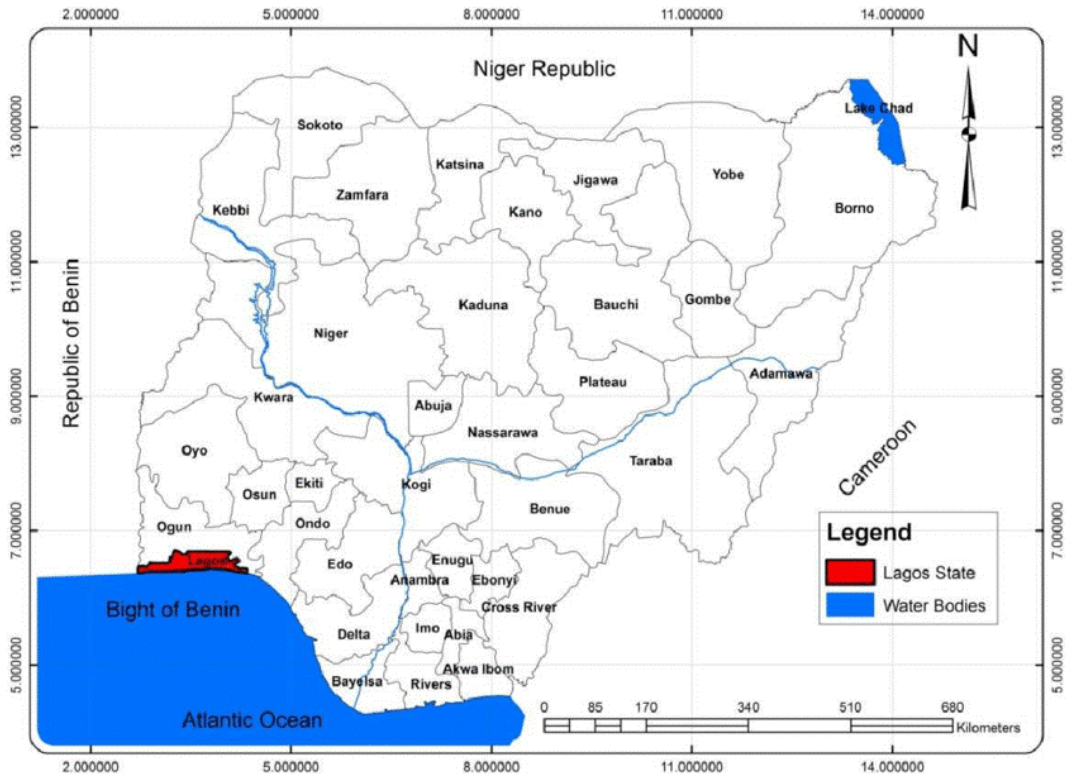


Figure 2.8: Map of Nigeria showing Location of Lagos State

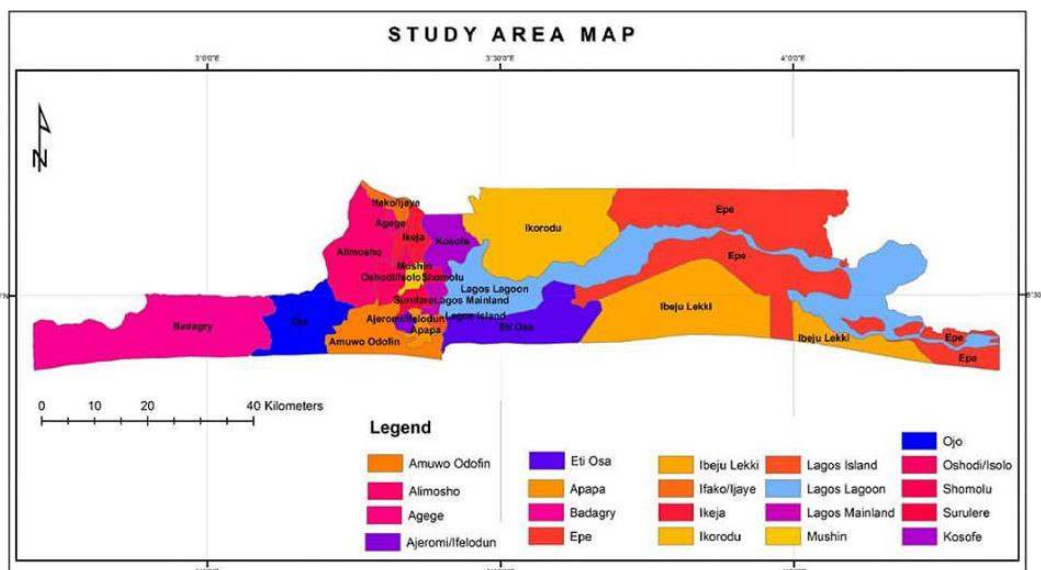


Figure 2.9: Map of Lagos State showing the 20 LGAs

2.3.2.1 Lagos State Waste Management Authority (LAWMA)

LAWMA's Mandate

Lagos State Government instituted the Lagos Waste Management Authority (LAWMA) to perform supervisory roles and charged LAWMA with the implementation, advocacy, monitoring and enforcement of waste management policies in Lagos State. LAWMA is to collect and transport commercial and industrial waste to designated landfill sites as well as management of the landfills. In 1997, Private Sector Participation (PSP) scheme was introduced to complement the efforts of LAWMA. The participants were assigned the responsibility of door to door/bulk waste collection in all the Local Government Areas at fees to be paid by serviced clients. For better performance, mega waste management companies were integrated to collect waste from tenements, markets, parks, industries and commercial centers within their zones for disposal at designated landfill sites.

LAWMA's Enforcement System

The key elements of LAWMA's enforcement strategies include:

- Routine monitoring;
- Emergency response/site visit/actions;
- Issuance of notices;
- Surveillance;
- Seal up, closure, outright disruption of infractions;
- Pre-opening compliance monitoring; and
- Post-opening compliance monitoring for sustainability.

The enforcement system is premised on routine monitoring involving regular monitoring and visitation to existing and potential clientele relative to regional jurisdiction in the state. Data gathering is carried out based on routine monitoring. Advocacy and engagement of the citizens is implemented based on available data. Earmark of persistent infractions and premises based on available data. Afterwards, enforcement of non-compliance by closure, seal up or disruption of infractions are carried out, constant monitoring of the area to determine if there will be need for further necessary actions such as prosecution arising from activities such as breakage of enforcement seal or keys or outright reopening by unauthorized persons.

2.3.2.2 Collection of Solid and Plastic Wastes in Lagos

The collection agents in Lagos State are: Lagos Waste Management Authority (LAWMA), Private Sector Participants (PSP), Highway Managers Limited (HWM) and Local Governments (LGs). There are four types of solid waste collection systems in operation in Lagos State. These are: door to door collection, bin collection, communal/bulk collection and street collection.

Lagos PSPs

Private Sector participation in waste collection and transportation has been in existence since 1997 under the Lagos State Ministry of Environment with pilot scheme in two LGAs

of Kosofe and Bariga. It was expanded to other areas in 1999 with setback in 2002 then reviewed in 2004 with new mega PSPs appointed. PSPs were transferred to LAWMA in March 2007. The Programme has created huge number of employments. There are 377 wards in the 20 LGAs and 37 LCDAs of Lagos State. There are over 350 PSPs operating in the 57 LGAs/LCDAs, as shown in Table 2.5.

Table 2.5: Lagos PSPs

S/N	LGA/LCDA	Number of PSPs
1	Agbado Oke Odo LCDA	19
2	Agbowa Ikosi LCDA	1
3	Agboyi Ketu LCDA	5
4	Agege LGA	9
5	Ajeromi LGA	8
6	Alimosho LGA	9
7	Amuwo Odofin LGA	6
8	Apapa LGA	7
9	Apapa Iganmu LCDA	6
10	Ayobo/Ipaja LCDA	5
11	Badagry Central LGA	1
12	Badagry West LCDA	1
13	Bariga LCDA	9
14	Coker Aguda LCDA	8
15	Egbe Idimu LCDA	10
16	Ejigbo LCDA	8
17	Epe LGA	2
18	Eredo LCDA	-
19	Eti Osa East LCDA	9
20	Eti Osa West LGA	13
21	Iba LCDA	5
22	Ibeju Lekki LGA	4
23	Ifako Ijaiye LGA	7
24	Ifelodun LCDA	7
25	Igando/Ikotun LCDA	11
26	Igbogbo Baiyeku LCDA	5
27	Ijede LCDA	2
28	Ikeja LGA	6
29	Ikorodu LGA	7
30	Ikorodu North LCDA	8
31	Ikorodu West LCDA	5
32	Ikosi/Isheri LCDA	8
33	Ikoyi/Obalende LCDA	15
34	Imota LCDA	1

S/N	LGA/LCDA	Number of PSPs
35	Iru/VI LCDA	7
36	Isolo LCDA	10
37	Itire Ikate LCDA	7
38	Kosofe LGA	9
39	Lagos Island LGA	5
40	Lagos Island West LCDA	LAWMA
41	Lagos Mainland LGA	9
42	Lekki LCDA	-
43	MosanOkunola LCDA	5
44	Mushin Ajina LGA	10
45	Odiolowo/Ojuwoye LCDA	9
46	Ojo LGA	3
47	Ojodu LCDA	12
48	Ojokoro LCDA	9
49	Olorunda LCDA	1
50	Onigbongbo LCDA	6
51	Oriade LCDA	4
52	Orile Agege LCDA	7
53	Oshodi LGA	2
54	Oto Awori LCDA	4
55	Somolu LGA	6
56	Surulere LGA	7
57	Yaba LCDA	4
TOTAL	20 LGAs, 37 LCDAs	351

2.3.2.3 Recycle and Reuse System

Modality for waste collection

LAWMA Waste Receptacles: The type of bins used include the following: wheeler bins, mammoth garbage bins, utility vehicles, skip bins, roll-on/roll-off hook lift bin (dino bin), etc. Pictures are shown in Plates 2.1 to 2.6.

Frequency of pick up: Daily, weekly or per trip.

Nature of waste: Municipal solid waste, biomedical waste, hazardous waste.



Plate 2.1: Wheeler Bins
120/240 Litres



Plate 2.2: Mammoth Garbage Bin (MGB) 1,100 Litres



Plate 2.3: Utility Vehicles Rear Loaders (REL) Garbage Compactor Trucks



Plate 2.4: Skip Bin relative rates per CBM (12 tonnes = 5.04 CBM)



Plate 2.5: Roll-on, roll-off hook lift bin (Dino Bin) 16 CBM (Single Dino)



Plate 2.6: Roll-on, roll-off hook lift bin (Dino Bin) 27 CBM (Double Dino)

For waste management purposes, Lagos state is divided into 3 regions namely Western, Central and Eastern districts, each headed by an AGM, there are 373 wards. Allocation to PSP is ward-based, each PSP has a minimum of 2 trucks. Collection from household is carried out once weekly while for commercial and others, frequency is determined by volume and type of receptacle. Households have further been classified based on socio-economic status and billed accordingly with the lowest fee at N500

Waste Sorting

In Lagos State, sorting of wastes is generally not done at point of generation in homes. Waste sorting is primarily done by scavengers at the final destination in landfill dumpsites. There are over 1,000 scavengers permanently located in these dumpsites.

Status of Waste Pickers

There is continuous registration of waste recyclers in Lagos State. Previously, there were more than 100 recyclers registered by LAWMA but with the establishment of LRI in December 2020, about 45 recyclers/aggregators have so far been registered, as at February 2021. The list of these registered recyclers captured by LAWMA is presented in Table 2.6.

The following are the four categories of recyclers in LAWMA database:

1. collection from companies;
2. collection from landfill;
3. door to door collection; and
4. processing companies.

Many of the registered recyclers are waste collectors particularly PSPs engaged in door to door collection from homes along the streets. There are few of these recyclers that are actually engaged in processing of the recyclables, notably RecyclePoints, Janirak Recyclers, etc.

Accordingly, with the innovation of the Lagos Recycle Initiative and invention of Pakam App, LAWMA is hoping to incorporate the informal sectors of the recycling chain consisting mainly of scavengers, pickers and collectors to register, train and attach them under recyclers/recycling companies (depending on the capacity of the company) that are available within their location environment for further registration and work-related purposes. This will enable a better flow of collection from point of generation with more clean and quality materials.

LAWMA's approach in reducing plastic pollution

LAWMA in a bid to curb the menace of plastic pollution and reduce the rate at which recyclables are land-filled, introduced the Lagos Recycling Initiative, which aims to collect, transport, store and process recyclables from the point of generation. The LRI is a program that aims to bring together all organized Estates, private sector and recyclers under one roof to aid recycling and reduce plastic pollution. Hence, the creation of the

PAKAM app, which works like the Uber App to enable waste generators to locate registered recyclers within their environment in order to exchange recyclables for cash or other incentives. LAWMA is introducing a raffle draw system to reward waste generators who patronize these recyclers. The raffle draw will be across the 57 LGAs/LCDAs of the state and waste generators will be the benefactors. The plastic waste generated will be carted away by aggregators attached to each recycler for further processing.

The Lagos Recycle

The Lagos Recycle which was designed in 2019, replaced former 'Lagos Bluebox' programme, has education and awareness incorporated and undertaken by LAWMA Academy. It focusses on sustainability and employability. As at February 2021, LAWMA is at the recruitment stage and over 40 recyclers and 400 aggregators have been engaged. There is monthly subvention from LASG dedicated for incentives to improve waste management in Lagos

Previously, the three companies fully in control of recyclables in Lagos were exporting waste plastics out of the country and importing refined ones back into the country leading to shipping of jobs overseas with consequent rising unemployment and exploitation of the value chain players at the downstream side. These companies are:

1. Lexsz, a Chinese company, buys black recyclables and ship to China;
2. Alkem, a Pakistani company, vs Coca Cola ships PET and others to Pakistan; and
3. Omnik, an Indian company, is in charge of pure water bags, about 5million a day in Lagos, ships to India.

NG Plastic at Shagamu interchange has capacity for 3,000 metric tonnes of recyclables per year. West Africa Energy, located in Igando/Ikotun LCDA, deals with black plastic and is a small-scale facility that was established with about 15 million Nigerian Naira capital.

LAWMA MD appealed to residents and corporate bodies to join forces with the Authority to tackle the menace of plastic pollution in the state, by engaging in recycling. Citing recent statistics, he said that Lagos State, with a population of 25 million residents, generates about 14,000 metric tonnes of wastes daily, out of which 3,500 metric tonnes are recyclables like plastics, bottles, and papers, and this if not properly checked posed serious dangers to the environment.

LAWMA has set up recycling centres at strategic locations in the state, as part of the Lagos Recycle initiative, with the vision to have a recycling centre in each local government, which would serve as collation centres for recyclables, thus ensuring the minimization of wastes that end up at the dumpsites. Four hundred (400) aggregators have been commissioned at Olushosun dumpsite as part of measures to drive effective implementation of the Lagos Recycle program. In addition to making the state cleaner, healthier and livable, the Lagos Recycle initiative would help create jobs for the teeming youth population, who are interested in becoming entrepreneurs, with over 6,000 jobs to

be created. The PAKAM App will seamlessly connect all stakeholders; including residents, recyclers, waste aggregators, etc. (Odumboni, 2021b).

The Lagos Recycle Initiative (LRI) was launched on 16th of December, 2020 to promote a cleaner environment in Lagos State with the main goal of encouraging separation of recyclable wastes at the point of generation. LRI involves collection of recyclables from the point of generation for recycling purposes and encourages waste to wealth. Community Recycling/Drop-off centres have been set up in the 57 LGAs/LCDAs of the state with Recyclers and Aggregators assigned to different areas for collection of these recyclables.

LRI was designed in 2019 to replace the former Lagos BlueBox Programme with emphasis on education awareness. LRI has now been trimmed down to Lagos Recycle. The two main components of the Lagos Recycle Programme are sustainability and employmentability. Currently, LAWMA is at the stage of recruitment for Lagos Recycle; over forty recyclers and four hundred aggregators have been registered and commissioned.

The main aims of LRI are to:

- reduce wastes getting into the landfill;
- capture about 50% of recyclables upstream with zero tolerance of scavenging on landfill;
- protect Lagos waterbodies and inhabitants;
- reduce Lagos State Carbon Footprint;
- increase economic security by tapping domestic resources through provision of clean raw materials to manufacturing companies
- encourage zero-waste campaign.

Pakam Application and Raffle Incentive System

Pakam is an all-inclusive Lagos waste management software application that connects recyclable waste real-time to recyclers at a click. The recyclable waste materials include plastics, paper, aluminum, glass, food containers. The App connects waste practitioners to the general or targeted communities via general information, engagement and targeted education. It also connects communities to environmental enforcement agencies by reporting indiscriminate waste disposal that leads to blockage and choking of waterbodies, using the real-time live video and chat window that pinpoint exact location. Pakam App system is all-inclusive and it will turn waste to a win-situation for all Lagosians. When you have recyclable waste, the system will automatically connect you to an aggregator whom will then schedule a pick-up day.

How Pakam App Works

The stepwise use of the App is as follows:

- Download the Pakam App for free on Google play store & apple store or visit www.lagosrecycle.com.

- Register on the App as a user
- Schedule a pickup
- Request is accepted and pickup is scheduled by and aggregator/recycler.
- Transaction receipt is generated after pickup.

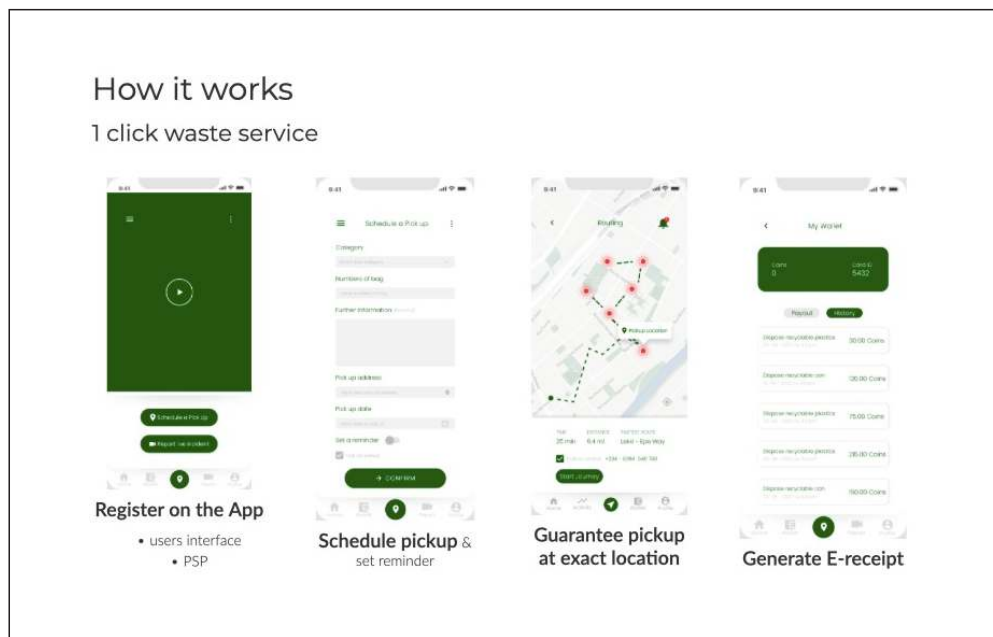


Figure 2.10: How PAKAM App Works

Incentive System

After collection by the aggregator, you automatically qualify for the raffle draw in which there will be 10 lucky winners in each of the 57 LGs/LCDAs who will win N10,000 (about \$20) monthly, which sums up to 570 winners.

Aggregators and Recyclers

LAWMA has been registering aggregators that will collect waste from designated areas under the new Lagos Recycle Initiative. As at February 2021, over 40 of them are in the LAWMA data base, shown in Table 2.6.

Table 2.6: List of Registered Recyclers under the Lagos Recycle Initiative

S/N	Recycler/Aggregator	LG/LCDA
1	RecyclePoints Limited	Alakija, Festac
2	Wecyclers Nigeria Limited	Lagos Island
3	Watco Global Services	Surulere
4	Horlag Recycling	Eredo, Epe
5	Zebaj Recycling	Ojokoro
6	Green Janitors	Badagry
7	Street Waste Company Ltd.	Ikoyi- Obalende
8	Negand Integrated services	Eti-Osa
9	EcoviridisEnvironmental Services	Eti-Osa East
10	Lasgidis Recyclers	Eti-Osa East
11	Waste point Limited	Iru-VI
12	FAN Renewable System Ltd.	Ikeja
13	D'monte greene	Ikosi-Isheri
14	Urban Spirit (Monttainai Recycling)	Onigbongbo
15	Wrm Integrated Nig. Ltd	LagosMainland
16	Laputa rubber industry limited	Mushin
17	Cycled Technology	Mushin
18	WestafricanENRG	Igandokotun/Ikeja
19	Planet Savers	Ikorodu West
20	Ecoprune	Alimosho/ Ifakoljaiye
21	HISL Recyclers	Ibeju-Lekki
22	Trashusers Services	Ibeju-Lekki
23	3R Recycling	Ibeju-Lekki
24	Scrap Empire	Ibeju-Lekki
25	Thermal Initiative	Lekki
26	MEDIC	Lekki/Apapalganmu
27	GIVO Solutions	Lekki
28	OD Aleginadav	Ijede
29	Top Polymers	Ikorodu Central
30	Recycle works Ltd.	Ikorodu North
31	Procycle	Agege
32	The 8088 recycling	Odi-Olowo
33	Chanja Datti Ltd.	Badagry
34	Ecoplastic & Aluminum Recycling	Ojo
35	Janirak Recyclers	Badagry2
36	African Clean up initiative	Ajeromi-Ifelodun
37	Parallel Point	Egbeldimu
38	Scrappays Technologies	Agbado OkoOdo
39	SWEEP Foundation	Surulere
40	FABE International Foundation	Epe/Ibeju Lekki
41	Dispose Recyclers	Oshodi Isolo
42	Brickify Ltd.	Ikorodu North
43	Plastic Solutions NG	Eti-Osa East
44	Greenhill	Oshodi Isolo
45	Redripe Investment	Ikorodu

Two Municipalities for Pilot Recycling Project

Two municipalities nominated for pilot recycling project are Ajegunle in Ajeromi LGA and Yaba in Yaba LCDA of Mainland Lagos. The two communities are heavily populated with high population of students consuming recyclables especially PET and water sachets. Due to high population of students in these two municipalities, there is no organized system for evacuation of wastes. There is enormous plastic pollution with high unemployment. In fact, Ajeromi LGA is the most populated of all the 774 LGAs in Nigeria.

Proposed Waste Collection System

The waste in Lagos is to be managed by private sector, registered and monitored by LAWMA. Two collection centres are proposed in each of the 57 LGAs/LCDAs making a total of 114 collection centres in Lagos State. Each collection centre will have a Mobile 40-foot Portakabin. There will be two Movable Portakabins in each LGA/LCDA making a total of 114 Portakabins for the entire state. One bailer is to be provided in each collection centre and placed inside the Portakabin. Each collection centre will be managed by a registered recycler. OPEX operating cost will be provided by LASG. A bailer costs between 0.3million to 6million naira. There are 373 wards in Lagos State, provision should be made for two cycle bikes, which have cages at the back, in each ward. A youth will handle a bike. In essence, Lagos State requires a total of 746 cycle bikes, 114 bailers, 114 portakabins to be managed by 114 registered recyclers under LAWMA supervision.

Aggregator and Informal Sector

Aggregator and informal sector is like Uber and taxi driver. In Lagos, a taxi driver drives around searching for passengers while an Uber operator is contacted by phone for pick-up with daily returns for Uber more than that of a taxi driver. LAWMA intends to incorporate all informal sectors including scavengers into the plastic value-chain as aggregators.

Transfer Loading Stations

Transfer Loading Stations (TLS) are centralized facilities where waste is unloaded from smaller collection vehicles and re-loaded into larger vehicles for transport to a disposal or processing site. This is otherwise known as transfer station or resource recovery centre and is a building or processing site for temporary deposition, consolidation and aggregation of waste. In Lagos, there are three transfer loading stations, namely: Simpson, Oshodi and Agege for preliminary sorting of waste materials. They are places where PSP waste collection trucks deposit their waste cargo prior to aggregation and loading into larger vehicles. These larger vehicles will transport the waste to the end point of disposal at LAWMA landfill dumpsites in an incinerator, landfill or hazardous waste facility or for recycling (Wikipedia, 2021). The transportation of garbage from the transfer loading stations is done generally using large trucks and trailers. Basically, TLS is a processing site for temporary deposition of waste and it serves as "middleman" between collection vehicles and final treatment or disposal facility.

The three transfer loading stations are:

- **Simpson TLS** is located around Sura Market, in the Simpson area of Lagos

Island. It serves as a temporary disposal site for waste collected in Lagos Island, Lagos Mainland/Victoria Island axes of the state.

- **Agege TLS** is situated along Oba Ogunji Road, collects waste from Agege, Ipaja and Ikeja axes of the state.
- **Oshodi TLS** is located in central part of Oshodi along Apapa-Oshodi Express way. The station services Oshodi, Apapa and Mile 2 axes of Lagos.

The first transfer loading station in Lagos State was commissioned at Simpson Street in Lagos Island, and it is simply about solid waste. Unlike Simpson TLS, the second TLS (Oshodi TLS) and the third (Agege TLS) help to do more as they have been embedded with medical waste treatment facilities to provide hospitals and clinics around the areas with efficient depository for treatment and disposal of medical waste in a safe and healthy manner. LAWMA planned to construct 20 TLSs to serve the 20 LGAs and 37 LCDAs across the state, allowing private sectors to participate effectively and creditably in the rapid development of the remaining 17 TLSs with four sites ready for development namely Ogombo, Abule-Egba, Ishasi and Owutu in Ikorodu.

Front views of Simpson, Oshodi and Agege TLSs are shown in Plates 2.7, 2.8 and 2.9, respectively.



Plate 2.7: Simpson TLS



Plate 2.8: Oshodi TLS



Plate 2.9: Agege TLS

2.3.2.4 Disposal Sites

Currently, there is no engineered landfill in Lagos State. There are 3 major dumpsites, 3 transfer loading stations (TLS) and 3 temporary satellite dumpsites serving Lagos State.

The three major dumpsites are:

- **Olushosun dumpsite** it is situated in the Northern part of Lagos, within Ikeja Local Government and receives approximately 40% of the total waste deposits from Lagos. It occupies a land area of 42.7 hectares with a residual life span of 20 years. It has been in use since November 1992. It is a 100-acre dump, the largest in Africa, and one of the largest in the world. The site receives up to 10,000 tons of waste daily.
- **Abule-Egba dumpsite** is about 10.2 hectares, located in the Western part of Lagos in Alimosho Local Government and receives waste from the densely populated area. The residual life span is approximately 8 years.
- **Solous dumpsites** consist of Solous II and Solous III, situated along Lagos State University-Iba Road.
 - Soluos II is on 7.8 hectares of land with average life span of 5 years.
 - Soluos III is a relatively new site, about 5 hectares of land with average life span of 5 years.

Each site receives an average of about 2,250m³ of waste per day and have been in operation since 2006 and 2009, respectively.

Upgrade activities have been carried out at the three main dumpsites at Olushosun, Abule-Egba and Solous.

Satellite dumpsites comprise of:

- Ewu Elepe dumpsite which is located at Ewu Elepe, off Ijede Road in Ikorodu Local Government. It occupies about 8 hectares of land and has been in operation since November 2008.
- Sangotedo dumpsite in Eti-Osa Local Government.
- Temu dumpsite occupying about 8 hectares of land in Epe Local Government and has been in use since February 2009.

These sites serve as backups for the three main dumpsites and also have advantages of proximity. They are temporary sites and receive an average waste of about 1,864.29m³ per day.

Arial view of Olushosun dumpsite is shown in Plates 2.10a and 2.10b.





Plate 2.10a:
Olushosun
Dumpsite



Plate 2.10b:
Olushosun
Dumpsite

2.3.2.5 LAWMA Needs

LAWMA requires provision of infrastructures for implementation of the Lagos Recycle programme involving:

- 114 No. of 40-foot Portakabins for 2 collection centres in each of the 57 LGAs/LCDAs;
- 114 No. Bailers, one in each portakabin collection centre; and
- 746 No. Cycle Bikes, two in each of the 373 wards in Lagos State.

This list was provided by the MD of LAWMA during interaction with him in the course of this assessment.

2.3.2.6 Local Plastic Recycling Companies in Lagos

There are many recycling companies in Lagos, but they are mostly waste collectors. Only few of them are actually recyclers. Many of them are already registered with LAWMA for the implementation of the Lagos Recycle programme. Most of the members of the Recycling Association of Nigeria are located in Lagos. Some corporate members are listed in Table 2.7

Recyclers Association of Nigeria

Recyclers Association of Nigeria (RAN) was registered in Nigeria as a non profit organization and inaugurated on 3rd of November, 2018. RAN works for the promotion of solid waste management through waste management educations using the 3Rs approach in Nigeria. Objectives of RAN can be represented by the acronym 'MAGPS' representing the framework of operations with the guiding principles of having a positive

impact to achieve a sustainable circular economy in Nigeria. The aim of the association (RAN, 2018) is as follows:

- **Material Recovery:** Engaging in activities that reduce waste to landfill to the barest minimum for an improved circular economy;
- **Advocacy:** To be the leading voice for the waste and recycling industry at the Federal, state and local government level, advocating on behalf of members, by advancing policies to help make the industry safer and to promote growth and innovation;
- **Green Investment:** Facilitate investment opportunities and activities considered good for the environment and profitable to members;
- **Partnership:** Encourage partnerships opportunities and a healthy relationship among members and stakeholders in the industry;
- **Safety:** Work to make waste collection, processing and disposal operations safer through training, promoting best practices, advancing safety legislation and by setting industry equipment standards.

Some registered corporate RAN members (RAN, 2017) are listed in Table 2.7.

Table 2.7: RAN Members

S/N	Names	S/N	Names
1	123recycle	26	Muda Africa
2	Alamonk Recyclers Ltd	27	Recycleedge
3	Amorgen Nigeria Company	28	Recyclehub
4	Chanja Datti	29	RecyclePoints Limited
5	Chestron Limited	30	Remould Global Ventures Ltd
6	D'allure Scraps Limited	31	Risley Bridge Company Ltd
7	Ecoplastic	32	Solid Chemicals Resource Limited
8	Ecoprune	33	Srap Empire
9	EcoViridis Environmenta Technology	34	Street Waste Company
10	Enpact Solutions	35	Tairan Industries Ltd
11	Environmental Expressions Limited	36	Thermal Initiative
12	E-Terra Technologies	37	Tong da Industries
13	Fabe Environment Enterprise	38	Allcycle
14	Fountain Resources Global Services	39	Vicfold Recyclers
15	Gedeihen Recyclers	40	Wecyclers Nigeria Limited
16	Greenhill Recycling Limited	41	Africa Clean up Initiative
17	Hinckley Associates Nigeria Recycling	42	Bohia Environmental Service Ltd.
18	HISL Recyclers	43	Slay Dot Com Aid Initiative
19	Horlag Recycling	44	Nolds Integrated Services Limited
20	iFarm Recyclers	45	Loyar Global Services
21	LasGidis Recyclers	46	Recyclan
22	Medic Initiative	47	eTrash2Cash
23	Mottainai Recycling	48	Zebaj Recycling
24	Janirak Recyclers	49	Trashusers Services
25	JDSL Recycling	50	Sweep Foundation

2.3.2.7 Challenges

In order to improve performance of LAWMA in the Lagos Recycle programme, some bottlenecks listed below need to be addressed:

- There is urgent need to engage the services of more private waste firms and other franchise to reduce the burden of waste collection and disposal on LAWMA.
- Delayed collection of household solid waste, in some cases, the wastes are not collected until after a week or two, consequently, the waste bin overflows and litters the surroundings.
- Improper garbage disposal and lack of reliable transport infrastructure means that collected wastes are soon dispersed to other localities.
- Overloading collection trucks with more than the tonnage of waste in order to reduce number of trips, resulting in spillage of wastes along the streets during transportation to treatment centres.

2.3.2.8 Operational Aspects of LAWMA

The educational arm of LAWMA is LAWMA Academy. It engages innovative approach to support corporate/personal development and drive social responsibility among citizens to improve waste literacy and promote good waste management practices to the 3Rs reduce, reuse and recycle.

The domestic waste collection through PSP programme in Lagos is strengthened by:

- Increased number of households accessing waste management service
- Enabling environmental law
- Supportive government and competent management
- Job creation with poverty alleviation
- Increased good customer relations and satisfaction

Weaknesses of the PSP programme include:

- Inability to consistently maintain and improve performance level;
- Difficulty in waste services charge collection;
- Unreliable service delivery;
- Inadequate enforcement of environmental law;
- Failure in enforcing standards; and
- Branding of compactor.

Opportunities that can be accessed by the programme include:

- Poverty alleviation;
- Availability of materials for local use;
- Income generation opportunity from sale of recyclable materials; and
- Incentives for residents to participate in sorting at sources.

Some threats to the PSP programme in Lagos include:

- Unfriendly relationship between LAWMA, PSP and volatile slum communities;
- Bad attitude of Lagos residents to waste handling;
- Difficulty in collecting waste service charge from residents;
- Insufficient number of waste compactors; and
- Poor road network infrastructure.

2.3.2.9 Lagos Waste Data

Summary of general waste deposited at Lagos landfill dumpsites in 2017, 2018 and 2019 is presented in Table 2.8, depicted in Figure 2.11 with monthly details for each year shown in Tables 2.9, 2.10 and 2.11 and respectively plotted in Figures 2.12, 2.13 and 2.14.

Inventory of wastes in 2016 and 2015 are presented in Tables 2.12 and 2.13, shown in Figures 2.15 and 2.16, respectively.

Table 2.8: Lagos Waste Data for 2017, 2018 and 2019

Year	General Waste Amount in Metric Tons
2017	1,349,010.17
2018	1,089,428.81
2019	1,656,757.00

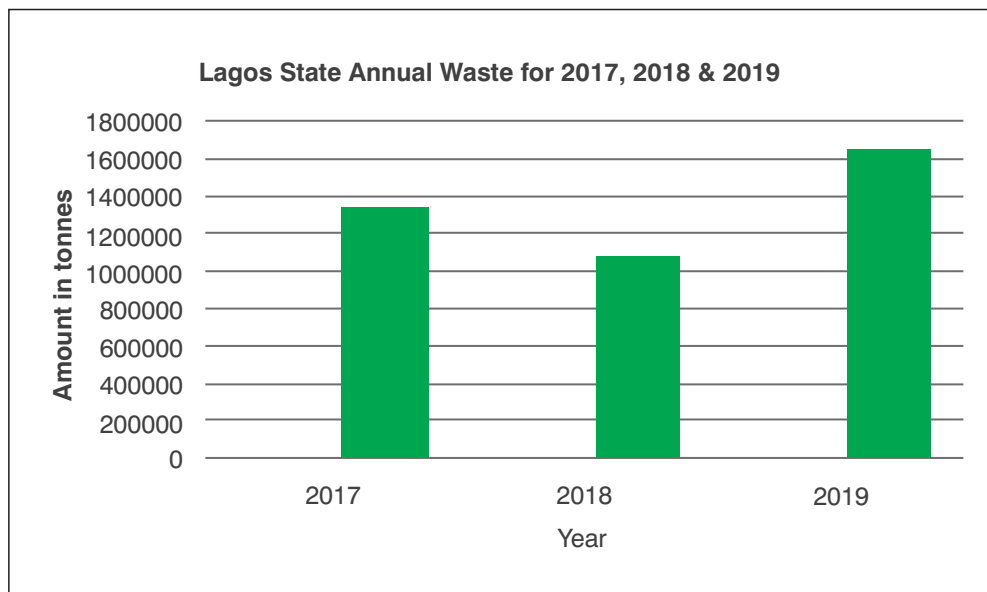


Figure 2.11: Lagos Annual Waste Data for 2017, 2018 and 2019

Table 2.9: Lagos Waste Data for 2017 in Metric Tonnes					
Month	LAWMA Landfill Dumpsites				Total
	Olushosun	Solous III	Ewu Elepe	Epe	
January 2017	78,067.00	28,912.00	14,141.00	8,681.00	129,801.00
February 2017	69,147.00	24,470.00	11,045.00	8,221.00	112,883.00
March 2017	78,663.00	27,068.00	11,144.50	8,192.00	125,067.50
April 2017	82,432.01	48,871.23	10,652.00	6,299.00	148,254.24
May 2017	73,118.16	49,098.92	10,978.00	6,722.00	139,917.08
June 2017	77,564.00	52,671.00	10,374.00	6,156.50	146,765.50
July 2017	38,460.00	17,805.00	12,959.00	18,600.00	87,824.00
August 2017	40,780.50	15,939.00	10,731.00	27,320.00	94,770.50
September 2017	42,689.50	9,764.50	10,457.00	21,298.10	84,209.10
October 2017	39,900.00	12,712.00	9,519.40	21,501.50	83,632.90
November 2017	43,492.00	14,983.05	11,823.40	26,420.50	96,718.95
December 2017	45,550.00	13,848.00	12,160.40	27,608.00	99,166.40
TOTAL	709,863.17	316,142.70	135,984.70	187,019.60	1,349,010.17



Figure 2.12: Lagos Monthly Waste Data in Metric Tonnes (2017)

Table 2.10: Lagos Waste Data for 2018 in Metric Tonnes

Month	LAWMA Landfill Dumpsites						Total
	Olushosun	Solous III	Ewu Elepe	Epe	AbuleEgba	Badagry	
Jan 2018	45,095.00	16,766.50	7,699.00	30,767.20			100,327.70
Feb 2018	34,277.50	10,237.00	7,031.00	13,560.14			65,105.64
Mar2018		17,605.00	16,477.00	28,027.69			62,109.69
Apr2018		15,962.00	28,549.00	27,507.44			72,018.44
May2018		10,464.50	31,986.00	35,185.18			77,635.68
Jun2018		12,764.00	36,729.00	28,654.00			78,147.00
Jul2018		14,653.05	34,389.00	33,505.00			82,547.05
Aug2018		12,748.00	51,102.00	33,319.00	6,939.00		104,108.00
Sep2018		13,808.00	28,404.00	32,329.00	13,050.00		87,591.00
Oct2018	25,504.88	14,455.05	10,514.00	19,879.00	10,863.00		81,215.93
Nov2018	76,514.63	14,875.00	8,050.00	13,955.00	13,654.05		127,048.68
Dec2018	102,019.50	16,591.50	7,827.50	9,661.50	14,184.00	1,290.00	151,574.00
TOTAL	283,411.51	170,929.60	268,757.50	306,350.15	58,690.05	1,290.00	1,089,428.81

Note: Olushosun closed down February 2018, re-opened 13 October 2018
Abule Egba re-opened 21 August 2018
Badagry came on board December 2018

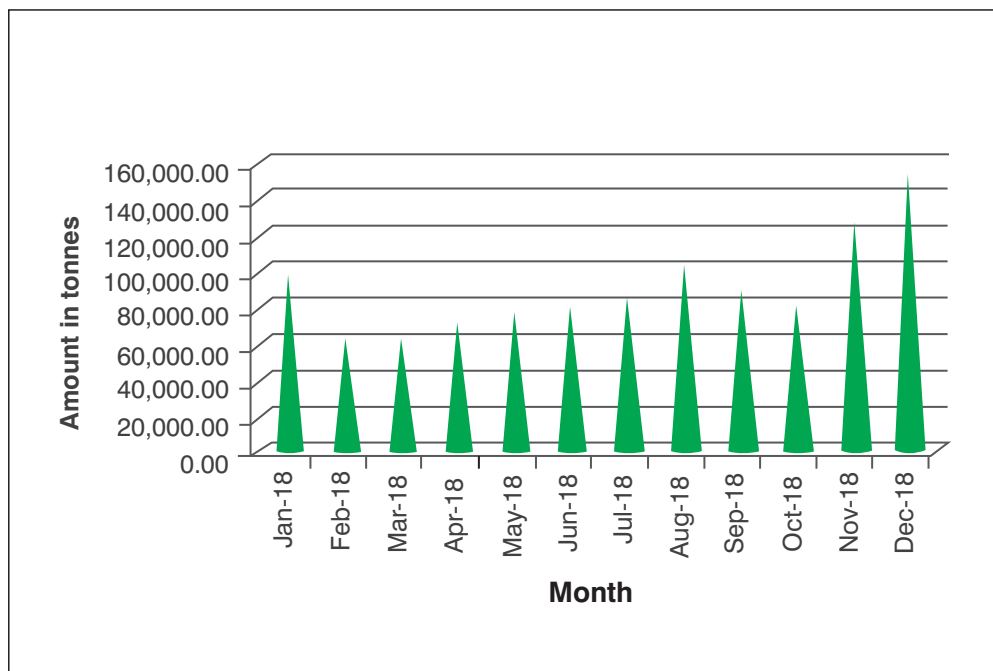


Figure 2.13: Lagos Monthly Waste Data in Metric Tonnes (2018)

Table 2.11: Lagos Waste Data for 2019 in Metric Tonnes

Month	LAWMA Landfill Dumpsites						Total
	Olushosun	Solous III	EwuElepe	Epe	AbuleEgba	Badagry	
Jan 2019	80,685.50	2,970.00	7,288.00	8,946.00	23,868.00	1,160.50	124,918.00
Feb 2019	84,712.50	-	2,415.00	10,834.50	24,156.00	1,359.00	123,477.00
Mar2019	86,651.00	1,359.00	1,668.00	9,965.50	19,761.00	1,452.50	120,857.00
Apr2019	111,164.50	14,821.00	8,811.00	12,277.00	21,028.00	1,836.00	169,937.50
May2019	87,598.50	10,971.00	6,731.00	10,065.00	14,235.00	1,332.00	130,932.50
Jun2019	102,140.50	12,157.00	7,882.00	14,631.00	13,761.00	1,836.00	152,407.50
Jul2019	85,668.00	8,971.00	8,210.00	14,025.50	9,582.00	1,467.00	127,923.50
Aug2019	86,627.50	10,642.00	8,491.00	13,692.50	8,434.00	1,521.00	129,408.00
Sep2019	109,907.00	12,288.00	9,271.00	13,928.50	9,864.00	2,115.00	157,373.50
Oct2019	81,632.00	6,816.00	7,276.00	12,437.00	5,999.00	1,674.00	115,834.00
Nov2019	112,533.50	8,350.00	11,143.00	21,319.00	8,073.00	2,025.00	163,443.50
Dec2019	91,945.00	10,195.00	10,090.00	19,213.00	7,164.00	1,638.00	140,245.00
TOTAL	1,121,265.50	99,540.00	89,276.00	161,334.50	165,925.00	19,416.00	1,656,757.00

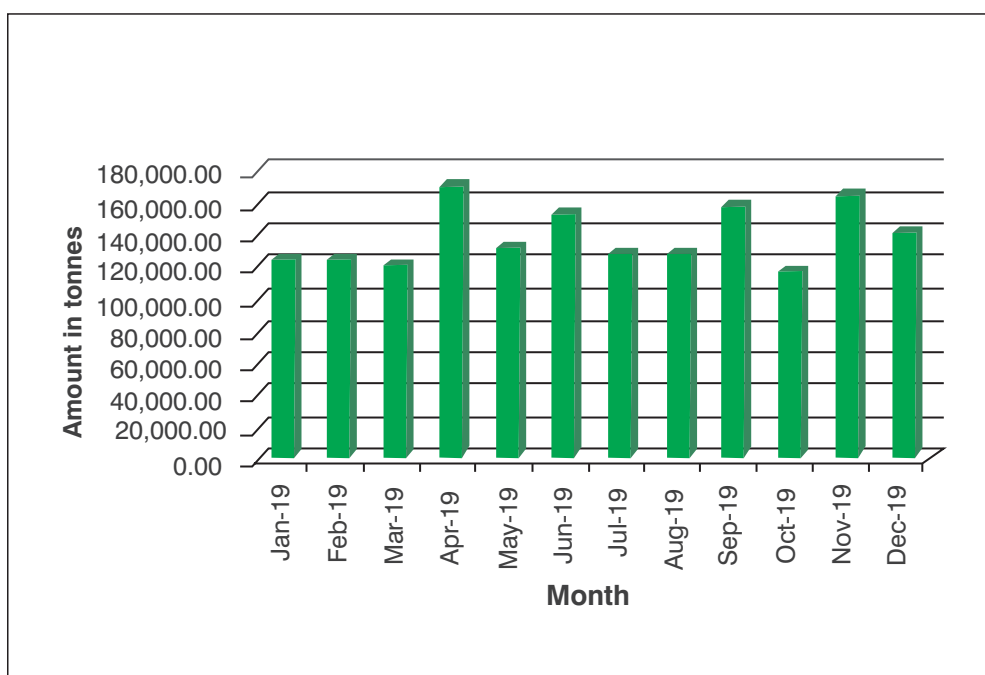


Figure 2.14: Lagos Monthly Waste Data in Metric Tonnes (2019)

Table 2.12: Lagos Waste Inventory for 2016

Waste Type	Approximate Composition in percent
Organics	43
Plastics	23
Paper	13
Textile	12
Inorganics	2
Glass	1
Metal	1
Beverage containers	1
C&D	1
HHW	1
Others	2

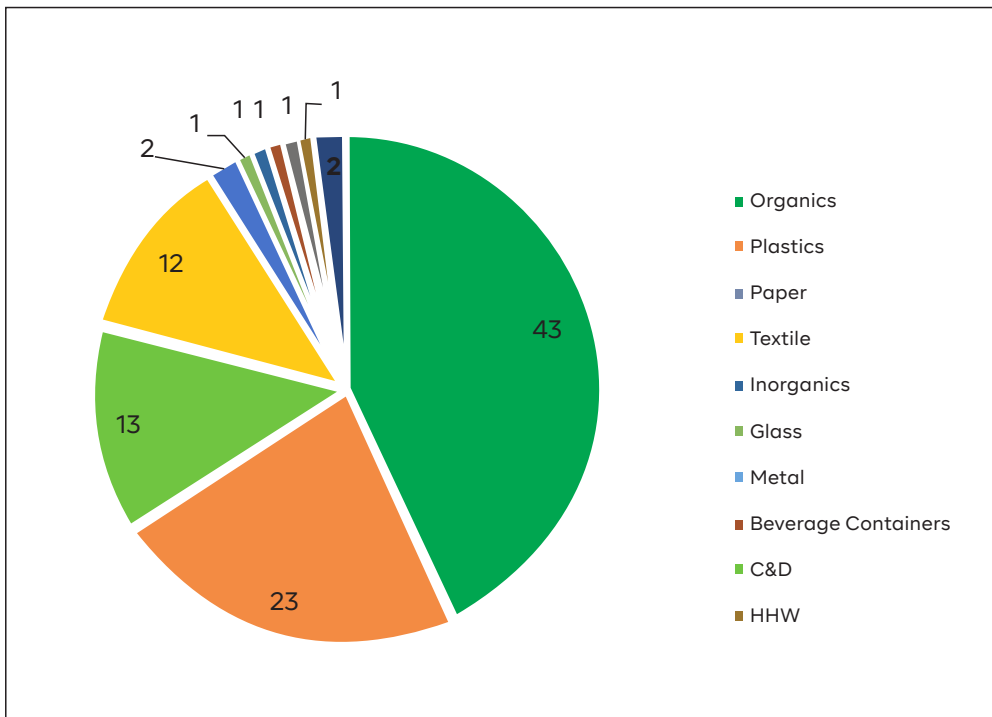


Figure 2.15: Lagos Waste Composition 2016

Table 2.13: Lagos Waste Inventory for 2015

Type of Waste	w/v%
Vegetables	45
Plastic	15
Paper	10
Fines	8
Putrescibles	8
Glass	5
Metal	5
Textile	4

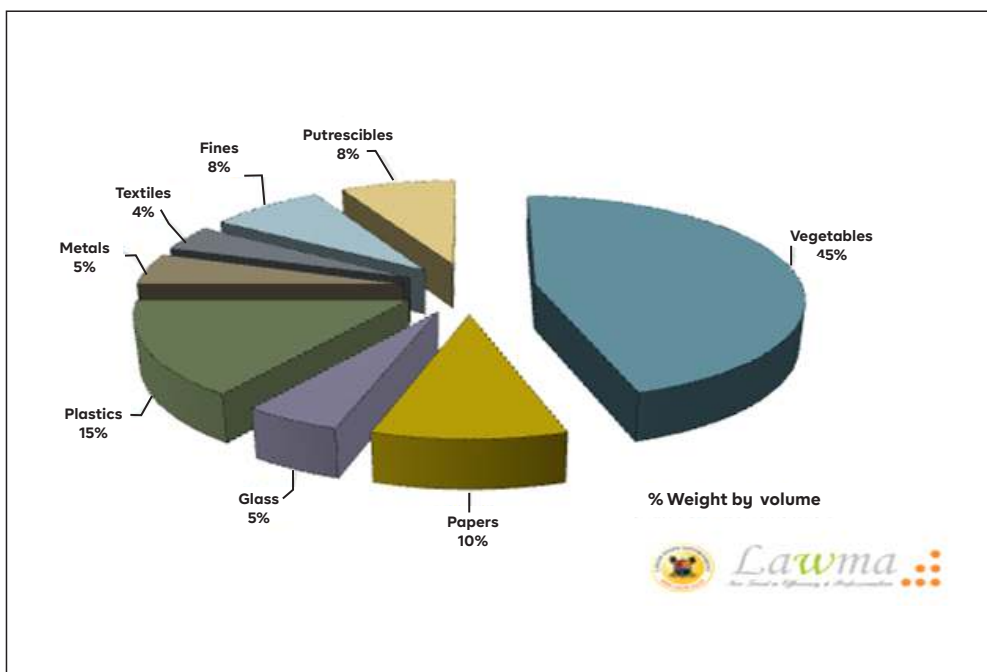


Figure 2.16: Waste Characterization for Lagos 2015

2.4 Plastics and COVID-19 Pandemic

The COVID-19 pandemic has increased the use of plastic medical and protective equipment, such as single-use gloves, masks and aprons. Much of this equipment must be discarded after use to limit the spread of the virus. However, demand for plastic packaging has also spiked in the retail sector, as customers wary of catching the virus shun loose products. Elsewhere, people are using antibacterial wipes and bottles of hand sanitizer at a rapid rate, with some worrying that discarded COVID-19 waste could soon outnumber jellyfish in the Mediterranean Sea.

As the market for plastic packaging was projected to grow by 5.5% in 2020, the cumulative effect that this will have is a much more waste plastic products for recycling, putting more burden on the plastic value-chain. In Nigeria, there has been more of the use of this protectives with careless disposal along the streets, co-mingling with other plastics and wastes ending up in the marine systems as seen in beaches around Lagos. Essentially, there is increased plastic pollution due to COVID-19 pandemic.

2.5 Marine Litters

Marine litter has been defined by the United Nations Environment as “any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Marine litters are mostly plastic, ranges from large industrial containers to plastic bags, drink containers, cigarette butts, plastic fragments, manufactured plastic pellets and numerous other consumer items. They interact not only with marine megafauna such as seabirds, turtles, marine mammals and fish, but also with bivalves, lugworms, oysters and corals.

New findings have estimated that the amount of plastic pollution in the ocean could triple by 2040 (Channels TV, 2020), if governments, businesses and communities do not take action, this becomes scary considering the fact that the findings did not take into account the recent global plastic load into the environment (Lau et al., 2020). PEW and SYSTEMIQ (2020) finds that no action to tackle marine plastic pollution would see the amount of plastic entering the ocean each year grow from 11 million metric tons to 29 million tons by 2040, bringing the total amount of plastic in the sea to a cumulative total of 600 million tons

A report by the World Economic Forum (WEF, 2016) projects that by 2050, plastics in the oceans will outweigh fish. Of the 260 million tons of plastic produced in the world yearly, about 10 per cent ends up in the ocean and 70 per cent of the mass eventually sinks, damaging life on the seabed. Also, the International Solid Waste Association (ISWA) in a study says 83 per cent of the 4.8 – 12.7 million tons of land-based plastic waste that ends up in the ocean from the 192 coastal countries originate from 20 countries, including Nigeria. A study by Africa Impact Sustainable Initiative also reports that 500 shipping containers of waste is dumped in Africa monthly. In 2010, the yearly mismanaged plastic waste for the continent was put at about 4.8 million tonnes and could reach 11.5 million tonnes in 2025 (NIMASA, 2020).

Nigeria is among the top 20 nations that contribute 83 per cent of total volume of land-based plastic waste that end up in the oceans/seas (NIMASA, 2020). It is estimated that over 200,000 metric tonnes of plastic waste from land-based sources in Nigeria is discharged into the Atlantic Ocean yearly (VOA, 2019). Nigeria generates an estimated 32 million tonnes of solid waste yearly, one of the highest in Africa (Bakare, 2020). Of that figure, plastic constitutes 2.5 million tonnes (VOA, 2019). This poses a great danger to the environment and particularly our marine ecosystem. Many coastal communities in Nigeria have no official waste collection service and there is nowhere for litter to go. Regrettably, most of the waste generated in these communities ends up in the seas and oceans (NIMASA, 2020).

It is now estimated that 8,300 metric tons of plastic have been produced by humans since the 1950s and if these rates continue, 12,000 metric tons will be in the natural environment by 2050 (Geyer et al., 2017). Plastics have been found in even the most remote parts of the Arctic and Antarctic oceans and microplastics in particular have been identified in every marine habitat (Vince and Hardesty, 2018).

According to United Nations Environment Programme (UNEP), about 80 per cent of marine litter originates on land. Plastic in the ocean results from poor or insufficient waste management and lack of sufficient recycling and recovery. UNEP identified these sources as the most important:

- Poorly managed or poorly resourced landfill sites;
- Sewage treatment and combined sewer overflows;
- People using beaches for recreation or shore fishing;
- Manufacturing sites, plastic processing, and transport;
- Shore-based solid-waste disposal and processing facilities;
- Inadequately covered waste containers and waste-container vehicles;
- Inappropriate or illegal dumping of domestic and industrial trash or waste;
- Street litter that is washed by rain or snowmelt, or blown by wind into waterways.

Microplastics result from breakdown of larger plastics and are also manufactured specifically for use in consumer goods. These small particles have high surface to volume ratios and can sorb environmental contaminants. Also, they are accessible to a wide array of marine organisms from the smallest (e.g., plankton) to the largest marine fauna (e.g., whales, fish, seabirds, and so on). Furthermore, as people eat filter-feedings marine delicacies such as shrimps, scallops, mussels and sea cucumbers, the relationship to human health and food security becomes an increasing concern (Vince and Hardesty, 2018).

2.6 Marine Pollution and COVID-19

Images of plastic littering oceans, hurting wildlife and polluting beaches are ever present, shown in Figure 2.17. Currently, COVID-19 may be worsening the problem because of a surge in the use and improper disposal of plastics and waste, including masks, personal protective equipment and single-use containers. Adding to the waste burden is a drop in

recycling, with many programs temporarily halted because of coronavirus-related health concerns. Historically low oil prices have also pushed down the cost of virgin plastic, so usage of it has increased versus the more environmentally friendly, yet more expensive recycled resin.

Nigeria, a developing country, lacks effective waste management systems and specialized collection and treatment facilities for plastics creating a major challenge to the goal of reducing the amount of plastic entering our oceans. A substantial improvement in the management of plastic waste is vital to stop the influx of plastic into rivers and oceans which is adding materially to the problems caused by over-fishing, untreated sewage and agricultural run-off, and poorly planned coastal development (World Bank, 2020).



Figure 2.17: Plastic Bottles Littering Beach



CHAPTER THREE

SURVEY OF PLASTICS
VALUE-CHAIN PLAYERS

3

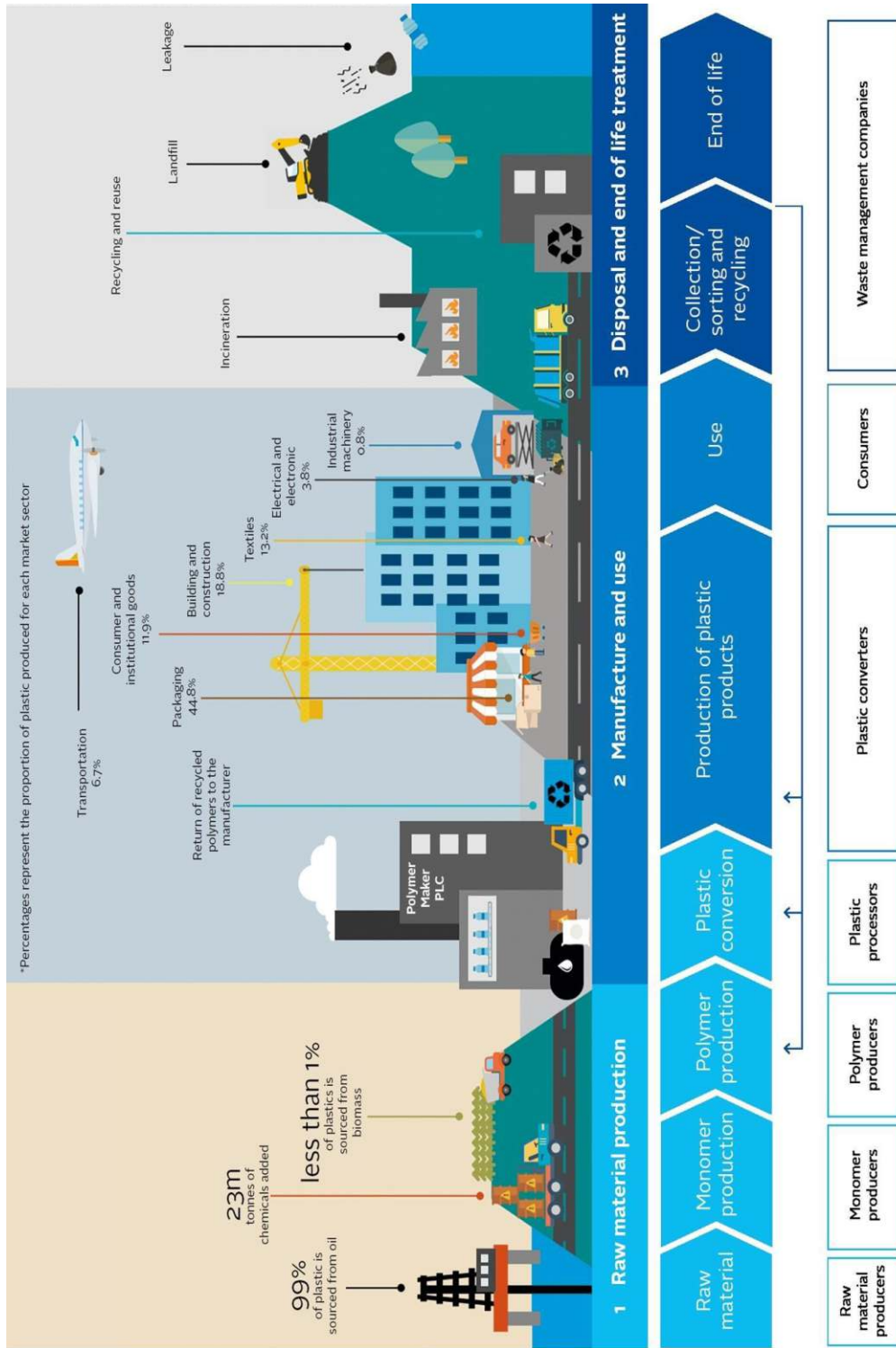
SURVEY OF PLASTICS VALUE-CHAIN PLAYERS

3.1 Plastics Value-Chain

The plastics value-chain (PVC) includes the full range of activities, which are required to bring a plastic product through the different phases of extracting raw materials, production, distribution to consumers and final disposal after use (UNEP, 2020a). The plastics lifecycle essentially consists of three main phases:

- Raw material production phase;
- Manufacture and use phase; and
- Disposal and end of life phase.

These three phases are clearly depicted in Figure 3.1 (PRI, 2020) showing the value players starting with raw material, monomer and polymer producers at the production stage; plastic processors, converters, producers and consumers at the second stage while plastic waste management companies including collectors, sorters, recyclers are involved in the end of life stage of plastics.



(Source: Principles of Responsible Investment, 2020)

Figure 3.1: Plastic Value-Chain

While plastic moves from one stage of the chain to the next, it is expected to gain value. However, the plastic value-chain remains linear with less than 20% of plastics re-entering the value-chain and huge amounts of plastics ending up in terrestrial and marine environments each year, exposing both the environment and marine life to existential problems. In addition, the diverse nature of the different plastic products, different uses and treatment routes at the end of its lifecycle increases the complexity of the value-chain as well as the number of diverse stakeholders including chemical and plastic manufacturers, consumer goods companies, retailers, waste management companies, and recycling technology companies (UNEP, 2020b).

3.2 Overview of Single-use Plastic Products Market in Nigeria

In Nigeria, the plastic value-chain players include: plastic raw material producers, polymer manufacturers, compounders, packaging producers, distributors, retailers, plastic waste collectors and recyclers. The diverse nature of the different plastic products, different uses and treatment routes at the end of its lifecycle increases the complexity of the value-chain as well as the number of diverse stakeholders (UNEP, 2020b).

Nigeria is one of the largest consumers of plastics in Africa. Between 1996 and 2017, about 20 million tonnes of primary plastics and plastic products were imported into Nigeria. This makes Nigeria the second largest plastic importer in Africa and accounts for 17 percent of the total consumption of plastic on the continent. If it remains “business as usual (BAU)” (i.e. no anticipated change in policy, use and waste attitude), and the volume continues to increase, it is determined that plastics importation and consumption is expected to reach a total of over 40 million tonnes by 2030. Euromap (2016) compiled plastics resin production and consumption data for 63 countries for the years 2009 to 2020, with 2009 to 2015 being actual while 2016 to 2020 are estimates. The data for Nigeria is presented in Table 3.1, showing year 2020 estimates of production and consumption being 0.513 Mt and 1.533 Mt, respectively.

Four categories of plastics in primary form take the largest share of importation quantities in Nigeria: polyethylene, polypropylene, polyvinylchloride, and polyesters. Together, they account for about 75 percent of total plastics imported in primary form and as products. The countries that are leading the supply of these plastics into Nigeria include the United States of America (17 percent), the Republic of Korea (13 percent), and India (9 percent) among more than eighteen other countries of origin.

Nigeria also produces a considerable amount of plastic products, which is increasing in alarming levels. In 2013, there were over 3,000 plastic product companies with a production capacity of over 100,000 tonnes per year. Approximately 5 million tonnes of polypropylene and other olefins were imported in primary form between 1996 and 2017 to supply companies that produce plastic diapers, margarine containers, yoghurt boxes, syrup bottles, rakes, plastic bottle caps, biscuit wrappers, crates, drinking straws, among others (Heinrich Boll Foundation, 2020).

One million tonnes of polyvinylchloride was imported as raw materials for companies producing pipes, wire and cable sheathing, synthetic leather products, shower curtains and food packaging. Another 290,000 tonnes of polystyrene was imported to produce disposable cups, plastic food boxes, insulation, egg boxes and seed trays, among other items. Other categories of plastics like amino resins, phenolics and polyurethanes are used largely in cushioning foams, thermal insulation foams and surface coatings. In addition to its plastic processing capacities, Nigeria produced 2.3 million tonnes of primary plastics between 2009 and 2015, ranking third among eight other African countries with considerable historical plastic resin production.

Nigeria's average plastic waste generation is hard to measure with estimates ranging from a low 7.5kg per capita per year up to 45kg per capita per year for cities like Lagos, however, consumption is rising. Already, over 850,000 tonnes of plastic wastes are mismanaged every year. Common disposal methods include dumping on landfill sites and open burning, which results in hazardous soil and air pollution as some categories of plastics contain plasticizers and flame retardants. In addition to the contamination produced by open dump sites, the light weight of many products such as plastic bags, styrofoam and straws makes it easy for them to be blown away from these sites thereby increasing the chances of routing them into water bodies. With other products like plastic bottles, they constitute a larger fraction of marine litter. More than 130,000 tonnes of plastic end up in Nigeria's water bodies every year. Nigeria is estimated to be among the top 20 countries around the world contributing to marine debris.

In Nigeria, less than 10 per cent of plastic waste generated is recycled. The low rate of recycling is partly explained by the fact that most categories of plastic waste are not usually sought after by recyclers. Examples include polystyrene waste, polyurethane foam, light packaging polymers or wastes of polyvinylchloride. As these products seem locally "unrecyclable", they constitute larger fractions of plastic waste found and left on dumpsites. Despite these huge challenges with forecasts predicting an increase in plastic use and production, there are sustainable alternatives to reduce the use of plastic.

While Nigeria consumed less than 1% of all PET bottles in 2018 globally, less than 10% of that waste gets collected and recycled, making it an environmental nuisance worldwide. In a study published in Science magazine by a team of researchers led by Jenna Jambeck of the University of Georgia, Nigeria was the ninth-largest source of ocean plastics, based on 2010 data, when the country consumed far less than it does now. The study found that 83% of Nigeria's PET waste is unmanaged. Consumption is expected to hit 300,000 metric tons by 2021, according to a report by FBRA.

Table 3.1: Plastics Resin Production and Consumption in Nigeria (2009 to 2020)

Year	2009	2010	2011	2012	2013	2014	2015	2016E	2017E	2018E	2019E	2020E
Raw Materials Manufacturing												
Plastics Production ¹	213	260	303	335	390	396	411	428	442	462	495	513
Plastics Consumption	672	713	780	821	921	1,010	1,072	1,146	1,229	1,322	1,424	1,533
Annual Growth Rate (year/year)	9.6	6.1	9.4	5.3	12.2	9.7	6.1	6.9	7.2	7.6	7.7	7.7
Export	49	33	23	8	2	1						
Import	656	584	579	617	702	754						
Consumption by Application (*)												
Packaging	53.6	51.7	51.9	51.4	52.5	52.7	52.9	53.4	53.8	54.1	54.3	54.4
Automotive	6.3	6.2	6.1	6.1	5.9	5.8	5.7	5.7	5.7	5.6	5.5	5.5
Construction indus	14.5	16.0	16.4	16.8	16.9	17.0	16.8	16.5	16.3	16.2	16.3	16.4
Elect/elec & teleco	3.4	3.5	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3
Others	22.2	22.6	22.2	22.1	21.4	21.2	21.1	21.1	21.0	20.8	20.6	20.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(*) estimates, based on analysis of total plastics consumption												
Consumption by Processing Method (*)												
Injection molding	25.1	25.2	24.7	24.9	24.2	23.9	23.7	23.6	23.4	23.2	23.0	22.8
Extrusion	52.2	53.6	53.4	53.0	51.8	51.9	52.2	52.1	52.0	51.9	51.8	51.7
Blow molding	9.3	8.5	8.2	8.3	8.2	8.4	8.4	8.5	8.6	8.6	8.7	8.7
EPS foam molding	0.3	0.3	0.3	0.2	0.3	0.1	0.0	0.1	0.1	0.1	0.1	0.1
PET preform & stretch blow moldi	5.7	4.7	5.8	5.8	7.9	7.9	7.9	8.0	8.1	8.4	8.6	8.9
Other	7.3	7.6	7.7	7.7	7.6	7.8	7.8	7.8	7.8	7.8	7.8	7.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(*) estimates, based on analysis of total plastics consumption												
Basic Data												
Population	151.874	156.051	160.342	164.752	169.282	173.938	178.721	183.636	188.686	193.875	199.206	204.684
GDP	718.866	800.185	856.619	909.731	974.435	1,052.937	1,091.700	1,128.025	1,183.115	1,253.809	1,328.130	1,408.066
Income per capita	4.733	5.128	5.342	5.522	5.756	6.054	6.108	6.143	6.270	6.467	6.667	6.879
Plastics consumpt per capita	4.4	4.6	4.9	5.0	5.4	5.8	6.0	6.2	6.5	6.8	7.1	7.5

(Source: Euromap (2016). Plastics Resin Production and Consumption in 63 Countries Worldwide: 2009 to 2020)

3.2.1 Plastic Production and Consumption Data

Table 3.2 shows Nigeria's annual plastic production data from 2009 to 2020 and depicted in Figure 3.2. Data for 2016 to 2020 are estimated values in metric tonnes (Euromap, 2016).

Table 3.2: Nigeria Plastic Production Data (2009 – 2020)	
Year	Plastic production in metric tonnes
2009	213
2010	260
2011	303
2012	335
2013	390
2014	396
2015	411
2016e	428
2017e	442
2018e	462
2019e	495
2020e	513

(Extracted from Euromap (2016). Plastics Resin Production and Consumption in 63 Countries Worldwide: 2009-2020)

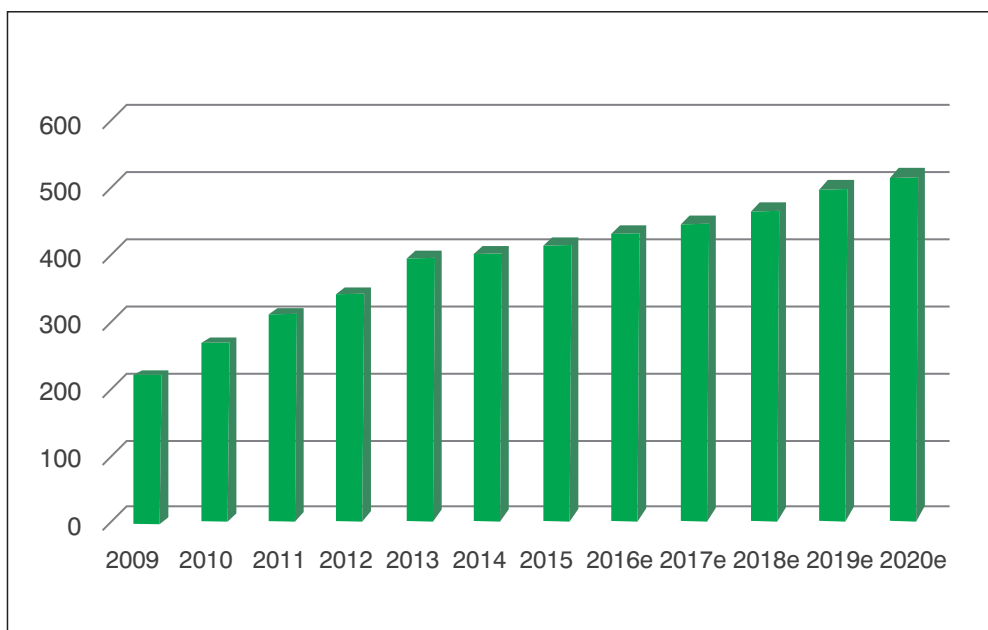


Figure 3.2: Nigeria Plastic Production in Metric Tonnes (2009 – 2020)

The yearly plastic consumption data for Nigeria from 2009 to 2020 is shown in Table 3.3 and represented in Figure 3.3. Data for 2016 to 2020 are estimated values in metric tonnes (Euromap, 2016).

Table 3.3: Nigeria Plastics Consumption Data (2009 – 2020)

Year	Nigeria plastic consumption in metric tonnes
2009	672
2010	713
2011	780
2012	821
2013	921
2014	1,010
2015	1,072
2016e	1,146
2017e	1,229
2018e	1,322
2019e	1,424
2020e	1,533

(Extracted from Euromap (2016). Plastics Resin Production and Consumption in 63 Countries Worldwide: 2009-2020)

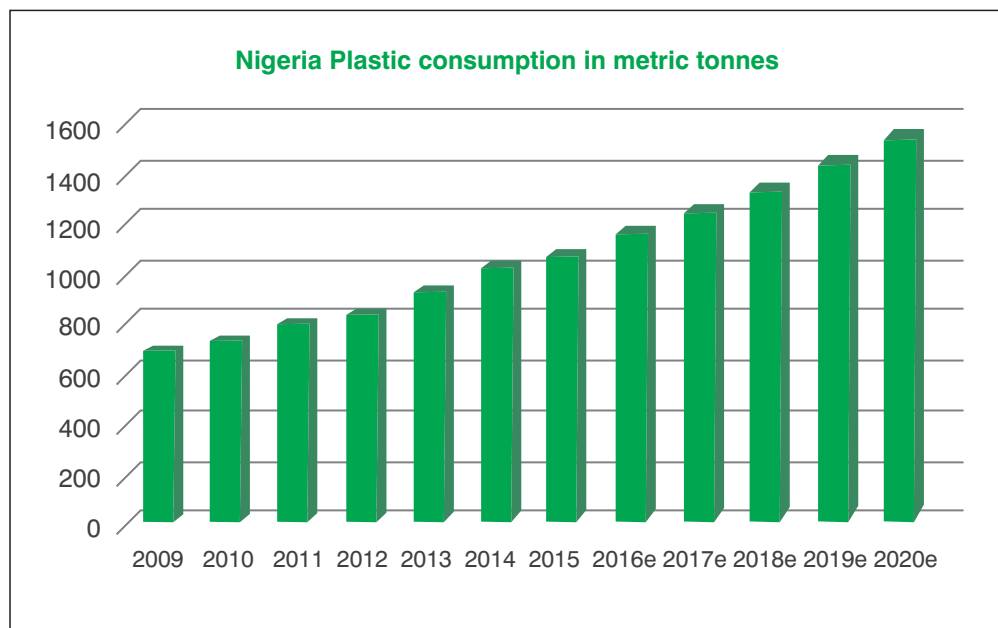


Figure 3.3: Nigeria Plastic Production Data (2009 – 2020)

Average consumption data for plastics by application from 2009 to 2020 is presented in Table 3.4 and shown in Figure 3.4.

Table 3.4: Plastics Consumption by Application (2009 – 2020)	
Application	Average consumption by application in percent (2009 – 2020)
Packaging	53.1
Automotive	5.8
Construction	16.3
Electrical/Electronics/IT	3.4
Others	21.4
Total	100.0

Calculated from Euromap (2016)

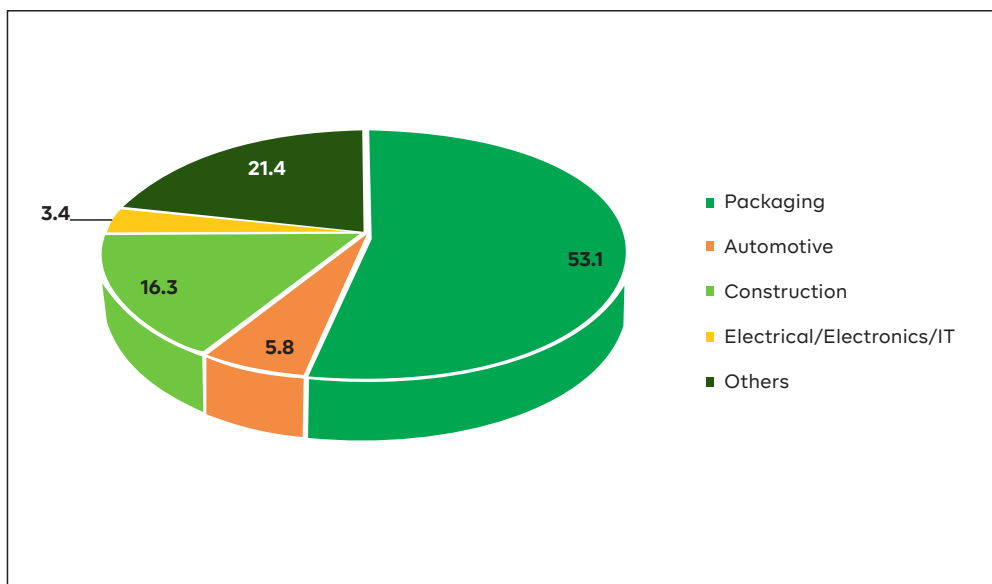


Figure 3.4: Average Consumption by Application in Percent (2009 – 2020)

Average consumption data for plastics by processing method, from 2009 to 2020, is shown in Table 3.5 and depicted in Figure 3.5.

Table 3.5: Average Consumption by Processing Method (2009 – 2020)	
Application	Average consumption by processing method in percent (2009 – 2020)
Injection molding	24.0
Extrusion	52.3
Blow molding	8.5
EPS foam molding	0.2
PET preform blow mold	7.3
Others	7.7
Total	100.0

Calculated from Euromap (2016)

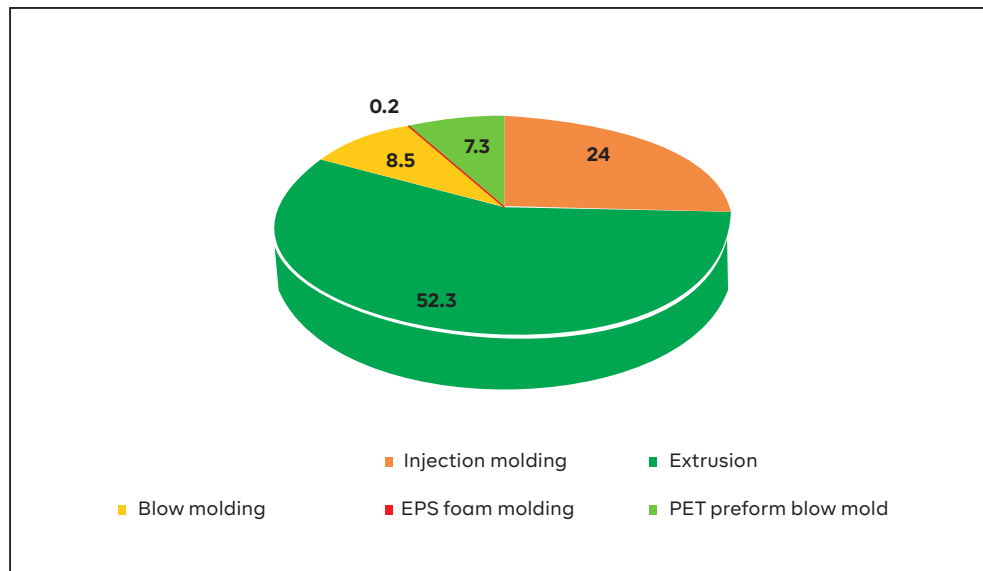


Figure 3.5: Average Consumption by Processing Method in Percent (2009 – 2020)

3.3 Plastics in Nigeria

Percentage consumption data for plastics by applications: Packaging 55%, Construction 16%, Automotive 6%, Electrical/Electronics/Telecommunications 3%, Others 20%.

Plastic policy

National policy on environment (revised, 2016), plastic-related:

- Secure and enforce a legislative ban on plastic bags; and
- Restrict and/or tax the use of polluting non-biodegradable consumer products including plastic shopping bags.

National policy on solid waste management (2018), plastic-relevant:

- Categories for sorting should include glass, paper, plastics etc. for reuse;
- Promote technologies for recycling of waste components including plastics;
- National Waste Management Resource Action Program, Producers' Responsibility for plastic, plastic as business opportunities in waste to wealth; and
- Promotion of plastic recycling, especially PET bottles.

Plastic waste management (2020), overall goal of the approved national policy on plastic waste management is to promote sustainable use of plastic as a resource through its life cycle management. The policy introduces new measures such as the following:

- limit the impact of littering of single-use plastic packaging product and waste materials;
- Bans single use plastic bags and styrofoam (Micron > 30 μ) and levy on thicker plastic bags and promote the use of alternatives to plastics (e.g. jute bags, leaves, paper, etc.) effective May 2020.
- Ban plastic bags, cutlery, styrofoam and straws, effective January 2025;
- Ensures that all plastic packaging in the market are recyclable or biodegradable or compostable and reusable by 2030.
- Phase out single-use plastic bags and Styrofoam, effective December 2028;
- Sets national and state-wide targets for 65% recycling rate for municipal waste, 75% recycling of packaging waste, reduce landfill to maximum of 10% of municipal waste, 50% recycling of all plastic waste, and use of plastic bags per person reduced by 50% by 2030;
- Requires mandatory EPR schemes most notably on all packaging items and introduce by law a nationwide bottle deposit requirement, a 5% deposit refund schemes for beverage containers; 5% charge on all single use grocery bag by 2021; alternatives are exempted from fines, no mention of bio-based plastics but biodegradables being exempted from fines; transform all plastic products, packaging materials and its waste to resource materials; and
- Generate a database on plastics, amongst others.

Presently, there has not been any pronouncement on the implementation but there are signals that it will soon receive priority attention, it was approved in October 2020.

Plastic Waste Treatment

Percentage of plastic waste treatment is as follows: recycle 10%, dumpsite 80%, others 10%. This is shown in Table 3.6 and plotted in Figure 3.6.

Some plastic waste treatment practices in Nigeria include:

- Bin bags are used in Nigeria
- There is no separation of waste at source
- Plastics are not separated from other wastes at source
- Generally, manual sorting is used to separate plastics from other wastes
- Final products of recycled plastics include pellets, fillings, interlocking tiles, ornaments, footwear, packaging bags
- Alternative materials to plastics such as bio-based plastic, biodegradable plastic, and oxo-degradable plastic are yet to be introduced into the Nigerian market.

Table 3.6: Plastic Waste Treatment Method

Treatment method	Plastic waste treatment in percentage
Recycle	10
Dumpsite	80
others (open burning, incineration, etc.)	10

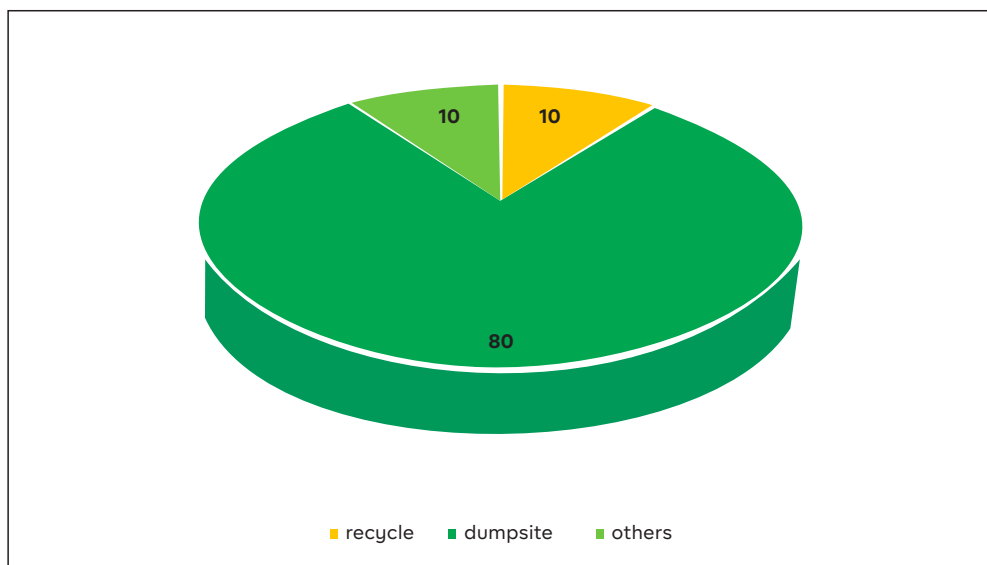


Figure 3.6: Plastic Waste Treatment in Percentage

Packaging

In most cases, there are no labels on the products which indicates the product/packaging is plastic, or indicates the polymer type but some like BAGCO super sack indicates PP, shown in Plates 3.1a and 3.1b.



Plates 3.1a and 3.1b:
PP Packaging with Label

Packaging used for various types of food, beverage, drink often found in supermarkets include LDPE, HDPE, PET, PS. They are shown in Plates 3.2a, 3.2b, 3.2c and 3.2d.



PET drink



HDPE beverage



PS food



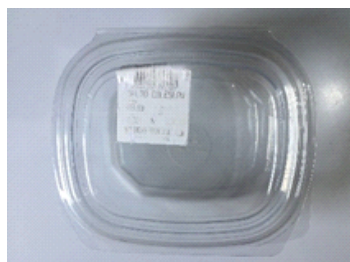
LDPE bread

Plates 3.2a, 3.2b, 3.2c and 3.2d: PET Drink, HDPE Beverage, PS Food, LDPE Bread Packaging

Packaging used for microwavable food/frozen food is HDPE and packaging used as salad container is PS, shown in Plates 3.3a and 3.3b.



Microwavable food container HDPE



Salad container PS

Plates 3.3a and 3.3b:
Microwavable Food
Container HDPE and
Salad Container PS

Packaging used for fresh vegetables and fruits is PS/LDPE films.

Packaging used for dry food/ingredients, liquid-based food/ingredients, and powder-based food/ingredients are shown in Plates 3.4a, 3.4b and 3.4c.



LDPE dry food



HDPE liquid-based food



PP energy-based food

Plates 3.4a, 3.4b and 3.4c: LDP Dry Food, HDPE Liquid-Based Food and PP energy-Based Food

Packaging used for shopping in supermarket, drug/cosmetic stores, retail stores are shown in Plates 3.5a, 3.5b, 3.5c and 3.5d.



Justrite supermarket



Shoprite



Clinic



Retail store

Plates 3.5a, 3.5b, 3.5c and 3.5d: Justrite, Shoprite, Clinic and Retail Store Shopping Packaging

Packaging used for shopping in open markets are shown in Plates 3.6a, 3.6b, 3.6c and 3.6d.



Market



Market



Market



Market

Plates 3.6a, 3.6b, 3.6c and 3.6d: Four Types of Shopping Packaging in Open Markets

Plastic Pollution

Situation of littering on the roads and beaches are shown in Plates 3.7a, 3.7b, 3.7c and 3.7d.



Plates 3.7a, 3.7b, 3.7c and 3.7d: Beach, Canal, Drainage, Road Pollution

Waste disposal/collection bins in use are shown in Plates 3.8a, 3.8b and 3.8c.



Plates 3.8a, 3.8b and 3.8c: Three Types of Waste Disposal/Collection Bins in use by LAWMA

3.4 Survey of Plastic Products Value-Chain

3.4.1 Overview of the Survey

The main objective of the plastic value-chain survey is to understand the current status of plastic production and needs of single-use plastics value-chain in Nigeria. The questionnaire is basically composed of business category specific questions inclusive of needs and value-chain wide questions on awareness, perception and their interests on environment and more environmentally-friendly plastic issues. Questionnaires were developed for eight categories of plastic value-chain players, namely: raw material producers, polymer producers, compounders, packaging producers, distributors,

retailers, recyclers and waste collectors. Questionnaires were provided electronically to companies' organizations and individual companies, followed up by face-to-face interviews, virtual meetings and telephone interviews. Interviews were conducted with visits to offices and in strict adherence to COVID-19 protocols. KoBoCollect data depository system was used for processing and analysis of the information submitted by the companies through the questionnaires

Single-use plastic products that were targeted include: food containers, cups for beverage, straws, cotton bud sticks, balloons and sticks for balloons, packets and wrappers, beverage containers, their caps and lids and beverage bottles, sachet water packaging, tobacco product filters, sanitary wipes/towels, lightweight plastic carrier bags, lightweight plastic wrappers/storage bags and fishing gears. Plastic value-chain data of targeted single-use plastic products was obtained for compounders, packaging producers, distributors, retailers, recyclers and waste collectors. Potential stakeholder companies currently producing single-use plastic products that are interested and willing to adopt new materials and/or technologies through local consultation, questionnaire and meetings were identified.

3.4.2 Scope and Methodology of Survey on Plastic Value-Chain in FCT and Lagos

Survey was carried out in consultation with major stakeholders involving contacts with value chain players and their organizations. Data was obtained using questionnaire survey, field survey and interviews. The construction of the research instruments was done and finalized in conjunction with UNIDO and FMEnv experts and administered to the value-chain actors. There were two teams for the study. Lagos team lead, Bosun Oladimeji, obtained required data from value-chain actors in Lagos. FCT team lead, Akin Adewole, was in charge of the stakeholders in FCT.

3.4.3 Analysis of Survey of Plastic Value-Chain Players

The number of Survey and questionnaire administration for plastic value-chains players in the study areas (FCT and Lagos) was carried out using KoboCollect an open data kit. Analysis of the data collected was carried out using the KoboCollect software version 1.28.0. A concise description of the important aspects relating to activities being undertaken by plastics value players in Nigeria is provided in Table 3.7.



Table 3.7: Simple Description of Single-Use Plastics Chain in Nigeria

Value Chain Group	Chain Position	Current Activities	Current Technologies	Notable Players	Missing Activities
Raw Material Producer	Production	They are involved in the manufacturing of household plastics (chairs, tables, bowls, buckets, ball pen, thermoforming cups, etc.	Blow moulding Injection moulding Thermoforming	The Papillon Plastics Company	Local fabrication of equipment Production of biodegradable plastics Extraction of plastics raw materials from natural gas, polymerization process to produce petro-based plastics pellets (PP/PE/PET/PS/PVC) Natural gas cracking processes, then polymerization process to produce pellets
Polymer Producer	Production	None was encountered	-	-	Alternatives to plastic products New environmentally friendly, cost-efficient technologies
Compounder	Manufacture	Injection moulding manufacturing process to produce plastic furniture. Plastic furniture and dry process in the factory. Manufacture of plastic bags, packages, plastic water tanks They are majorly involved in the manufacturing of household plastics, ball pen foam pack and domestic pet jars. Thermoforming cup, plate and bowl - coolers/ warmers	<ol style="list-style-type: none"> 1. Injection moulding technology, 2. blow moulding, 3. Polyurethane foaming, 4. Pet blowing and 5. Thermoforming 	<p>Altak Industries Ltd. Agiville Industries Ltd Sonhart Investments Limited The Papillon Plastics Company</p>	
Packaging/product Producer	Manufacture	Plastic film extrusion of polyethylene into film ranging from a thickness of 3-300 microns Variety of laminates (solvent-based and solvent less) structures for food and non-food applications. Producers of plastic bags, bread wrappers and carrier bags Sellers of plastics bags, bread wrappers and carrier bags Packaging and storage containers used by pharmaceuticals companies, drug stores and hospitals, food & beverages producers.	<ol style="list-style-type: none"> 1. Polymer Extrusion Gravure 2. Flexographic printing process 3. Asia Technology 4. Extrusion blown film 5. Extrusion sheet 6. Thermoforming 7. Injection Moulding 8. Blow moulding 9. Lamination 	<ol style="list-style-type: none"> 1. Omnik Ltd. 2. Dura Pack Limited. 3. Celplas Industries Nigeria Ltd 4. Sacvin Nigeria Ltd. 5. Polyfilm Packaging Nigeria Ltd. 6. Mega Plastics Industry Ltd 7. Seven-Up bottling company 8. Bagco Morpack 	<p>Locally manufactured equipment New environmentally friendly, cost-efficient technologies Bio-based packaging</p>

Cont. Simple Description of Single-Use Plastics Chain in Nigeria

Value Chain Group	Chain Position	Current Activities	Current Technologies	Notable Players	Missing Activities
Distributor	Use	Lightweight plastic carrier bags, plastic bin bags, food containers, etc. Plastics like food packet, food container, light weight plastic food wrapper, etc.			Bio-based plastic products
Retailer, Supermarket, Brand Owner	Use	Sales of plastic products such as plates, parkers, water Bottles, trays and other items. Plastic chairs and tables, waste basket, plates and bowls, cups etc.		Seven-Up Bottling Company Nigerian Bottling Company/Coca Cola Unilever	r-PET not in use, not legislated in Nigeria
Waste collector	Recycling	Collect recyclables from households, pubs and buy from other aggregators. Crush HDPE, PP and LDPE plastics and sell as raw materials Zebaj produces Polypropylene (PP) plastic pellets from household waste such as plastic buckets, paint buckets, broken chairs etc. Nolds Integrated Services is a nascent company in the sphere of waste management and recycling. It focuses on collection of plastic wastes. Currently in the initial phase which is collection but intends to expand to recycling to other products.		Nolds Integrated Services Ltd. Slay Dot Com Aid Initiative Chanja Datti LOYAR GLOBAL RESOURCES JANIRAK RECYCLERS D ALLURE SCRAP Wecyclers ZEBAJ RECYCLING LIMITED ALAMONK RECYCLERS LTD Recyclan	Sorting of wastes at source of generation Properly organized waste collection
Recycler	Recycling	BASF uses cost-effective pyrolysis technology to regenerate original crude oil content from sorted PP, PE and PS. Harvests recyclables directly from post-consumers thus generates very neat materials.	1. Pyrolysis 2. Baling and Crushing	Alkern Lexsz Plastics Ltd BASF West Africa Ltd. RecyclePoints Omnik	Organized recycling activities More recycling activities within Nigeria More incinerating facilities for energy recovery

3.5 General Overview of Plastic Value-Chain in FCT and Lagos

The Lagos team administered 64 questionnaires to 59 companies while FCT obtained 41 filled questionnaires from 40 companies. The two teams received a total of 105 questionnaires obtained from 99 companies in Lagos and FCT. All companies that participated in this study willingly volunteered and submitted their questionnaires after clarifications, interviews and successful administration.

Lagos state study area has the highest number and categories of players in the plastic and single-use plastic sector that were interviewed. A total number of 59 companies were interviewed in Lagos consisting of 5 recyclers, 20 waste collectors, 8 distributors, 13 retailers, 12 packaging producers, 5 compounders and a raw material producer as five (5) companies are involved in the value-chain both as waste collectors and as recyclers.

A total of forty (40) companies operating in the single-use plastic sector in FCT, were interviewed. This study reports 11 recyclers, 10 waste collectors, 10 distributors and 10 retailers as one company operates both as a waste collector as well as a recycler in FCT.

This assessment therefore covers a total of 99 companies involved in waste collection, recycling, retail/brand ownership, distribution, packaging and compounding areas of plastic value-chain. Only one company submitted questionnaire for raw material production. The study obtained more actors involved in the downstream than in the upstream sectors of the chain. The study revealed that there are many players in Lagos than in FCT.

A total of 105 questionnaires were successfully administered and analyzed during the course of this plastic value-chain assessment. This is made up of 59 value-chain players in Lagos and 40 in FCT. Five companies in Lagos and one in FCT are actively involved in two categories of the value-chain. Table 3.8 gives a summary of PVC questionnaires administered.

Table 3.8: Summary of Plastic Value-Chain Questionnaires

Value - Chain	Lagos	FCT	Total
Recycler	5	11	16
Collector	20	10	30
Retailer	13	10	23
Distributor	8	10	18
Packaging	12	-	12
Compounder	5	-	5
Raw Material	1	-	1
Total	64	41	105

Figure 3.7 shows the percentage of each category of the value-chain. Collectors (29%) and retailers (22%) constitute about half of the companies surveyed. The downstream constituting collectors and recyclers constitute 43.8% (46 out of 105) while midstream, made up of retailers and distributors, account for 39.1% (41 of the 105 questionnaires) of the questionnaires obtained for assessment. In essence, the upstream sector constitutes less than one-fifth (17.1%), that is 18 out of 105 questionnaires analyzed for the plastic value-chain.

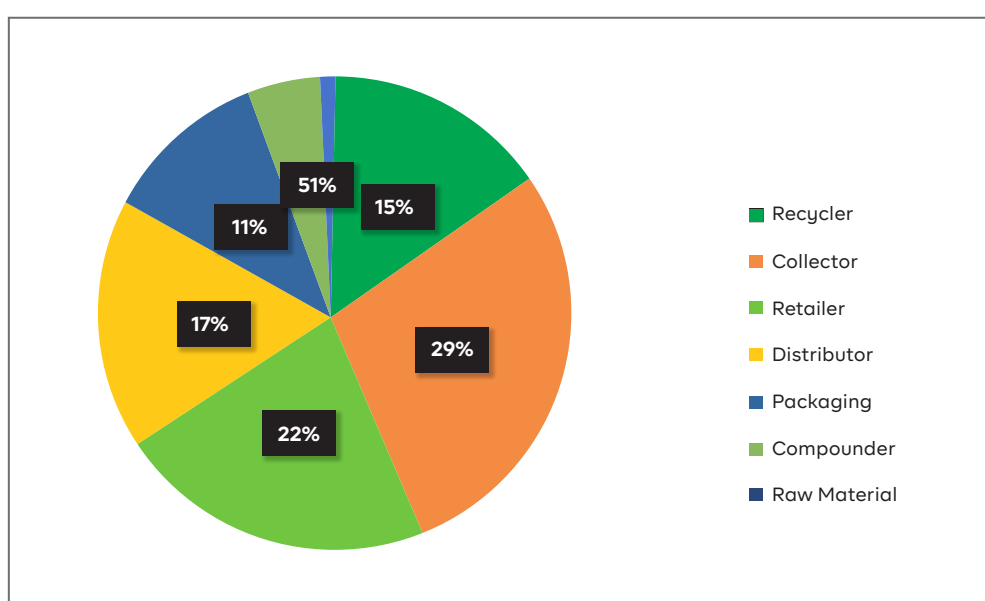


Figure 3.7: Percentage of Each Value-Chain Category

3.5.1 Compounders

Five (5) companies in this category willingly submitted their questionnaires for analysis. All the five are in Lagos. Three out of the five compounders use recycled plastics. They are all located in the Lagos study area. The 3 companies using recycled plastics attributed the usage to satisfactory quality and cost effectiveness with no effect when mixed with virgin plastics. The 2 compounders that are not using recycled plastics expressed fear for the impact on the quality of the products, especially if it is to be used for food contact products.

Only one compounder uses alternative raw materials. The remaining four have never considered the use. The company using it reported challenges in the regular increase in price of the raw materials, non-availability of trained personnel and non-availability of cheap machines for proper production due to absence of appropriate technology. The other 4 companies complained that alternative raw materials are not available, there is lack of experience, non-availability of technology with staggering high cost coupled with probable negative customer reactions.

3.5.2 Packaging Producers

All the twelve (12) packaging companies are in Lagos. Nine companies (75%) use recycled plastics while the remaining three (25%) do not use. The concerns they have include its limitation for use especially for food contact products and also its use from limited sources to control the quality as in the case of materials produced through in-house production process. The reasons put forward for not using recycled plastics is all about quality for food contact products, lack of knowledge and specifications by buyers.

Only one of the companies (9%) has used alternative raw materials while the remaining eleven companies (91%) have never considered its use. Challenges to be encountered in using alternative materials like biodegradable for carrier bags/compostable include cost of importation and cost of raw materials. Reasons adduced for not considering use of alternative materials include the cost in comparing plastic with paper bag and also no proper alternative for product dealt like bread bags.

3.5.3 Distributors

There were ten (10) distributors in FCT and eight (8) in Lagos that willingly participated in the survey making a total of eighteen (18) companies involved in distribution aspect of the plastic value-chain acting midstream of the sector between producers and end users.

Most of the distributors in Lagos (6 out of 8, 75%) do not have any collection system for the used plastics (bottles, packaging, containers) at customer's office/factory/shop. In FCT, 4 out of the 10, less than half of the distributors have collection system for used plastics. Overall, 6 out of the 18 distributors have collection system for the used plastics, while 12 out of the 18 (66.7%) do not have collection system. Therefore, most of the distributors (67%), that is two-thirds, do not have collection system for used plastics at customers' places.

None of the distributors in Lagos currently perform as used plastic collector upon delivery as 7 out of the 8 distributors responded non-affirmatively. Only four out of the ten distributors, less than half (40%) in FCT currently perform as used plastics collector upon delivery, the remaining 6 companies (60%) do not perform as collector. Therefore, for the 17 distributors in FCT and Lagos that responded to this question, only 4 (23.5%) perform as used plastics collectors upon delivery, 13 (74.5%) do not.

Distributors' willingness to collect used plastics upon delivery and bring them to recyclers; assuming that this is required by value-chain customers, 6 FCT distributors are ready to do this without charge, 3 are ready but must be with charges while only one distributor positively consider this, clearly none of them is unwilling. In the case of Lagos, the trends seems to be contrasting with that of FCT as most of the distributors (6 out of 8, 75%) are willing with charge but none is willing without charge while the remaining 2 are considering it positively. For FCT and Lagos, 6 (33.3%) are willing without charge with all the 6 in FCT, 9 (50%) made up of 3 in FCT and 6 in Lagos willing to do so but with some charges while 3 (16.7%) positively consider. None of the distributors in FCT and Lagos are unwilling to collect used plastics. In essence, all distributors are willing to collect used plastics upon delivery. This is presented in Table 3.9 and shown in Figure 3.8.

Table 3.9: Willingness to Collect Used Plastics Upon Delivery

Collect used plastics	FCT	Lagos	Total
Yes without charge	6	-	6
Yes with charge	3	6	9
Positively consider	1	2	3
No	-	-	-
Total	10	6	18

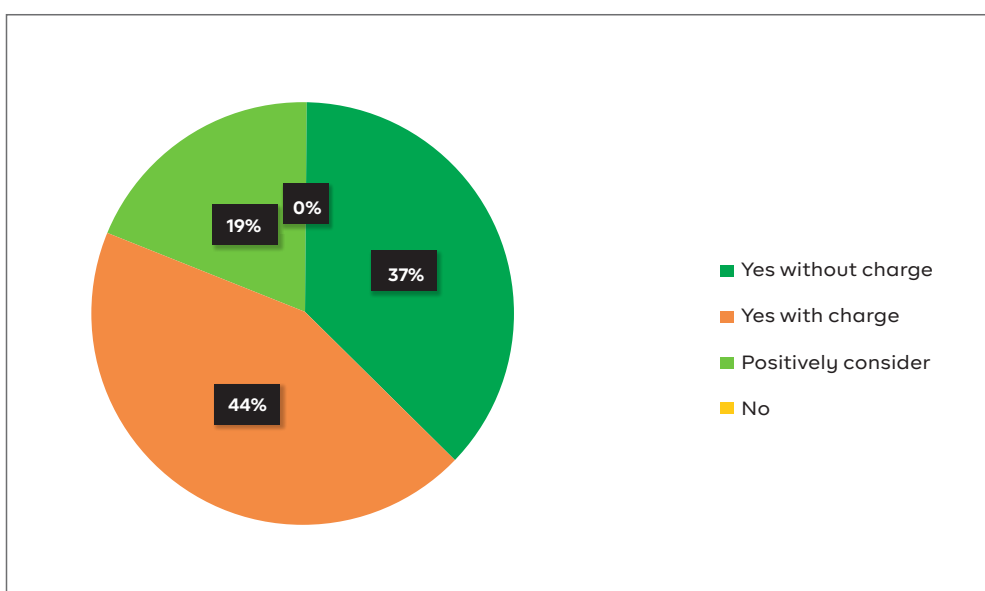


Figure 3.8: Willingness to Collect Used Plastics Upon Delivery

3.5.4 Retailers

Thirteen (13) retailers in Lagos and 10 in FCT participated in this survey, making a total of twenty-three (23) retailers. In the area of promotion of environmental protection at shop/business, 5 FCT retailers (50%) don't practice environmental protection, 2 are planning to practice environmental protection while only 2 of them (20%) are really into environmental protection with no response from a retailer. In a nutshell, half of them (50%) are not into environmental protection at their places of work with one-fifth (20%) being environmentally conscious.

The trend in Lagos is on the positive side, 9 out of 13 retailers (69.2%) are actually into good environmental practices, only one (7.7%) is planning to do so while three (23.1%) are on the negative side. There is more environmental protection practice with retailers in Lagos (69%) than in FCT (20%). Overall, about half of the retailers in FCT and Lagos (11 retailers, 47.8%) currently practice environmental protection, 3 (13.0%) are planning to do so with 8 retailers (34.8%) not currently practicing environmental protection and a retailer (4.4%) didn't respond. This is summarized in Table 3.10 and shown in Figure 3.9.

Table 3.10: Retailers' Environmental Protection at Work Place			
Practice Protection	FCT	Lagos	Total
Yes	2	9	11
Plan to do	2	1	3
No	5	3	8
Mute	1	-	1
Total	10	13	23

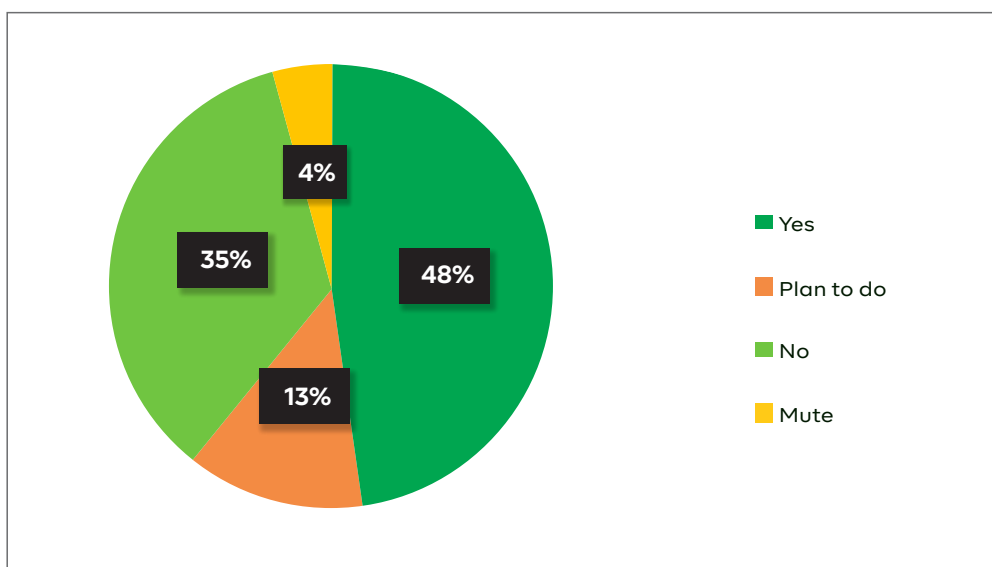
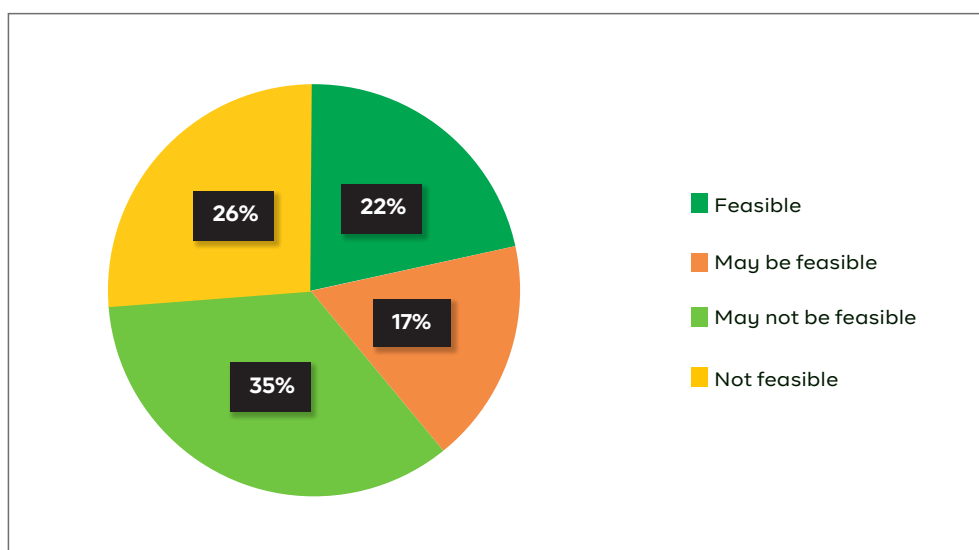


Figure 3.9: Retailers' Environmental Protection Practice at Workplace

While all the retailers in FCT and Lagos provide single-use plastic bag for free to customer, none charges for provision of the plastic bags, the feasibility of charging the customer for plastic bags has shown that the trend swings to not feasible, 7 out of 13 in Lagos ticked not feasible (2)/may not be feasible (5) while 7 out of 10 in FCT responded with not feasible (4)/may not be feasible (3). The trend shows more inclination to not feasible in FCT than in Lagos. At the other end, 5 out of the 13 in Lagos and 3 out of the 10 in FCT chose feasible/may be feasible. Summary of the trends is presented in Table 3.11 and depicted in Figure 3.10.

Table 3.11: Feasibility of Charging Customers for Plastic Bags

Feasibility	FCT	Lagos	Total
Feasible	2	3	5
May be feasible	1	3	4
May not be feasible	3	5	8
Not feasible	4	2	6
Total	10	13	23

**Figure 3.10:** Feasibility of Charging Customers for Plastic Bags

For feasibility of providing bag alternative to plastics, Table 3.12 and Figure 3.11 present our findings. The trend swings to being feasible as 11 out of 17 retailers (64.7%) that responded chose feasible/may be feasible. On the other hand, those that chose not feasible/may not be feasible are 6 out of 17 (35.3%).

Table 3.12: Feasibility of Providing Bag Alternative to Plastics

Feasibility	FCT	Lagos	Total
Feasible	3	2	5
May be feasible	2	4	6
May not be feasible	2	2	4
Not feasible	2	-	2
Total	9	8	17

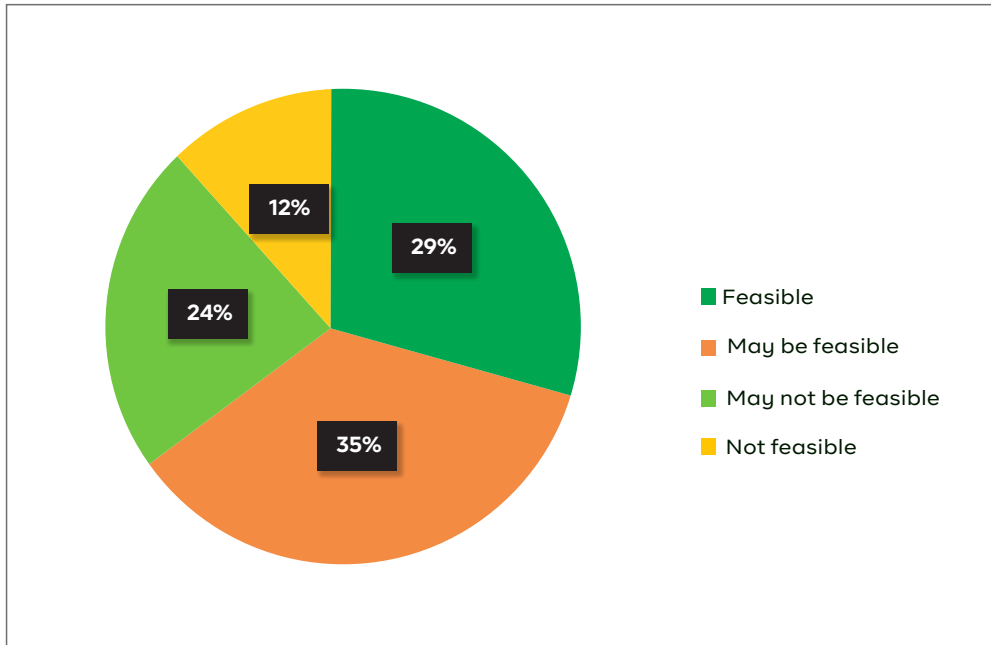


Figure 3.11: Feasibility of Providing Alternative Bags to Plastics

As regards choice of alternatives to plastics, Table 3.13 and Figure 3.12 show surprising choice of paper bag by 6 out of 8 Lagos retailers (75%) that responded to the question despite being a metropolitan mega city which is in contrast to that of FCT where 6 out of 9 (66.7%) chose bio-based as alternatives. This probably shows that FCT retailers are more knowledgeable about alternatives to plastics as they are located in the administrative capital where federal ministries and agencies headquarters are sited. Overall, it seems that paper bag is the choice of retailers as alternatives to plastics as 9 out of the 17 respondents (52.9%) chose paper and interestingly, most of them are in Lagos (6 in number).

Table 3.13: Choice of Alternatives to Plastics			
Choice	FCT	Lagos	Total
Paper bag	3	6	9
Biodegradable	-	1	1
Bio-based	6	1	7
Total	9	8	17

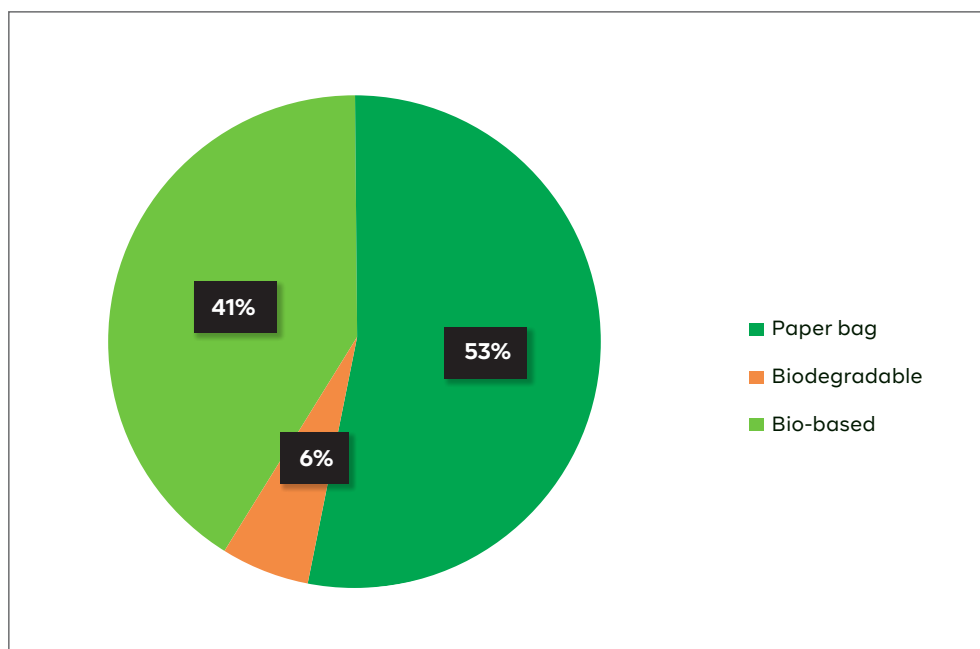


Figure 3.12: Choice of Alternative Bag to Plastic

Efforts to reduce the use of SUP at shop/business is presented in Table 3.14. Clearly, retailers are not really putting in efforts to reduce usage of single-use plastic at their workplaces and shops as most of them (15 out of 23, 65.2%) do not put in efforts at all

Table 3.14: Efforts to Reduce Usage of Single-Use Plastics			
Reduce SUP	FCT	Lagos	Total
Yes	4	4	8
No	6	9	15
Total	10	13	23

Most of the retailers (13 out of 20, 65%) that responded to sales of products from recycled plastics don't sell recycled plastics. The remaining 7 retailers (35%), all in FCT responded that they sell recycled plastics still pointing to the fact that FCT retailers are more abreast with plastics management issues than their Lagos counterparts. Also, none of the Lagos retailers sells recycled plastics. There is more of recyclability in FCT than in Lagos. Probably, the main reason for not making sales of recycled plastics in Lagos is that they do not have vast knowledge of the products unlike their counterparts in FCT.

Customer perception of recycled plastics is that they are generally less expensive as shown in Table 3.15 with Figure 3.13.

Table 3.15: Customer Cost Perception of Recycled Plastics			
Customer Perception	FCT	Lagos	Total
More expensive	2	-	2
Same price	-	5	5
Less expensive	8	8	16
Total	10	13	23

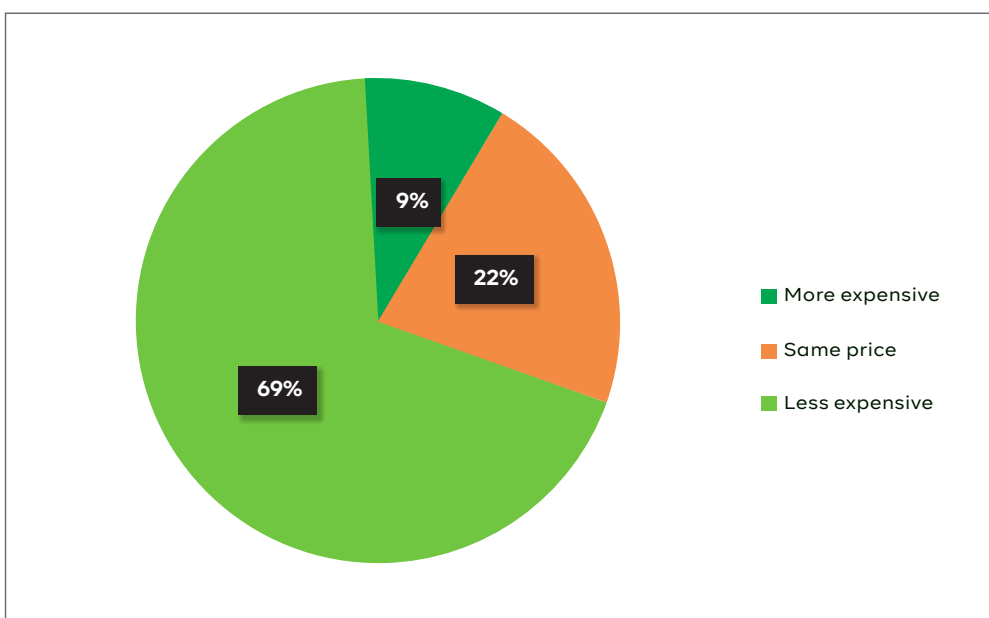


Figure 3.13: Customer Perception of Cost of Recycled Plastics

All respondents indicated that recycled plastics are not of high quality but mainly of a lower quality (17 out of 22, 77.3%). This is presented in Table 3.16 and shown in Figure 3.14.

Table 3.16: Customer Quality Perception of Recycled Plastics			
Customer Perception	FCT	Lagos	Total
Higher quality	-	-	-
Same quality	1	4	5
Less quality	9	8	17
Total	10	12	22

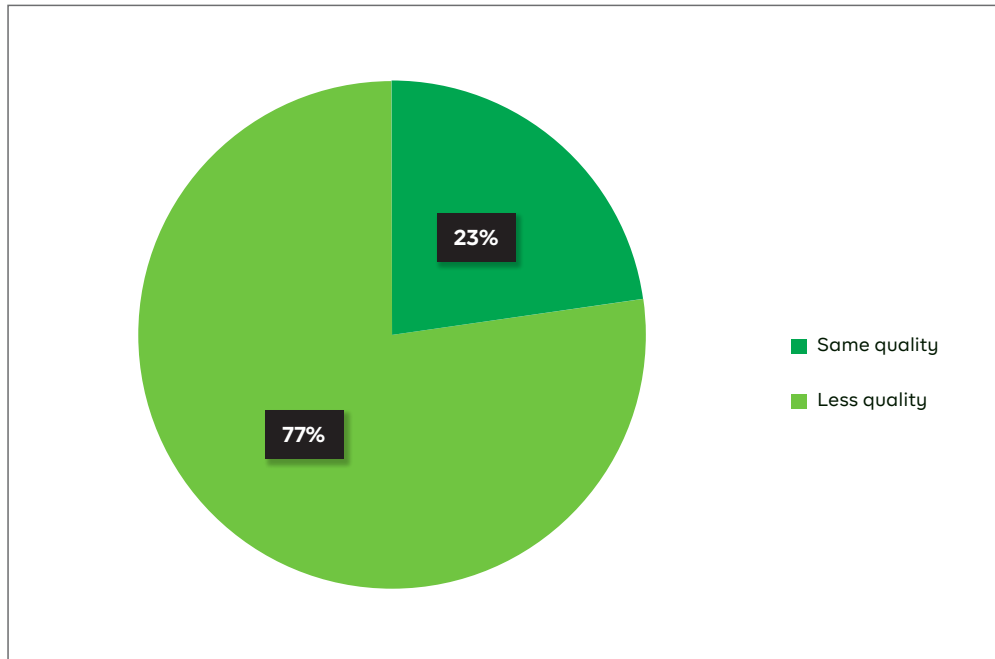


Figure 3.14: Customer Quality Perception of Recycled Plastics

Almost all customers perceive recycled plastics as being safe/rather safe (20 out of 22, 90.9%), only 2 of them (9.1%) perceive them as not safe/rather not safe.

Generally, most retailers do not consider selling alternative plastic products (13 out of 22, 59.1%). However, the same contrasting trend is observed as majority of Lagos retailers do not, while majority of FCT retailers consider selling alternative plastic products. Major reason for not considering sales of alternative to plastics is simply a matter of demand following the principle of 'no customer/market demand'.

3.5.5 Waste Collectors

Thirty (30) waste collectors participated in this survey and it comprises of 10 in FCT and 20 in Lagos. This category of plastic value-chain is the most surveyed in this assessment as it constitutes 30 out of the 105 questionnaires administered (28.6%).

Top five used plastic item collected by them include:

- Beverage (PET) bottles, their caps and lids;
- Food containers;
- Sachet beverage packaging;
- Lightweight plastic carrier bags; and
- Plastic bin bags.

Used plastic are collected at:

- Residents;
- Garbage dump site;

- Plastic collection site;
- Companies; and
- Retailer, supermarket and brand owner.

Major conditions that the waste plastics have to undergo before being brought to recyclers include - it has to be sorted by type, sorted by colour, must be clean with no contamination and must undoubtedly be bailed. Most sorting work is done manually in Nigeria.

3.5.6 Recyclers

Sixteen (16) recycling companies (FCT 11, Lagos 5) participated in the survey. The waste plastics being processed for recycling include beverage (PET) bottles, caps and lids, lightweight plastic carrier bags, sachet beverage packaging, plates and cups, lightweight plastic food wrappers, bottles for water, bottles for other drinks, food containers.

Collection of waste plastics is done by:

- Company's own personnel;
- Purchase from waste collector company;
- Getting from retailers, super markets, brand owners;
- Purchase from informal collectors; and
- Purchase from municipality collection service.

Majority of the recyclers (12 of the 13 recyclers, 92.3%) use mechanical/material recycling to produce PET bottles. Only one company carries out chemical recycling on feedstock to produce liquid chemicals. Major challenges faced by recyclers is correct sorting and then contamination of used plastics.

3.5.7 Specific Findings

Plastic Products in Nigeria

Products dealt with by plastic value chain actors in Nigeria include PET bottles/caps/lids, light weight plastic carrier bags, plastic bin bags, food containers, food packets, cups for beverage, straws, plastic chairs and tables, drums and waste bins.

Plastic producers (compounder/packaging)

- Recycled plastic: the product quality is the major challenge/discouraging element for its use, especially for food contact.
- Alternative raw materials: The cost of raw materials, availability of technology and lack of knowledge on production are the major challenges/discouraging elements.

Retailers

- Providing plastic bag: Most of retailers provide plastic bags for free and the feasibility of charging for bags is generally negative as 14 out of the 23 retailers (60.9%) perceived not feasible/may not be feasible.
- Alternative bag: The majority of respondents (11 of 17, 64.7%) perceive alternative bag to plastic to be feasible to provide to customers. Most retailers in FCT (6 of 9, 66.7%) suggested bio-based material as against paper material put forward by most retailers in Lagos (6 of 8, 75.0%).

Waste Collectors/Recyclers

Correct sorting and cleanness of used plastics brought for recycling is a major concern, which will determine the quality of recycled plastics. Most waste collectors conduct manual sorting with possible mechanization requiring training of workers for better sorting knowledge.

Other Findings

Some of the findings include:

- Bioplastic is not well known among single-use plastic value-chain companies as 72 of 99 surveyed companies (72.7%) do not know at all;
- There is high level of interest (63.6%) on bioplastic and available options (63 of 99 surveyed companies);
- Awareness raising and promotional activities are needed for PVC players;
- There is high level of awareness (68.7%) on the environmental impacts of plastic wastes (68 of 99 surveyed companies);
- Most retailers (13 of 23, 56.5%) do not sell products from recycled plastic nor consider selling alternative plastic products.

In conclusion, there is a wide gap between retailer wares and consumer needs which requires bridging the gap through provision of necessary friendly alternatives that this study intends to tackle through provision of alternative raw materials and technologies.

3.5.8 Awareness on Environmental Impact of Plastic Wastes

Most of the plastic value-chain companies (about 70%) are aware of the environmental impacts of plastic wastes, shown in Figure 3:15.

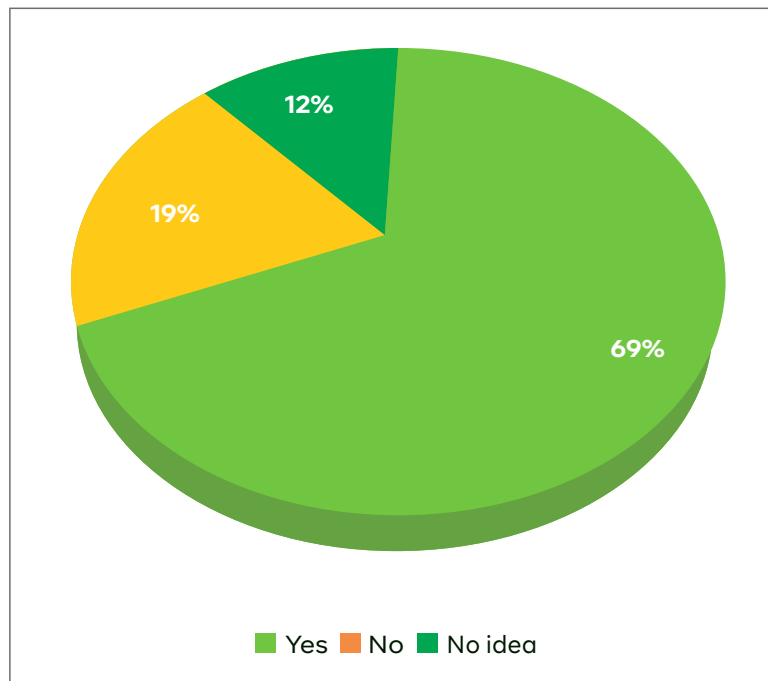


Figure 3.15:
Awareness on
Environmental
Impact of Plastic
Wastes

Policy measures considered to be effective in reducing usage of single-use plastics include the following in order of priority as chosen by the plastic value players:

- Laws and acts mandating the producers for waste recovery;
- Ban of use and sales of certain SUP;
- Levy on SUP producers/suppliers;
- Levy on consumers; and
- Levy on retailers.

3.5.9 Extended Producer Responsibility (EPR)

In terms of the extended producer responsibility, 22 out of the 27 companies (81.5%) in FCT that responded know about EPR while only 5 out of the 27 companies (18.5%) claim not to have heard about it. This is shown in Figure 3.16. In Lagos, 28 out of 41 (68.3%) reported in the affirmative while those that have never heard about EPR are 13 in number constituting (31.7%), shown in Figure 3.17. Plastic value-chain actors in FCT are more knowledgeable in EPR than those in Lagos. Summing up, 50 out of 68 in FCT and Lagos (73.5%) know about EPR while 18 out of 68 (26.5%) do not know about EPR, this is depicted in Figure 3.18.

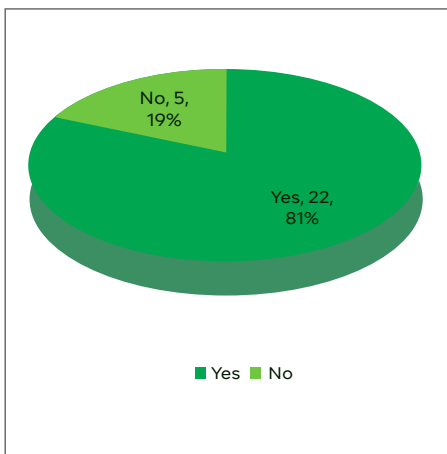


Figure 3.16: FCT
Knowledge of EPR

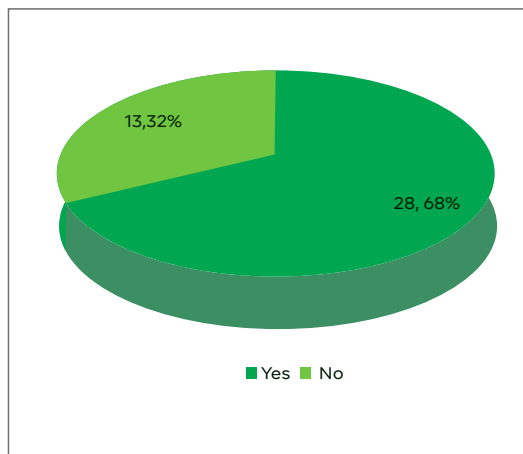


Figure 3.17: Lagos
Knowledge of EPR

Figure 3.19 shows that most of the companies in FCT and Lagos (76%) can cope with EPR, in the event that it becomes a regulation while the remaining 24% said they can't cope.



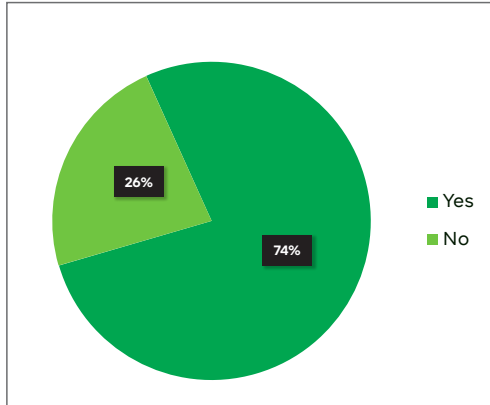


Figure 3.18: Lagos and FCT Knowledge of EPR

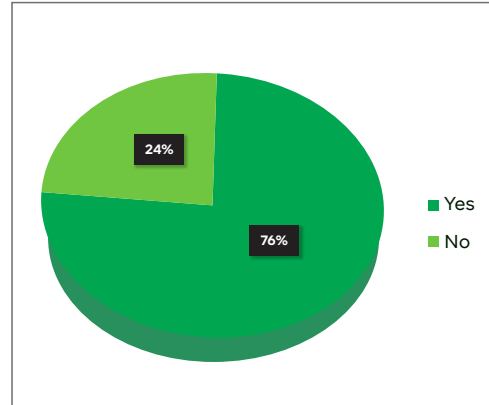


Figure 3.19: Ability to Cope with EPR

Majority of those companies in Lagos (95%) will consider redesigning their products in terms of collectability and use of alternatives if EPR becomes a regulation as shown in Figure 3.20. In FCT just above half (60%) are in the affirmative, as shown in Figure 3.21.

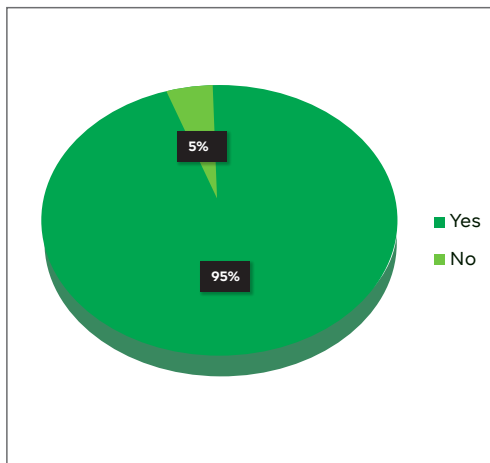


Figure 3.20: Lagos Redesign Product for EPR

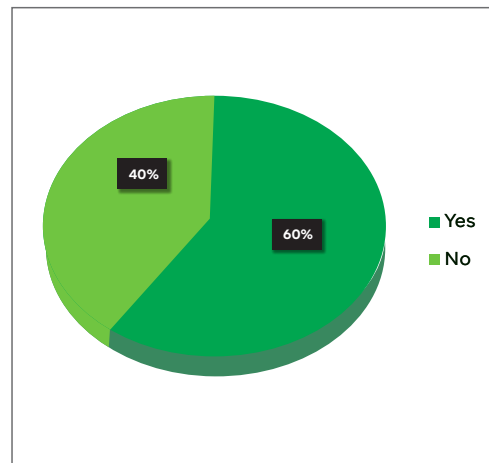


Figure 3.21: FCT Redesign Product for EPR

Compounders were reluctant about the expected price increase to the product putting pressure on inflation as well as their fear that the government may not be able to impose fair EPR across the industry. Retailers' concerns are that it is time consuming, being a difficult process. However, for waste collectors, it is a big boost for them, as it is going to be easier for collection and also for recyclers, it will boost collection drive and increase volumes of collection.

3.6 FCT Value Chain Players

In Abuja the following value chains categories were interviewed and questionnaires administered to recyclers, waste collectors, distributors and retailers.

3.6.1 Recyclers

A total number of 11 recyclers were interviewed and completed the questionnaires. Majority of the respondents that completed the questionnaire on behalf of their establishments are top ranked personnel (managers, field managers, assistant project managers) in their organizations.

Brief description of businesses, products and operations

Below are the list of businesses, products and operations carried out by some of the recyclers and their recycling businesses in the FCT;

- Assist organizations in safeguarding the environment and promote sustainable development which includes engineering/environmental services, management systems and engineering services.
- Committed to transformation of waste to value (wealth) with increasing demand to rid our environment of non-biodegradable waste materials.
- Collect plastic bottles and recycle them into new products
- Waste management, litter control, vegetation control, health safety and Environment services.
- Provide non-hazardous solid waste collection, recycling and landfill disposal services to commercial, industrial, governments and residential customers.
- Assist and ensure homes and business come up with smart solutions for all of their waste needs.
- Carry out appropriate waste and single-use plastics sorting into High density, Low density and polyethylene terephthalate (PET), while the PET is baled together for easy transportation
- Engage in household waste management, buy from the waste collectors and recycle single-use plastics product such as plastic PET bottles.

Plastic Products and Recycling Business Operation

The survey shows beverage (PET) bottles, caps and lids are mainly the plastic products recyclers deal with, while lightweight plastic carrier bags, sachet beverage packaging and lightweight plastic food wrappers are other plastic products that these recyclers handle including other materials like glass and tires. This is shown in Figure 3.22.

Type of business in value chain

Recyclers in FCT engage in different types of plastic business aside recycling as all the respondents in this value chain acknowledged they are recyclers as well as waste collectors including others shown in Figure 3.23.



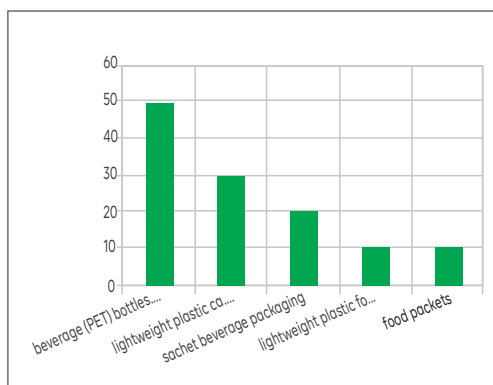


Figure 3.22:
Type of Plastic Products

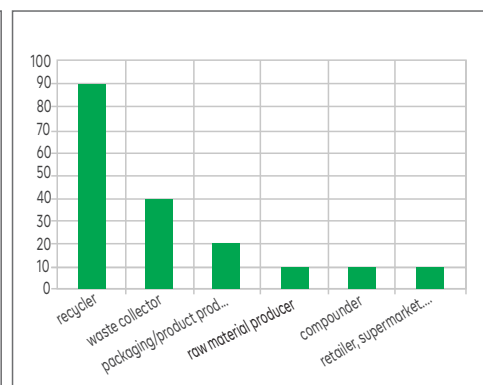


Figure 3.23:
Type of Business in Value-Chain

The survey result indicated that most recycling business in the FCT were established between years 2011 and 2021, while some were founded between 2000 and 2010. Most respondents (10 out of 11) prefer not to give details of their recycling business capital investment as just one respondent indicated business start-up with a capital roughly above N500,000 (about \$1,000).

Most recyclers (8 out of 11, 72.7%) prefer non-disclosure of their employment capacity. Those that responded have capacity to employ between 10 and 25 employees, out of which female employees are less than 5 and their male counterparts are more than 10 in number.

Type of Plastics Collected for Recycling

Most respondents (7 out of 11, 72.7%) collected bottles for water, plates and cups, food containers, bottles for other drinks to recycle while the remaining (27.3%) would rather not mention the kind of plastics they collect for recycling.

Approximate Quantity (kg) of Waste Collected for Recycling Per Month

Only 2 recyclers responded, one of the respondents indicated he collects 4,000kg of waste per month without details on the types of waste collected while the other respondent collects 10,000kg of water bottles per month, 15,000kg of bottles for other drinks and 1,000kg of food containers all per month.

Waste Collection Methods

Survey result indicated that 6 respondents purchase from waste collector companies as a means of collecting their single-use plastic waste, another 6 respondents make use of their employees to collect their single-use plastic wastes, another 4 respondents collect from retailers, supermarkets and brand owners, 3 respondents purchase from the informal waste collectors while only one of them purchase from municipality collection service. This is shown in Figure 3.25.

The method of recycle as indicated by all the respondents in the survey result is mechanical/material recycle, where plastic waste particularly the single-use plastics undergo sorting, packaging (milling or grinding), washing and drying, then re-

granulating thus producing recyclates that can be converted into plastic products substituting the virgin plastics. Recycled products as indicated in the survey result are turned into PET bottle by all the FCT recyclers.

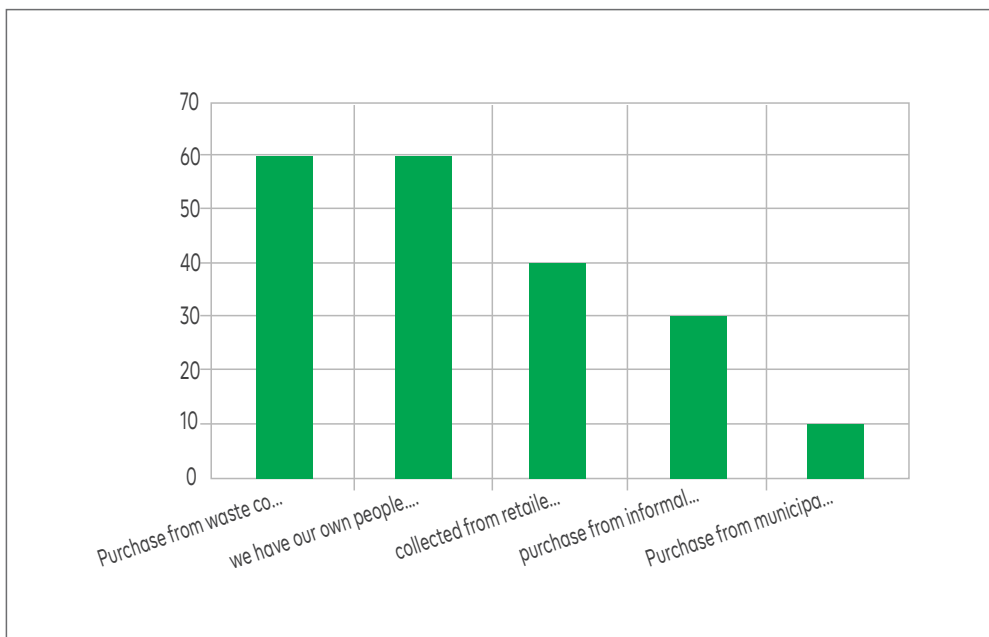


Figure 3.24: Waste Collection Methods

Processing Capacity of Used Plastics

The average capacity in tonnes of plastic waste processed in the FCT daily is 3,001.3kg, as indicated in the responses shown in our survey, 3 respondents gave records of what they process monthly. Data is quite an essential tool as this will inform any prospective investor in the waste sector, particularly single-use plastic waste, to assess the quantum of plastic wastes that might be available for use either as feedstock or raw material for intended operations and capacity.

Products from feedstock recycle are chemicals in solid form as indicated by majority of the respondents while 4 respondents had no response. Most of the respondents that answered this question used their recovered as power generation plant, while the others used theirs at waste incineration plant.

Challenges Faced Regarding Used Plastics

Recyclers (all respondents) in the FCT stated the following problems when it comes to used plastics: contamination of plastics, inappropriate sorting, insufficient knowledge on the types and classification of single-use plastics with no definite technical challenges mentioned.

Bio-Plastics

All respondents showed their knowledge of the different types of bio-plastics, but majority of the respondents understood partially what bio-plastics are, while the remaining confidently explained what they know about bio-plastics.

Data gathered from the survey showed that 6 of the respondents maybe wanted to know about bio-plastics and the different available options for their recycling business, while 4 respondents are willing and ready to know what bio-plastic is and the options available for their businesses.

Environmental Impacts of Plastics

All respondents (11) answered this question which shows that the environmental impact of single-use plastic is evident in our communities and environment, 7 said somehow yes, while remaining 4 said yes.

Reason Hampering the Reduction of Plastic Use

Most recyclers mentioned lack of awareness on the side of consumers, lack of regulatory framework, lack of awareness on the side of plastic producers and product characteristics as the top reasons hampering the reduction of plastic use in the FCT. This is shown in Figure 3.25.

Responsible Institution Considered to Reduce Single-Use Plastics Usage

All respondents indicated that the responsibility of plastic waste reduction should be vested in the local government authority.

Policy Measures Considered to Reduce Single-Use Plastic Usage

Levy on consumer, laws and acts mandating plastic single-use producer for waste recovery of their product, levy on single-use plastic producers/suppliers and levy on retailer were all indicated as top policy measures to be considered for effective reduction in the use of single-use plastics. This is depicted in Figure 3.26.

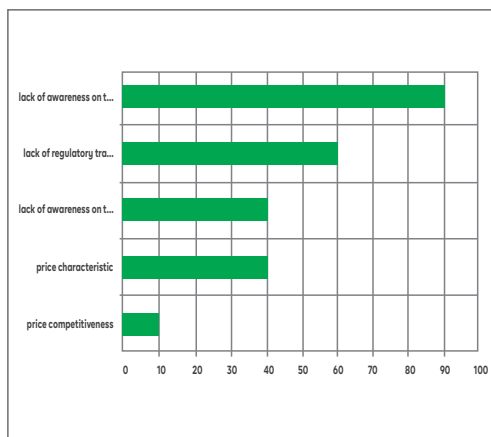


Figure 3.25: Reason Hamper Reduction Plastic Use

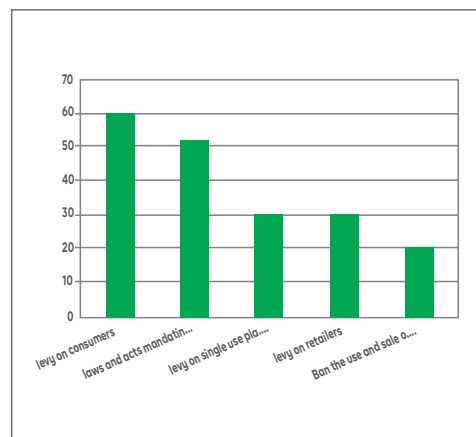


Figure 3.26: Policy Measures to Reduce Plastic Use

Extended Producers Responsibility (EPR)

The survey record indicated that 7 respondents know little about EPR while 4 recyclers indicated that they know EPR. About half of the respondents indicated EPR will cause demand for recycling to be less, 5 respondents are of the opinion that with EPR the quality of recycled product will be better, 3 of them indicated that demand for recycling will be more, while only one respondent believes the quality of recycled product will be worse and this might affect their business.

3.6.2 Waste Collectors

A total number of ten (10) waste collectors were interviewed and completed the questionnaires.

Plastic Products and Recycling Business Operation

The survey shows food containers and beverage (PET) bottles, their caps and lids as some of the major plastics product dealt with as indicated by the respondents (71.43% of the respondents), lightweight plastic food wrappers (57.14%) and sachet beverage packaging (57.14%) are also in the list of collectors in the FCT. In addition, plastic bin bags, food packets and cups for beverage accounts for the least of the plastic waste collected as indicated by the respondents (28.57%) with other materials dealt with being HDPE (chairs, tables, etc.).

Type of business in Value-Chain

Some waste collectors are involved in compounding and distribution of plastic wastes, as shown in Figure 3.27.

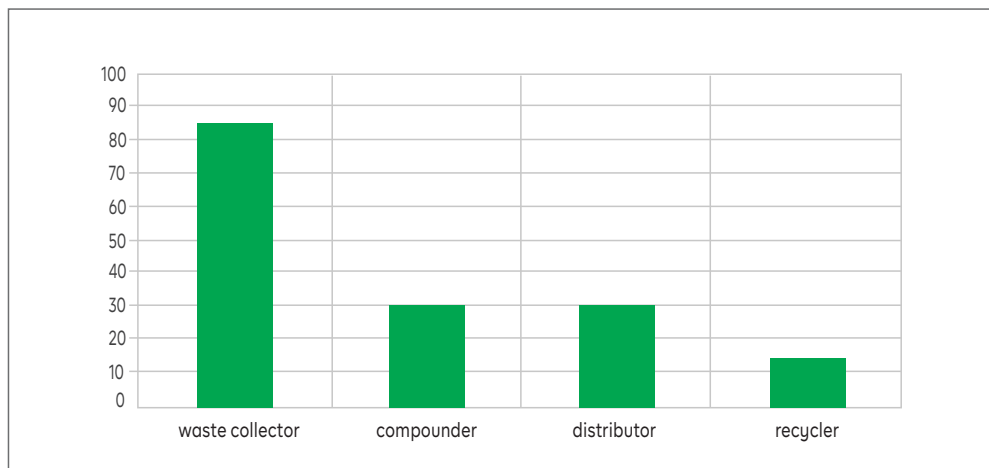


Figure 3.27: Type of Business in Waste Collectors

Two of the waste collectors in FCT established their businesses between years 2011 and 2020. Other respondents preferred not to say when their businesses were established.

Business Capital

One respondent indicated investment capital to be above N500,000 and another respondent between N100,000 and N200,000.

Employment Capacity

A respondent answered that its organization currently has between 26-35 employees on their payroll with more than 20 of the employees being females, all engaged in different capacities ranging from full time employment, part time and informal employments.

Revenue

Two respondents reported a revenue generation within the last three years (2017-2019) to be above N500,000 while other respondents preferred not to mention what their revenue had been.

Plastic waste collected and approximate quantity

Water bottles, milk bottles, food containers, pastes and cups, bottles for other drinks and ice cream containers are the plastic waste collected for recycling with two respondents indicating that water bottles of 15,000kg/month, milk bottles of 10,000kg/month and bottles for other drinks of 1,000kg/month were all collected.

When these plastics are collected, all respondents showed that they carry out segregation of different kinds of plastics, 85.71% of respondents take away residues from the collected plastics and 85.71% of respondent also carryout bundling of the plastics before they are being transported to the recyclers. This is presented in Figure 3.28.

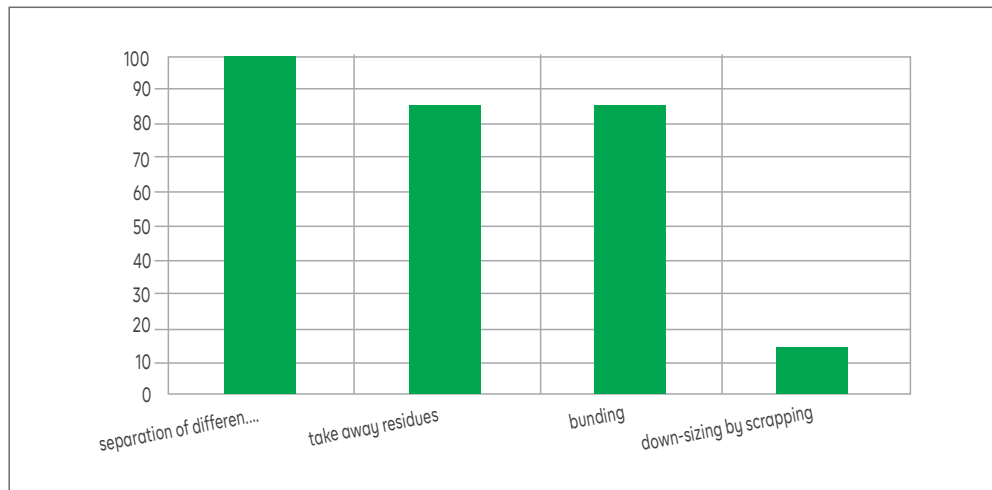


Figure 3.28: Processing of Waste Plastics Collected

Separation of plastic wastes

More than half of the respondents (57.15%) indicated that they separate plastic wastes by manual sorting, while the remaining ones did not mention how they separate their wastes.

Situation of Plastic Generation in recent years

All respondents indicated that plastic waste, particularly single-use plastic generation in recent years has increased a lot.

Plastic Waste Collection Points

Wastes are collected by respondents from residents, retailer, supermarket & brand owner, plastic collection points, companies and garbage dumpsites. All used plastics collected by the waste collectors at different collection points are sold to the recycler.

Recycling companies that buy used plastics in FCT

Waste collectors sell their used plastics to franchise recycling companies located in FCT.

Price of used plastics sold to recycling companies

Results gathered from the survey show respondents (28.57%) sold used plastic above N20 per kg, while 14.9% respondent sold above N50 per kg. The conditions of plastics brought to the recycler are plastics that are sorted (28.57% respondents), sorted into different colours (14.29%), label removed and bailed (14.29%).

Bio-plastics

Six out of the 7 respondents (85.71%) know the meaning of bio-plastics.

Informal Waste Collectors

As indicated on the result, majority of the respondents (85.71%) make use of the informal sector for waste collection and any other tasks that might have been assigned to them, while 14.29% do not make use of informal sector. Only two waste collectors responded to this question. A respondent deploys 15 workers from the informal sector for waste collection, while another respondent uses 17 workers from the informal sector.

Environmental Impacts of Single-use Plastics

All respondents are aware of the environmental impacts of plastic waste, in particular single-use plastics.

Waste Collectors Company's Future Vision and Strategy to Reduce or Tackle Single-Use Plastic Waste

Responses of three waste collectors that answered this question are as follows;

- Become a household name in waste management solution;
- To create 5million trash entrepreneurs by 2025;
- To at least have 1 trash collector/Recycler in every Nigerian home through proper sensitization, awareness and the use of technology;
- Through technology, youths can be more engaged and benefit economically from recycling.
- Positioning the waste collection business to process biodegradable waste into alternative fuel

Reasons Hampering the Reduction of Plastic Use

All respondents answered and indicated lack of awareness on the side of consumers, majority (71.43%) stated price competitiveness of plastic products and majority (71.43%) also indicated lack of regulatory framework as reasons hampering the reduction of plastic use, particularly single-use plastics in the FCT.

Plastic Waste Management Responsibility

The survey result shows that all respondents (100%) indicated individual, 85.71% selected local government and 14.29% indicated that the federal government should be

charged with the responsibility of plastic waste management. This is shown in Figure 3.29.

Type of Policy Measures Considered Effective to Reduce the Use of Single-use Plastics

All respondents chose laws and acts mandating single-use plastic producer for waste recovery of their product as an effective policy measure considered effective to reduce the use of single-use plastics and its menace in our environment, 85% indicate levy on consumers is appropriate, while 71.43% preferred levy on single-use plastic producers/suppliers as the best policy measure to reduce the use of single-use plastics in our environment. This is shown in Figure 3.30.

Extended Producer Responsibility (EPR)

From the survey records, 85.71% of the respondents know EPR and what it stands for, while 14.29% know EPR very well. 28.57% respondents indicated EPR would lead to more demand for waste collection. As for the effect of EPR on business, a respondent is of the opinion that it is a positive development because it would mandate producing companies to buy back their plastics and this could encourage them to seek the services of waste collectors as producers' responsible organization (PRO).

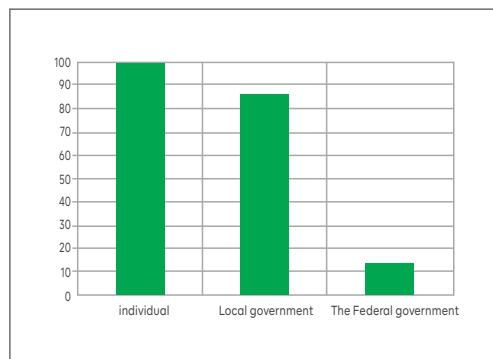


Figure 3.29: Institutions for Waste Management

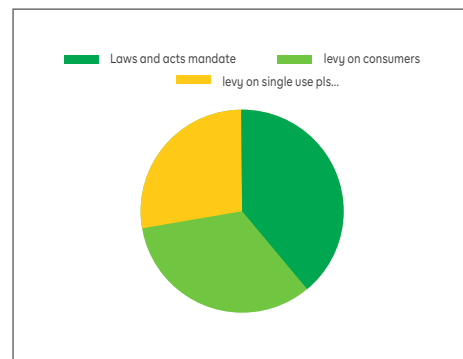


Figure 3.30: Measures to Reduce Plastics Use

6.3 Distributors

A total number of 10 plastic distributors were interviewed and completed the questionnaires.

Plastic Products

Data gathered from the survey indicated that all respondents responded to this question by indicating the type of plastic products they deal with in respect to sales and distribution. They include, in order of response: lightweight plastic food wrappers, plastic bin bags, food containers, lightweight plastic carrier bags, food packets, Beverage (PET) bottles/caps/lids, cups for beverage, sachet beverage packaging, balloons and sticks for balloons, straws, cotton bud sticks.

Type of Business in Value-Chain

Majority (70%) of the respondents are retailers, supermarket and brand-owners while 10% of the respondents are into plastic distribution.

Year of Business Establishment

All respondents answered this question, 70% of the respondents' businesses were established between years 2011 and 2020, some established between 2006 and 2010 (20%) and others between 2000 and 2005 (10%). This is shown in Figure 3.31.

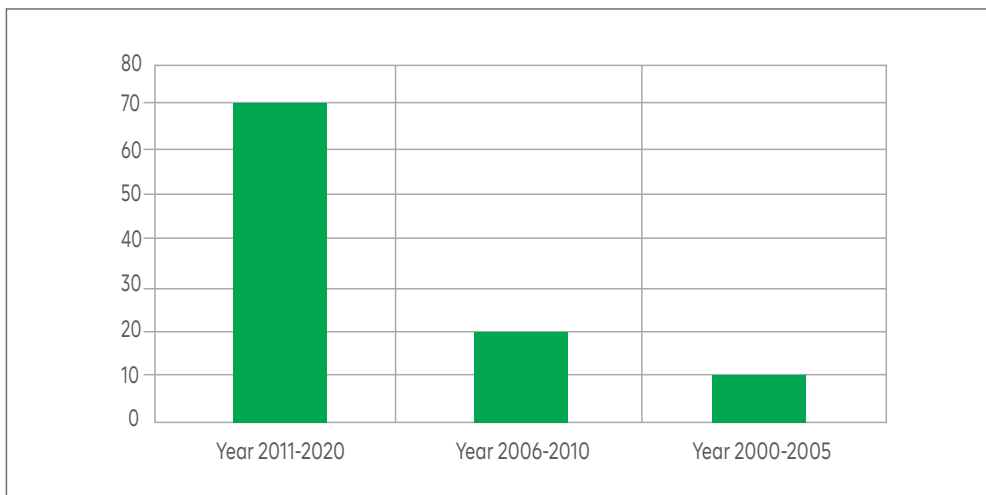


Figure 3.31: Year of Establishment of Distributor Business

Business Capital

The investment capital to start as a plastic distributor ranges from N200,000 to N300,000 (50% respondents), 30% respondents started with capital above N500,000, and the other 10% respondents indicated amount ranging between N1,000,000 and N1,500,000.

Employees

Only one respondent indicated number of employees in the business to be less than 10, out of which females employed are less than 5. Most respondents (90%) did not give answer to this question.

Revenue

The revenue recorded from 2017 to 2019 indicated by the respondents are as follows: above N500,000 (40% respondents), above N300,000 (20%) and 10% of the respondents generated above N200,000 revenue in three years. The net sales in the last three years by 2 respondents is above N500,000. Majority (80%) of the respondents did not respond to this question.

Brief Description of Company's Business, Products and Operations

The survey results indicated that 80% of the respondents answered this question, below

are the list of products, business and operations carried out by plastic distributors in FCT, Abuja:

- Sell plastic products including food packet, food container, light food plastic, plastic bin bags, lightweight plastic carrier bags, etc. and supply to customers as per demand;
- Sell plastic products, particularly single-use plastics, to dealers and retailers in bulk; and
- Sell plastic products to dealers, retailers and end users who buy in bulk.

Transportation Material Made out of Plastics

More than one-half (60%) of the respondents showed they don't make use of transportation materials made of plastic to transport their goods to their prospective customers while 30% indicated they make use of materials made of plastics as transport. Most of these transport materials are discarded (30% respondents) after use, while 30% respondents also indicated they re-use transport materials, 40% of the respondents did not indicate what they do with the transport material after delivery. Some respondents (40%) leave the transport material at the place of delivery, 20% respondents discard the transport materials for recycling.

Most respondents (70%) do not make use of plastic materials as transportation storage for their delivery, respondents practically make use of the following:

- Material in metal form, called container for storage and transportation;
- Materials made of paper bags like carton and plastics material which are usually big containers;
- Products are packed in carton like paper bags but very strong. However they are bound with twines and rolled out with tapes.

Customers Collection System for the Used Plastics Waste

More than one-half of the distributors (60%) noticed that majority of their customers have no collection or storage system for the used plastics in their premises or stores, while the remaining 40% respondents indicated their customers have collection and storage system for the used plastics particularly single use plastic in their store. Some customers store for some certain period of time and later sell to interested buyers, others store in a collection bag, and when filled, invite plastic waste collectors for collection and some other customers collect broken or damaged single-use plastics and sell to waste collectors.

Used Plastic Waste Collector upon Delivery

Many (60%) of the respondents indicated they are not into used plastic waste collection upon delivery while 40% showed they are into used plastic waste collection upon delivery.

Plastic Waste Collection or Recycling Business in the Future

Distributors' response to willingness to deal with customers' request to pick up used plastic upon delivery and take to recycler, shows 60% indicated yes with no charge, 30% yes with some charge and the remaining 10% of the respondents indicated they will consider the possibility. This is shown in Figure 3.32.

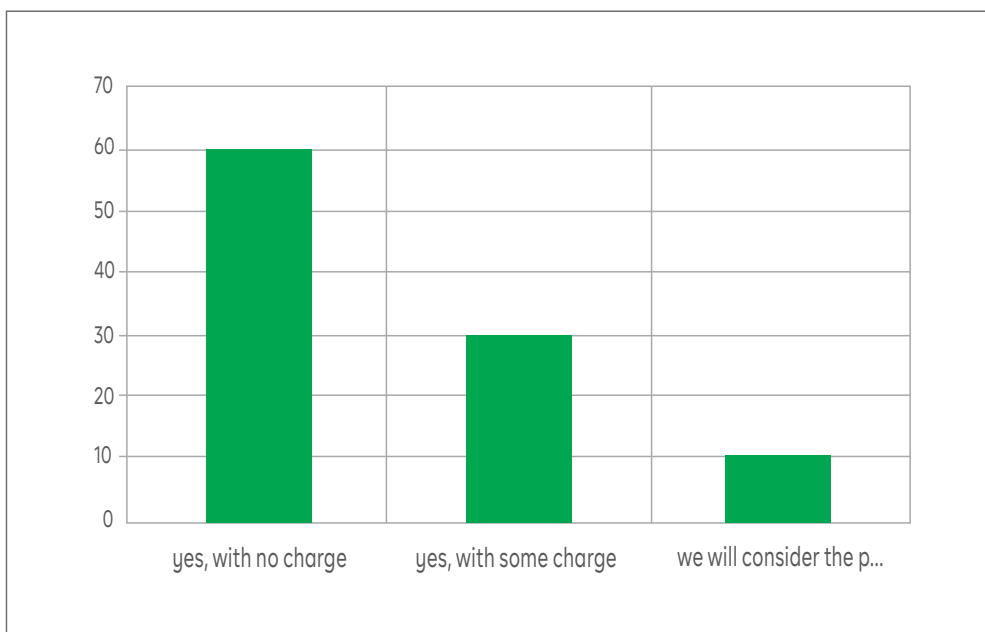


Figure 3.32: Plastic Waste Collection

Bio-Plastics

Information gathered from the survey shows 9 of the 10 respondents partially know what bio-plastics are while only one of them doesn't know. All respondents are not sure if they wanted to learn more about bio-plastic as they all indicated maybe yes in their responses.

Environmental Impacts of Plastic Waste

Record from the survey showed all respondents answered this question. 40% of the respondents indicated that they know the impact of single-use plastic on the environment while 60% indicated yes.

Company's Future Vision and Strategy to Reduce Fossil Based Plastic Production

Some respondents (20%) intend to partner with government to enforce the construction of recycling plants in the FCT while majority (80% respondents) are yet to come to terms with their future visions and strategy to reducing fossil based plastic production.

Reasons Hampering the Reduction of Plastic Use

All respondents are concerned on what could be done to minimize the usage of plastics, 70% of them indicated lack of awareness on the side of consumers; 60% said lack of awareness on the side of the plastic producers, 40% opined price competitiveness of plastic products; 20% stated product characteristics of plastics (lightness, strongness, etc.) and 10% respondents indicated lack of regulatory framework as reasons hampering the reduction of plastics, particularly single-use plastics. This is depicted in Figure 3.33.

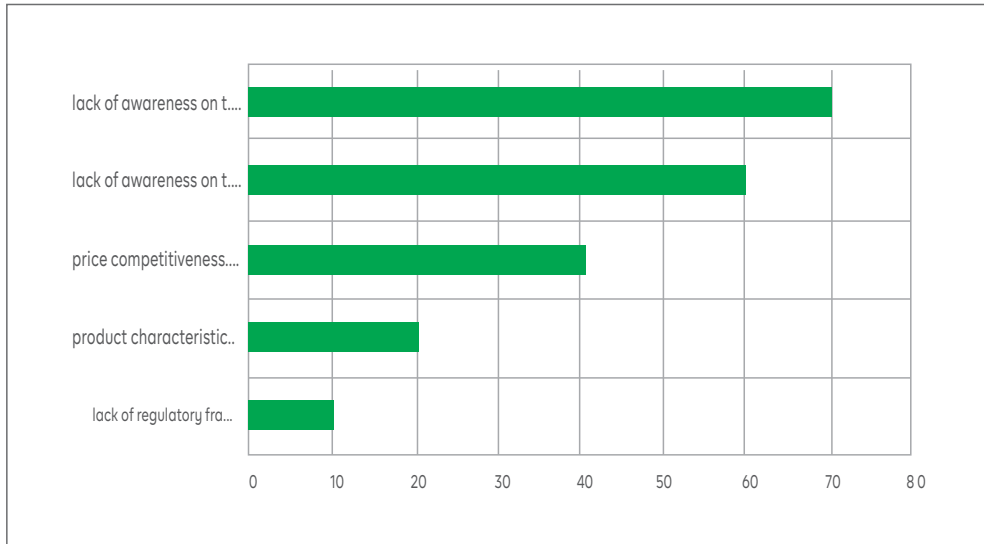


Figure 3.33: Reason Hampering Reduction of Plastic Use

Responsibility in Reducing Plastic Waste

The following institutions and people should be responsible for the reduction of plastic waste in our communities and environment as shown in Table 3.17.

Table 3.17: Responsibility in Reducing Plastic Waste		
SN	Responsible	Respondents (%)
1	The Federal government	100
2	Individual	80
3	Plastic producers/Industry	50
4	State government	40
5	Retailers (shops, department stores)	10

Policy Measures to Reduce the Use of Single-Use Plastics

All respondents indicated laws and acts mandating single-use plastic producer for waste recovery of their product will be an effective policy measure, 90% opted for banning the use and sale of certain single-use plastic items and 90% believed levy on single-use plastic producers/suppliers would be a perfect and effective policy measure to reduce the use of single-use plastics.

3.6.4 Retailers

A total number of 10 plastic retailers were interviewed and completed the questionnaires.

Majority of the respondents that completed the questionnaire on behalf of their establishments are business owners, sales person, in their organization and mostly women.

Table 3.18: Types of Plastic Products Displayed for Sale

SN	Plastics	Respondents (%)
1	Plastic bin bags	100
2	Lightweight plastic carrier bags	90
3	Food packets	90
4	Food containers	80
5	Cups for beverage	70
6	Lightweight plastic food wrappers	70
7	Sachetbeverage packaging	70
8	Beverage (PET) bottles, their caps and lids	60
9	Straws	60
10	Cotton bud sticks	50
11	Sanitary items (wet wipes and sanitary towels)	10
12	Balloons and sticks for balloons	10

Type of Business in Value-Chain

All the 10 respondents are into retail, supermarket and brand owners' type of business in the value-chain.

Year of Business Establishment

All the surveyed plastic retail businesses were established between years 2011 and 2020.

Business Capital

Four respondents answered this question as they indicated that the investment capital raised to start their retail business was less than N50,000 (30% respondents), while the other respondent indicated capital to be between N50,000 and N100,000. These responses do not form a true reflection of the capital investment value for the plastic retail business sector of the FCT as most respondents did not answer this question.

Employment Capacity

A respondent answered this question, indicated retail store employed less than 10 workers, all males.

Revenue

The revenue generated in the last three years by the two respondents that answered this question were greater than N100,000 and more than N200,000 respectively. Majority (80% respondents) didn't respond to the question.

Brief Description of Company's Business, Products and Operations

Sales, wholesale plastic product distribution to other retailer and end-users, purchase of plastic products particularly single-use plastics were majorly the business and operations descriptions made by the retailers as indicated in the survey result that was answered by 2 respondents.

List of single-use plastic packaging/product

The single-use plastics dealt with by the retailers are: cups for beverage, sanitary items, sachet beverage packaging, food containers, food packets, lightweight plastic, food storage bags, beverage bottles/caps/lids and straw cups for beverage.

Awareness of the Environmental Impacts of Plastic Wastes, In Particular Single-Use Plastics

Data gathered indicated that 60% of the respondents showed they somehow know the environmental impacts and menace the single-use plastics has caused in our communities, while 20% have no knowledge of the damage caused by single-use plastics to our environment.

Business Promotion of Environmental Protection by Shop/Business

Result from the survey showed that 90% of the respondents answered this question; 50% indicated they do not have any protection program and do not plan for it, 20% respondents are planning to promote environmental protection programme and 20% have environmental protection programme. This is depicted in Figure 3.34.

Customers' Demand for Environmentally Friendly Products

Response from the survey record showed 90% of the respondents indicated that customers are demanding for more environmentally friendly products.

Plastic Waste Generation Situation

The survey result showed 50% respondent do not know the situation of plastic waste generation in recent years in their shops, 20% respondents indicated it has somehow increased, while 20% respondents confirmed it has increased a lot. This is shown in Figure 3.35.

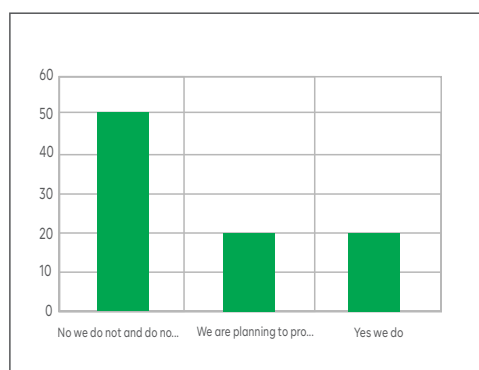


Figure 3.34: Environmental Protection at Shop

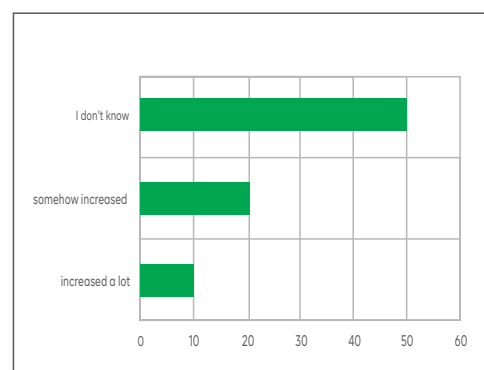


Figure 3.35: Situation of Plastic Waste Generation

Provision of Single-Use Plastic Bag For Free to Customers

Most (90%) respondents indicated they provide single-use plastic bag to their customers for free. 30% respondents indicated it is not feasible for their business to charge customers for the single-use plastic provided to them, 30% also states it may not be

feasible; 20% indicated it is feasible and 10% claimed it may be feasible. This is presented in Figure 3.36.

Business Feasibility to Provide Alternative Bag to Plastic

Data gathered indicated that 90% respondents answered this question, out of which 30% respondents believed it is feasible to provide alternative bag to plastic to consumers or customers; 20% feels it may be feasible if some certain modalities are in place; 20% respondents indicate no, it is not feasible and the remaining respondents (20%) chose it may not be feasible. This is shown in Figure 3.37.

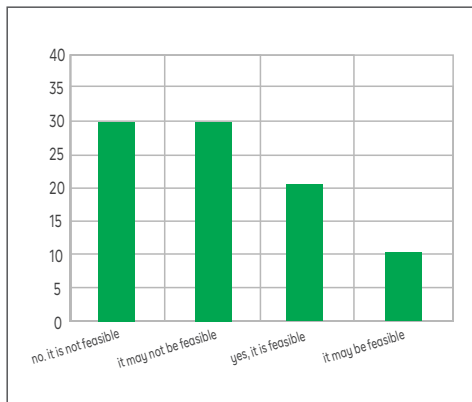


Figure 3.36: Provision of Plastics Free to Customers

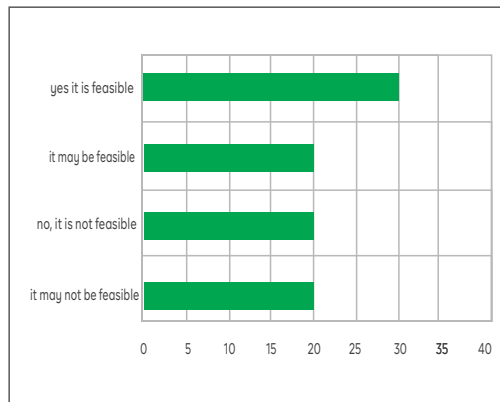


Figure 3.37: Feasibility of Providing Alternative Bags

Type of Feasible Alternative Bags

The survey record indicated that 60% respondent out of the 90% that answered this question chose bio-based material bag as a feasible alternative bag to plastic bag, while 30% respondents preferred the paper material bag.

Efforts to reduce the use of single-use plastics at your shop/business

More than one-half (60%) respondents said that they do not have plan to reduce the use of single-use plastics at their shop/business while 40% respondents are planning to reduce the use of single-use plastics.

Most (70%) of the respondents indicated that they sell plastics products made from recycled plastics, while the remaining 30% respondents do not sell plastics products from recycled plastics.

While most of the recycled plastic products are mixed as claimed by 60% of respondents, 20% respondents indicated that the recycled plastic products they sell are locally produced.

Impacts of recycled plastic products on business

The following concerns on recycled plastic products were raised by four respondents that answered this question:

- Customers might end up not purchasing it if product is of low quality;
- The difference between the local and imported recycled plastic product should not be so distant in terms of quality, cost and price; and
- Locally produced recycled products are not on the high-side but good quality which are imported are very expensive, so the locally produced and the imported should be at par in terms of cost and quality.

Reasons for not selling recycled plastic products

Retailers gave the following reasons for not selling recycled products:

- Non-availability of products;
- They can barely identify the recycled products in the market;
- The distributor regulates the plastic market, retailers sell whatever plastic product that is made available by the distributor; and
- Education and awareness campaign by the manufacturers on recycled products.

Customers Perception of Recycled plastic products

Majority (80%) of the respondents indicated that customers believe recycled plastic products are less expensive, while 20% stated customer perceived recycled plastic products to be more expensive.

Majority (90%) of the respondents showed that customers' perception of recycled plastic products compared to usual plastic products is that the recycled plastic products are of lower quality while 10% respondents indicated the recycled plastic products are of the same quality with the usual plastic products.

Safety of Recycled Products

All respondents answered this question, 90% respondents indicated rather yes, recycled products are safe while 10% respondent said rather no, recycled products are not safe. All respondents that answered the question agreed that recycled products are environmentally friendly.

Sale or Considered Sale of Alternative Plastic Products

Majority (90%) of the respondents answered this question, 70% of the respondents are considering alternative plastic products for sale, while 20% indicated they are not considering it. The following reasons were given for considering/selling alternative plastic products:

- Availability of alternative plastic product;
- Marketability, alternative plastic products should be marketable; and
- Alternative plastic products should be manufactured based on the trend and product types in the plastic industry.

The following reasons were given for not considering the use of alternative plastics:

- Fear of the unknown, as the alternative material might be expensive if its new in the market;
- Manufacturers dictate the price; it might not be affordable and business friendly; and
- The quality of the alternative material is of concern.

Respondents do not have any type of products with alternative raw materials that have been recently sold or they have in mind to sell. The source of these alternative raw materials as indicated by the respondents is from mixed sources (both local and imported) as indicated by 60% respondents that answered this question.

Future Vision and Strategy to Reduce Fossil Based Plastic Production

All respondents that answered this question indicated they have no future plans, visions and strategy to reduce the fossil based plastic production.

Bio-plastics

The survey result gathered showed that 70% respondents do not know about bio-plastics, 10% indicated they know it and 10% indicated they have a partial idea of bio-plastics. 80% respondents indicated they might be interested to know more about the bio-plastics and the different available options for their businesses, while a respondent is not interested in these options.

Environmental Impacts of Single-Use Plastic Waste

Survey result showed that 70% respondents are aware of the environmental impacts of plastic waste, in particular single-use plastics. 10% respondents indicated they are not aware of the environmental impacts of single-use plastics.

Reason Hampering the Reduction of Plastic Use

Data gathered showed that 90% respondent answered this question. 90% respondents indicated lack of awareness on the side of plastic producers, 90% indicated lack of regulatory framework, 60% respondent chose lack of awareness on the side of consumers and 10% respondents indicated price competitiveness of plastic products, being the reasons hampering the reduction of plastics use, shown in Table 3.19.

Table 3.21: Reasons Against Reduction in Plastics Use

Reasons Hampering Reduction of Single-Use Plastics	Respondents (%)
Lack of awareness on the side of plastic producers	90
Lack of regulatory framework	90
Lack of awareness on the side of consumers	60
Price competitiveness of plastic products	10

Responsibility in Reducing Plastic Waste

All the respondents that answered this question indicated that the plastic producers/industries should have the responsibility of reducing plastic waste. The retailers in their words, believe since the producers are the ones manufacturing the plastic products they should also be prepared and have modalities in place to manage the wastes from their products.

Effective Policy Measures to Reduce the Use of Single-use Plastics

Laws and acts mandating single-use plastic producer for waste recovery of their products

(80% respondents), levy on single use plastic producers/suppliers (70% respondents) and ban use and sale of certain single-use plastic items (60% respondents) were the responses indicated in the survey result on effective policy measures considered to reduce the use of single-use plastics by the respondents.

Extended Producer Responsibility (EPR)

All respondents answered this question, out of which 40% respondents showed they know a little bit of EPR, 30% claimed they have never heard of it, 20% respondents know EPR, while the remaining 10% respondents do not know much about EPR, shown in Figure 3.38

Willingness to voluntarily implement EPR, even if it is not a regulation

Less than half of the respondents (30%) indicated rather yes, they would be willing to voluntarily implement EPR without it being a regulation, 20% respondents are certain they would implement it, 20% respondents indicated they will not and the remaining 20% respondents were not so sure. This is shown in Figure 3.39.

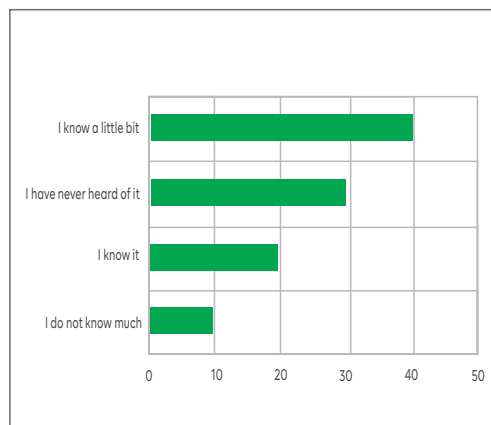


Figure 3.38: Knowledge of EPR

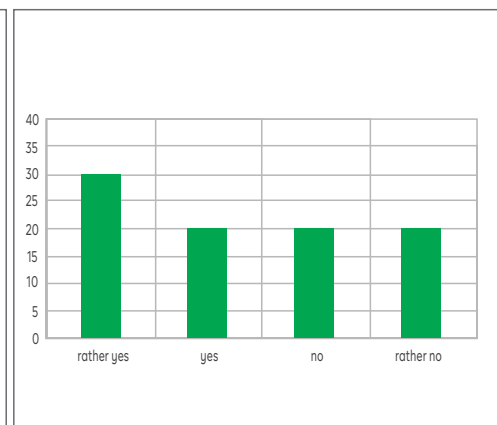


Figure 3.39: Willingness to implement EPR

Ability to Cope with EPR when it becomes a Regulation

All respondents were keen about the EPR program as they all responded to this question, 60% respondents indicated they may be able to cope with the guidelines of the EPR as it affect plastic and plastics waste when it becomes a regulation, 30% respondents showed they will not be able to cope and the last 10% respondents indicated they would cope with difficulty. This is shown in Figure 3.40.

Majority (60%) of the respondents indicated they would consider redesigning their product if EPR on plastics products becomes a regulation, 30% indicated they would not consider redesigning and 10% are not so sure if they would give redesigning of their plastic products a consideration if EPR on plastic products becomes a regulation. This is depicted in Figure 3.41.

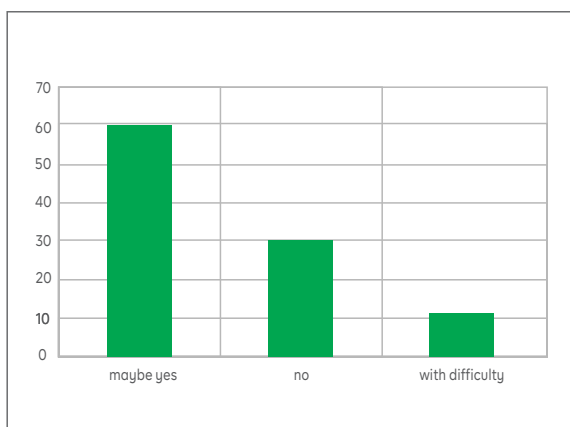


Figure 3.40: Ability to Cope with EPR

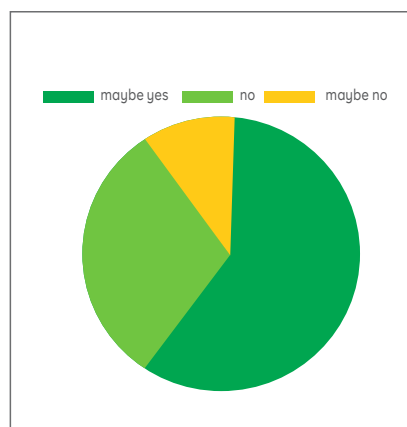


Figure 3.41: Redesigning Product for EPR

Challenges and concerns business may face with EPR

Concerns of the respondents regarding their business with EPR Implementation include:

- Implementation might be time consuming, time wasting and might be difficult;
- Levy on plastic retailers might affect their business;
- It might not be realistic in the business context of Nigeria.

3.7 Lagos Study Area Value-Chain Players

In Lagos, the following value-chain categories were interviewed and questionnaires administered to them:

- Recyclers (5);
- Packaging Producers (12);
- Waste Collectors (20);
- Distributors (8);
- Retailers (13);
- Compounders (5); and
- Raw material producer (1).

3.7.1 Recyclers

A total number of five (5) recyclers were interviewed and completed the questionnaire.

Brief Description of business, products and operations

One of the companies is involved in the supply of liquid chemicals to industries dealing with home and personal care, food and nutrition, performance materials, oil and gas, pharmaceuticals, etc. The other four recyclers harvest recyclables directly from post-consumers. Recyclers purchase materials from waste collectors and transport to factory for sorting and selection to different colour and plastic types. They are crushed into flakes, washed and dried. The plastic goes through an extrusion process i.e. it is melted at a temperature depending on the type of plastic. The melted plastic comes out as a strand which goes through a cooling process and cut into small pellets.

Plastic Products Dealt with and Recycling Business Operation

The survey result shows the following plastic product are dealt with by the respondents:

- Beverage (PET) bottles, their caps and lids;
- Sachet beverage packaging;
- Lightweight plastic carrier bags;
- Plastic bin bags;
- Lightweight plastic food wrappers; and
- Straws.

Type of business in value-chain

Respondents engage in different types of plastic businesses aside recycling as all the respondents in this value-chain acknowledged they are recyclers as well as waste collectors. The survey result indicated that respondents recycling business (100% respondents) were established between year the 2011- 2020.

Employment Capacity

A respondent employed between 36-40 workers while the others have capacity and employees more than 100, out which female employees are greater than 50 in number. They engage all types of workers ranging from being fully employed, part time and informal.

Approximate Quantity of Waste Collected for Recycling Per Month

Recycling amounts range from 20MT/month of bags including plastic water bottles of 350,000kg/month, bags (50,000kg/month) to bottle caps (30,000kg/month).

Waste Collection Methods

Most recyclers (4 out of 5, 80%) purchase from waste collector company as a means of collecting their single-use plastic waste, only one make use of their employees to collect their single-use plastic wastes, 50% (4 respondents) collect from retailers, supermarkets and brand owners, 50% purchase from the informal waste collectors, while 50% purchase from municipality collection service.

The method of recycle as indicated by 80% of the respondents is mechanical/material recycle while only one recycler carry out feedstock/chemical recycling, where plastic wastes undergo sorting, packaging (milling or grinding), washing and drying, then re-granulating thus producing recyclates that can be converted into plastic products.

Recycled products as indicated by the only respondent that carries out chemical recycling into monomers, chemical in liquid form while remaining four respondents produce PET bottles.

Processing Capacity of Used Plastics

Recycling technology that the five respondents use are chemical pyrolysis (one respondent) and mechanical crushing/bailing by four respondents.

Challenges Faced Regarding Used Plastics

Recyclers indicated logistic challenges related to plastics collection and access to funding for deployment of technology to communities around Lagos. Lack of analytical capacity has made some of them to ship samples abroad for analysis.

Bio-plastics

All respondents showed their knowledge on the different types of bio-plastics while the recycler that produce monomers displayed extensive understanding of bio-plastics and confidently explained it. All respondents are willing and ready to know what bio-plastics are and the options available for their businesses.

Environmental Impacts of Plastics

All the five respondents know the environmental impacts of plastics.

Reason Hampering the Reduction of Plastic Use

Respondents attributed lack of awareness on the side of consumers, lack of awareness on the side of plastic producers and product characteristics as top reasons hampering reduction of plastic use in Lagos.

Responsibility in Reducing Plastic Waste

All respondents indicated that the responsibility of plastic waste reduction should be vested in the following institutions and value-chain in the following order, namely: individuals, NGOs, civil organizations, volunteers, State Government, Federal Government, Local Government, plastic producing industries and retailers being the least in responsibility.

Policy measures to be considered to Reduce Single-Use Plastics Usage

Levy on consumers, laws and acts mandating plastic single-use producer for waste recovery of their product, levy on single-use plastic producers/suppliers, levy on retailer, ban the use and sale of certain single-use plastic items, were indicated as top policy measures to be considered for effective reduction in the use of single-use plastics.

Extended Producers Responsibility (EPR)

All respondents indicated that they know EPR. The respondents opined that EPR will cause demand for recycling to increase and that with EPR the quality of recycled product will be better.

EPR and Recycling Business

Respondents explained that EPR allows plastic producers to influence how consumers dispose of plastic waste. Such intervention early in the plastics recycling value-chain reduces pretreatment costs, making recycling process more economically sustainable. They also indicated that It is a plus for the recyclers and collectors (working with PRO) as EPR programme would boost collection drive and increase volumes of collection.

3.7.2 Waste Collectors

A total number of 20 waste collectors were interviewed and completed the questionnaire.

Plastic Products and Recycling Business Operation

The plastic products being dealt with are presented in Table 3.20.

Table 3.20: Plastic Products' Business Operation

SN	Plastics	Respondents (%)
1	Beverage (PET) bottles, their caps and lids	82.61%
2	Food containers	52.17
3	Sachet beverage packaging	47.83
4	Lightweight plastic carrier bags	43.48
5	Plastic bin bags	26.09
6	Cups for beverage	21.74
7	Lightweight plastic food wrappers	17.39
8	Straws	17.39
9	Food packet	4.35
10	Cotton bud sticks	4.35
11	Balloons and sticks for balloons	4.35
12	Tobacco product filters	4.35
13	Sanitary items (wet wipes and sanitary towels)	4.35
14	Fishing gears	4.35

Other plastics include domestic wastes (4.35%), lightweight plastic food storage bags, including resealable bags/Ziplocs (4.35%), plastic bags (4.35%), cartons (BCC) (4.35%), Aluminium cans (4.35%), jerry cans (4.35%), used tyres (4.35%), household items (4.35%) and fashion accessories, broken chairs (4.35%) and paint buckets (4.35%).

Type of business in value-chain

Waste collectors are also into recycling of plastic wastes as well as distribution and packaging production.

Business Capital

Many respondents indicated that their waste collection businesses started with more than N500,000 investment capital, few of them indicated that they financed theirs with between N50,000 and N100,000, with some being between N100,000 and N200,000 and lastly some others reported between N200,000 and N300,000.

Employment Capacity

Respondents' employment capacity includes those with less than 10 employees working with their organization, some have between 10 and 25 employees, some other respondents having between 26 and 35 employees, few with 36 to 45 employees and a respondent has above 100 employees.

Revenue

Revenue generated in the last three years, between 2017 and 2019 is above N500,000 for 10 respondents while a respondent generates more than N200,000 and another respondent indicated revenue amount less than N100,000.

Net Sales

Eight of the twenty (40%) respondents indicated they made above N500,000 in the last three years (2017 – 2019) as net sales while two respondents made above N50,000 and N100,000 was realized as net sales by a respondent.

Brief Description of Company's Business, Responsibilities and Operations

They collect recyclables from households, pubs and buy from other aggregators. They also crush materials such as HDPE, PP and LDPE plastics and sell as raw materials to other manufacturers. Materials like metals and other plastics are supplied to recycling companies that have the capacity to recycle them. They produce polypropylene (PP) plastic pellets from household waste such as plastic buckets, paint buckets, broken chairs, etc. The collected recyclables are further processed at the collection and sorting hubs and thereafter sold to manufacturing/recycling plants using the items as raw materials for the production of a wide range of items, including but not limited to polyester fiber, carpets, hangers, pegs, aluminum ingots, craft papers for making carton, etc.

Plastic waste collected and approximate quantity

The following plastic wastes are collected with approximate quantity per month. Bottles for water, milk bottles, food containers, plates and cups, bottles for other drinks and ice cream containers are the types of plastic waste collected for recycling and 2 respondents indicated that bottles for water (15,000kg/month), milk bottles (10,000kg/month) and bottles for other drinks (1,000kg/month) were collected. This is shown in Figure 3.42.

Most respondents carry out segregation of different kind of plastics, about half take away residues from the collected plastics and about 40% of respondents also carryout bundling of the plastics before they are transported to recyclers.

Separation of plastic wastes

Respondents indicated that they separate plastic wastes by manual sorting, and depending on the requirements from their clients, sorters manually take off the caps, labels disposes all forms of liquid and solid waste from containers before further processes. Women are part of these processes as they are used in the sorting processes for plastics colour separation.

Situation of Plastic Generation in recent years

Information gathered showed that all respondents answered this question and indicated that plastic waste has increased a lot (73.91%), somehow increased (8.7%) and others believed it has been constant and no change, particularly the single-use plastic generation. This is shown in Figure 3.43.



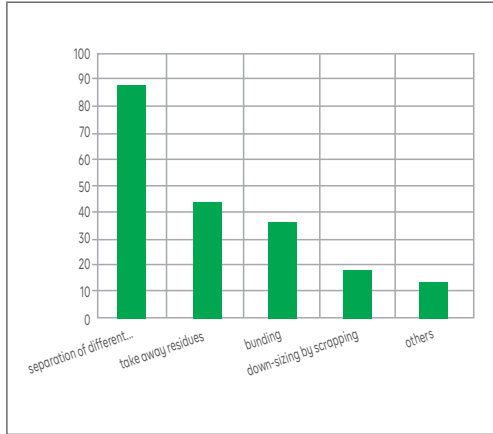


Figure 3.42: Plastic Wastes Collected

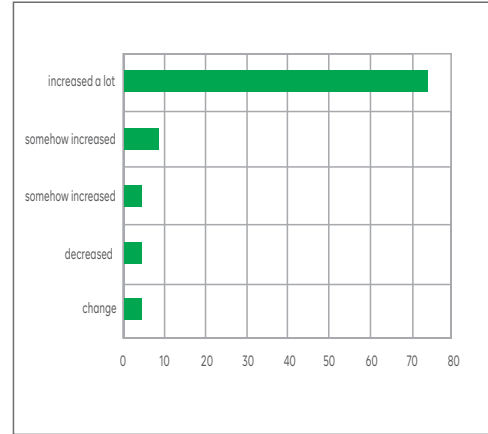


Figure 3.43: Situation of Plastic Generation

Plastic Waste Collection Points

Wastes are collected by respondents from residents (86.96%), retailers, supermarkets & brand owners (39.13%), plastic collection points (43.48%), companies (39.13%) and garbage dumpsites (56.52%). Some of the used plastics collected by the waste collectors at different collection points are sold to the recycler (43.48%) while 56.53% respondents showed their establishment is part of recycler's operation.

Informal Waste Collectors

As indicated in the result, majority of the respondents (78.26%) make use of the informal sector for waste collection and any other tasks that might have been assigned to them, while 21.74% do not make use of informal sector.

A respondent indicated he made use of 100 workers from the informal sector for waste collection, while some other respondents made use of 28, 20 and as low as 1 worker from the informal sector.

The numbers of females engaged among the informal sector for waste collection activities as indicated by the respondents are between 20-25 (4.35%), less than 5 (39.13%) and between 5-10 women, this shows women inclusiveness in waste collection activities in Lagos.

Recycling companies that buys used plastics in Lagos

Waste collectors sell their waste plastics to recycling companies in Lagos.

Price of used plastics sold to recycling companies

Results gathered from the survey shows respondents (26.09%) sold used plastic above N50 per kg, while 8.7% respondent sold above N100 per kg, 8.7% respondents sold for N50 per kg. The conditions of plastics brought to the recycler are plastics that are usually dirty, they come in different conditions but usually have to be sorted and cleaned, sorted into different colours, label removed and bailed. This is presented in Figure 3.44.

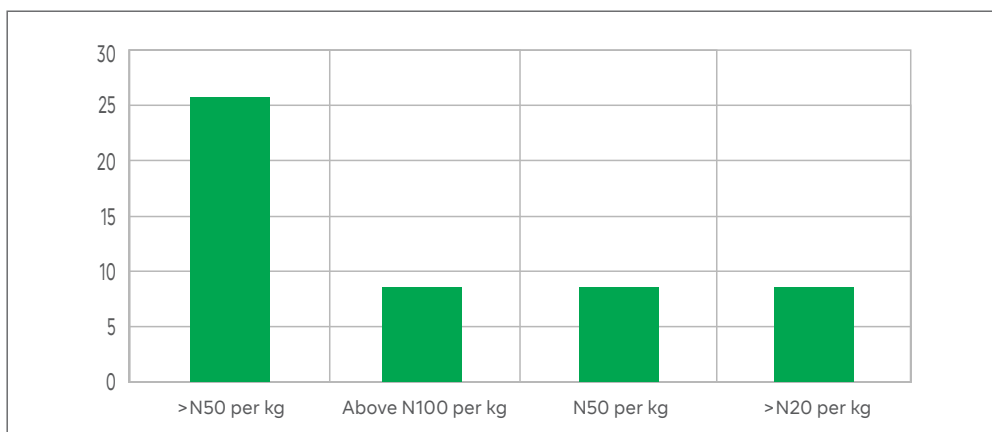


Figure 3.44: Price of Used Plastics Sold to Recycling Companies

Types of Bio-plastics

All respondents answered this question with about 20% respondents knowing the meaning of bio-plastics, about half of respondents partially have an idea of bio-plastics while 30% do not know bio-plastics. Majority of the respondents (90%) are willing to know more about bio-plastics and the different options available for their businesses.

Environmental Impacts of Single-use Plastics

All respondents that answered this question are aware of the environmental impacts of plastics waste, in particular single-use plastics.

Waste Collectors Company's Future Vision and Strategy to Tackle Single-Use Plastic Waste

Responses of some waste collectors are as follows;

- To acquire automated recycling machines to increase capacity and contribute to educating Nigerians on ways to minimize waste.
- Upscale waste collection capacities across all forms of plastics and to work closely with recycling companies and the fast-moving consumer goods (FMCG) companies in satisfactorily delivering the required amount of plastics for reuse and recycling.
- Plan to ensure the consistent upgrade of separation and sorting activities to make recycled plastics in Nigeria fit for the food and beverage industry. By this, concerns with contamination will be resolved.
- Incorporate urban waste company to delve into full time recycling and harvest the business opportunities.
- Change from the manufacturing of fossil-based plastics into biodegradable plastic materials. Continue research and development studies in this field.
- Raise more education and awareness on sustainable environment and climate change.

Reason Hampering the Reduction of Plastic Use

All respondents answered this question, majority (78.26%) of the respondents indicated lack of regulatory framework, 69.57% indicated lack of awareness on the side of

consumers, 47.83% indicated lack of awareness on the side of plastic producers and 43.48% respondents indicated price competitiveness of plastic products as reasons hampering the reduction of plastic use, particularly single use plastics in Lagos.

Plastic Waste Management Responsibility

Majority of respondents indicated plastic producers/industry and individual should be responsible, about 60% selected local government, federal government and state government respectively while about 50% indicated the NGOs and civil organizations should be charged with plastic waste management.

Type of Policy Measures Considered Effective to Reduce the Use of Single-use Plastics

Many respondents (about 75%) chose the laws and acts mandating single-use plastic producer for waste recovery of their product as an effective policy measure considered effective to reduce the use of single-use plastics, about 70% indicate levy on single-use plastic producers/suppliers as appropriate while about 35% preferred ban the use and sale of certain single-use plastics as the best policy measure to reduce the use of single-use plastics in our environment.

Extended Producer Responsibility (EPR)

More than half of the respondents know EPR and what it stands for, while about 10 know EPR very well and 20% know a little bit of EPR. More than half of the respondents indicated EPR would lead to quality of waste collected to be better, about half indicated more demand for waste.

3.7.3 Distributors

A total number of 7 plastic distributors were interviewed and completed the questionnaires.

Plastic Products

Table 3.22 shows the type of plastic products they deal with.

Table 3.21: Type of Plastic Products Distributors Sell

SN	Plastics	Respondents (%)
1	Food containers	71.43
2	Sachet beverage packaging	57.14
3	Plastic bin bags	57.14
4	Straws	57.14
5	Beverage (PET) bottles, their caps and lids	42.86
6	Food packets	42.86
7	Cotton bud sticks	42.86
8	Sanitary items (wetwipes and sanitary towels)	42.86
9	Lightweight plastic carrier bags	28.57
10	Cups for beverage	28.57
11	Lightweight plastic food wrappers	28.57
12	Balloons and sticks for balloons	14.29
13	Lightweight plastic food storage bags	42.86

Type of business in value-chain

Majority (71.43%) of the respondents are distributors, 57.14% respondents are retail, supermarkets and brand-owners while 14.29% of the respondents are into packaging production and the other 14.29% are polymer producers.

Year of Business Establishment

Two respondents' distributorship businesses were established between years 2006 and 2010, and between 2011 and 2020.

Business Capital

The capital invested as a plastic distributor in Lagos is above N500,000 as provided by a respondent.

Employees

A respondent indicated number of employees to be less than 10, out of which females employed are less than 5 workers and are all fully employed.

Brief Description of Company's Business, Products and Operations

Some briefs of products, business and operations of some plastic distributors are as follows:

- Deal in all plastic products, particularly single-use plastics, e.g. food packet, food containers, light plastic food wrappers, plastic bin bags, lightweight plastic carrier bags, etc. and supply to customers as per demand.
- Sell plastic products, particularly single-use plastics, to dealers and retailers in bulk.
- Sell plastic products to dealers, retailers and end users who buy in bulk.

Plastic Value-Chain Part the Company Operates

Majority (85%) of the respondents operate as retailers, supermarkets and brand-owners, while 42.86% respondents are packaging/product producers in the plastic value-chain of the company they operate.

Transportation Material Made out of Plastics

One respondent doesn't make use of transportation materials made out of plastic to transport their goods to their prospective customers while two respondents indicated they make use of materials made out of plastics as transport. The two respondents indicated they re-use transport materials.

Customers Collection System for the Used Plastics Waste

Majority of distributors (85.71%) noticed majority of their customers have no collection or storage system for the used plastics in their premises or stores, while the remaining 14.29% respondents indicated their customers have collection and storage system for the used plastics particularly single use plastic in their store, as indicated in the survey result. Some customers store for a period of time and later sells to interested buyers, others store in a collection bag and then invite plastic waste collectors for collection, while some other customers collects broken or damaged single-use plastics and sells to waste collectors.

Used as Plastic Waste Collector upon Delivery

Majority (85.71%) of the respondents indicated they are not into used plastic waste,

particularly single-use plastics, collection upon delivery. These are all the respondents that responded to the question as indicated in the survey result.

Data gathered from the survey result showed respondent response and willingness to customers request to pick up used plastic upon delivery and take them to recyclers; 57.14% indicated yes, with some charge, 28.57% respondents indicated they will consider the possibility. Regardless of the responses and options selected by respondents all actions are geared towards effective plastic wastes particularly single-use plastic waste management.

Bio-Plastics

All respondents indicated they had no knowledge of bio-plastics. Most (85%) of them are not sure if they wanted to learn more about bio-plastic as they all indicated maybe yes in their responses while a respondent is not interested in learning about bio-plastics.

Environmental Impacts of Plastic Waste

Two respondents indicated they know the impact of single-use plastic in the environment, while 3 respondents indicated somehow yes, and the remaining respondent indicated no knowledge

Company's Future Vision and Strategy to Reduce Fossil Based Plastic Production

Majority of the respondents intend to partner with government to enforce the construction of recycling plants in Lagos, while few are yet to come to terms with their future visions and strategy to reduce fossil based plastic production.

Reason Hampering the Reduction of Plastic Use

Four respondents indicated lack of awareness on the side of consumers, lack of awareness on the side of the plastic producers, two respondents chose product characteristics of plastics (lightness, strongness, etc.) and one respondent indicated lack of regulatory framework as reasons hampering the reduction of plastics, particularly single-use plastics.

Responsibility in Reducing Plastic Waste

The following people and institutions should be responsible for the reduction of plastic waste in our communities and environment as indicated by the respondents, shown in Table 3.22.

Table 3.22: Responsibility in Reducing Plastic Waste

SN	Institutions	Respondents (%)
1	Individual	100
2	The Federal government	80
3	State government	50
4	Local government	40
5	Plastic producers/industries	20
6	Retailers (shops, department stores)	10

Policy Measures to Reduce the Use of Single-Use Plastics

All respondents indicated laws and acts mandating single-use plastic producer for waste recovery of their product will be an effective policy measure, two opted for levy on single-use plastic producers/suppliers and only one distributor believed levy on consumers would be a perfect and effective policy measure to reduce the use of single-use plastics.

3.7.4 Retailers

A total number of 10 plastic retailers were interviewed and completed the questionnaire.

Plastic Products

All the ten retailers responded to this question, shown in Table 3.23.

Table 3.23: Plastic Products Being Sold by Retailers		
S/N	Plastics	Respondents (%)
1	Plastic bin bags	100
2	Food containers	90
3	Lightweight plastic carrier bags	90
4	Cups for beverage	80
5	Straws	70
6	Food packets	70
7	Beverage (PET) bottles, their caps and lids	60
8	Waste bin	10
9	Plastic chairs and tables	10
10	Drums and waste bins	10
11	Drums	10

Type of business in Value-Chain

All the 10 respondents are into retail, supermarket and brand owners while one of them is into distributor type of business in the value-chain.

Year of Business Establishment

All retailers responded to this question with four of them established between years 2000 and 2005, another four established between 2011 and 2020 while the other two were established between 2006 and 2010.

Employment Capacity

All respondents answered this question and indicated average employment capacity is less than 10 employees, with less than 5 female employees, all fully employed.

Revenue

No response from respondents.

Brief Description of Company's Business, Products and Operations

Sales, wholesale plastic product distribution to other retailer and end-users, purchase of

plastic products particularly single-use plastics are some business and operation descriptions made by the retailers.

List of Single-use plastic packaging/product

The single-use plastics dealt with by the retailers are:

- Lightweight plastic carrier bags;
- Food containers;
- Lightweight plastic food wrappers;
- Beverage (PET) bottles, their caps and lids;
- Chairs and tables;
- Cups for beverage; and
- Straws.

Shop Awareness of Environmental Impacts of Plastic Wastes

Data gathered indicated that 20% of the respondents showed they somehow know the environmental impacts and menace the single-use plastics has caused in our communities, while 40% have no knowledge of the damage caused by single-use plastics to our environment and 40% respondents are aware of the environmental impacts of single-use plastics. This is shown in Figure 3.45.

Business Promotion of Environmental Protection by Shop/Business

Result from the survey showed that 100% of the respondents answered this question; 30% indicated they do not have any protection program and do not plan for it, 10% respondents are planning to promote environmental protection programme and 60% have environmental protection programme, shown in Figure 3.46.

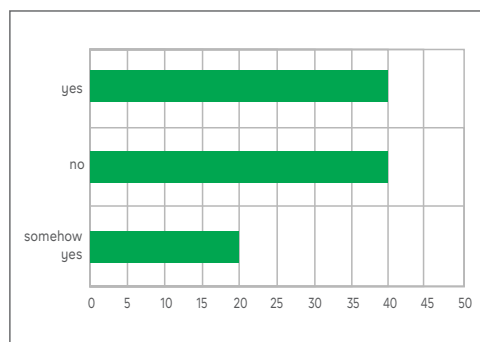


Figure 3.45: Shop Awareness Environmental Impacts

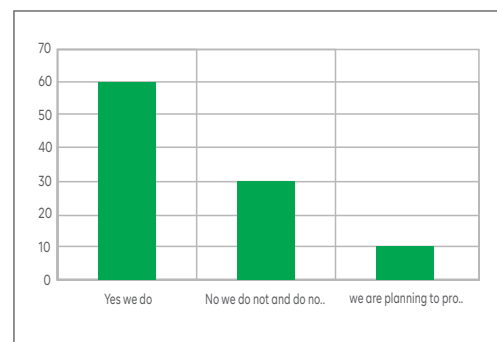


Figure 3.46: Promote Environmental Protection

Customers Demand on More Environmentally Friendly Products

Half of the respondents indicated that customers' demands on more environmentally friendly products in recent years have not changed, 30% indicated it has increased while 20% do not know if there have been changes in customers' demands on environmentally friendly products.

Plastic Waste Generation Situation

The survey result showed 30% respondent do not know the situation of plastic waste

generation in recent years in their shops, 10% respondents indicated it has somehow increased, while 30% respondents confirmed it has increased a lot. This result shows an effective waste management structure needs to be put in place for environmentally sound management of plastics, particularly single-use plastics in Lagos which needs to be active from the plastic product retail points.

Provision of Single-Use Plastic Bags for Free to Customers

Eight respondents indicated that they provide single-use plastic bags to their customers for free. A respondent indicated that it is not feasible for their business to charge customers for the single-use plastic provided to them, 3 retailers also stated that it may not be feasible, another 3 indicated it is feasible while one retailer claimed it may be feasible.

Business Feasibility to Provide Alternative Bags to Plastics

Two respondents believed it is feasible to provide alternative bags to consumers, four of them feel it may be feasible if some certain modalities are in place and two respondents chose it may not be feasible. Those respondents that indicated it may not be feasible to provide alternative bags to plastics are concerned about the quality of the alternative bags as this could be capital intensive and customers might not agree to be charged for them.

Type of Feasible Alternative Bags

Six respondents chose paper material bag as a feasible alternative bags to plastics, while two respondents preferred the bio-based and biodegradable material bags respectively. This is shown in Figure 3.47.

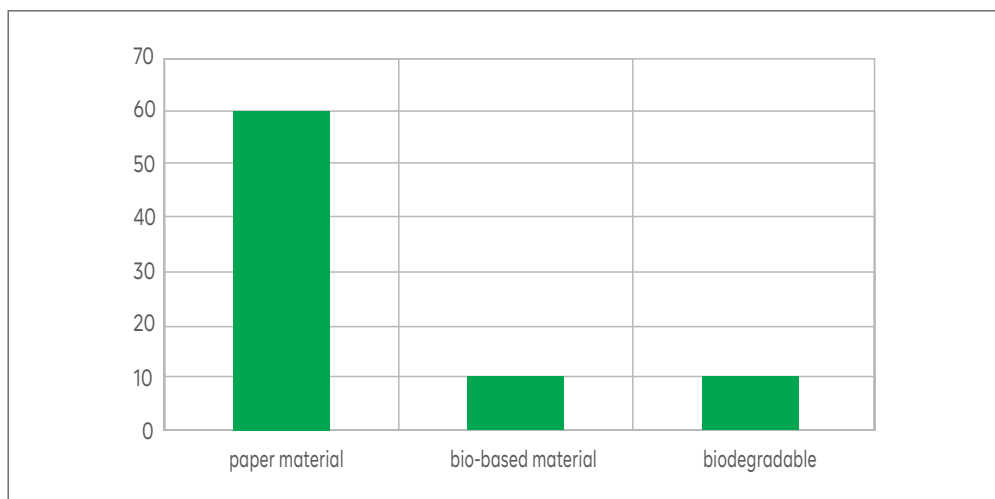


Figure 3.47: Types of Alternative Bags

Efforts to reduce the use of single-use plastics from shop/business

Nine respondents said they do not have plans to reduce the use of single-use plastics at their shops/businesses while a respondent is planning to reduce the use of single-use plastics. A respondent encourages customers to come along with their shopping bags, on their next shopping trip.

All respondents indicated that they do not sell plastics products made from recycled plastics. While most of the recycled plastic products are mixed (60% respondents), 20% respondents indicated that the recycled plastic products they sell are locally produced.

Customers Perception of Recycled plastic products

Majority (80%) of the respondents indicated that customers believe recycled plastic products are less expensive, while 20% stated customers perceived recycled plastic products to be of the same price with the usual plastic product.

Majority (80%) of the respondents showed that customers perceive recycled plastic products to be of lower quality, while 10% respondents indicated that recycled plastic products are of the same quality with the usual plastic products.

Safety of Recycled Products

Majority (90%) respondents answered this question, 60% respondents indicated recycled products are safe, 20% can't really say by choosing rather yes and 10% respondent said rather no, recycled products are not safe. They believed recycled products are environmentally friendly. This is shown in Figure 3.48.

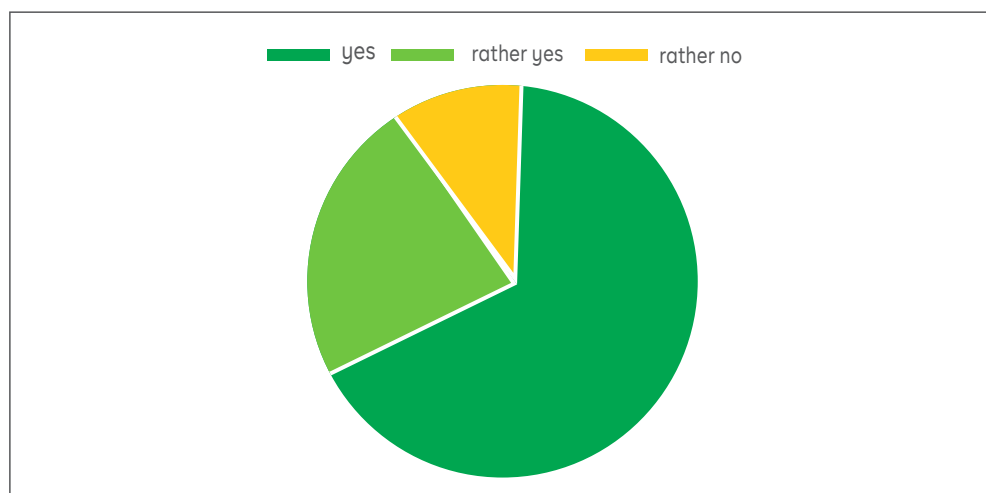


Figure 3.48: Safety of Recycled Products

Sales or Considered Sales of Alternative Plastic Products

All respondents are not selling and are not considering sales of alternative plastic products. The respondent blamed non-demand for the alternative plastic products as the reason for not considering to sell the products. Respondents indicated that alternative plastic is a threat to plastic market and they are not viable in terms of sale and there are no demands for them.

Future Vision and Strategy to Reduce Fossil Based Plastic Production

Some respondents indicated they intend to ensure proper waste disposal and also aim to promote alternative product to plastic when available as some of their future plans, visions and strategy to reduce the fossil based plastic production.

Types of Bio-Plastics

Eight respondents do not know about bio-plastics, 1 indicated knowledge of it and another respondent indicated partial idea of bio-plastics. This is shown in Figure 3.49.

Five respondents indicated they might be interested in knowing more about the bio-plastics and the different available options for their businesses while 4 respondents are ready to know more about it with one respondent not interested in these options. This is depicted in Figure 3.50.

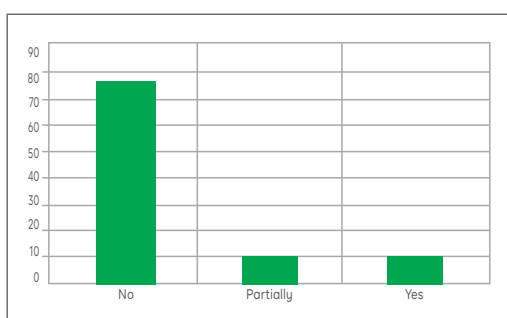


Figure 3.49: Types of Bio-Plastics

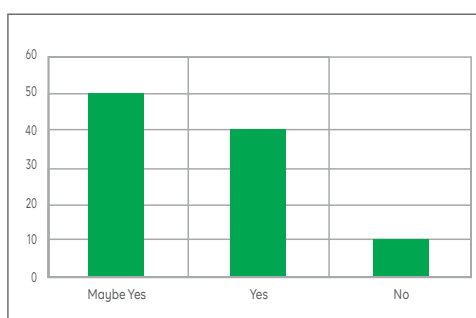


Figure 3.50: Knowledge of Bio-plastics

Environmental Impacts of Single-Use Plastic Waste

Four respondents are aware of the environmental impacts of plastic waste, in particular single-use plastics, a respondent indicated non-awareness of the single-use plastics environmental impacts.

Reason Hampering the Reduction of Plastic Use

Table 3.24 shows that 9 respondents indicated lack of awareness on the side of consumers, 3 indicated lack of regulatory framework, 8 respondents chose lack of awareness on the side of plastic producers and 1 respondent indicated price competitiveness of plastic products as the reasons hampering the reduction of plastic use, particularly single-use plastics.

Responsibility in Reducing Plastic Waste

Respondents that answered this question indicated that the federal government (90%), individuals (70%), plastic producers/industries (60%), state government (50%) and the local government (30%), all should have the responsibility of reducing plastic waste.

Table 3.24: Reasons Hampering Reduction of Plastic Use

SN	Reasons Hampering Reduction of Single-Use Plastics	Respondents (%)
1	Lack of awareness on the side of consumer	90
2	Lack of awareness on the side of plastic producers	80
3	Lack of regulatory framework	30
4	Price competitiveness of plastic products	10

Effective Policy Measures to Reduce the Use of Single-use Plastics

Laws and acts mandating single-use plastic producer for waste recovery of their products and levy on single use plastic producers/suppliers are the responses indicated for effective policy measures to reduce the use of single-use plastics by the respondents.

Extended Producer Responsibility (EPR)

All respondents answered this question, out of which 1 respondent showed they know a little bit of EPR, 8 claimed they have never heard of it and 1 respondent has knowledge of EPR. This is shown in Figure 3.51.

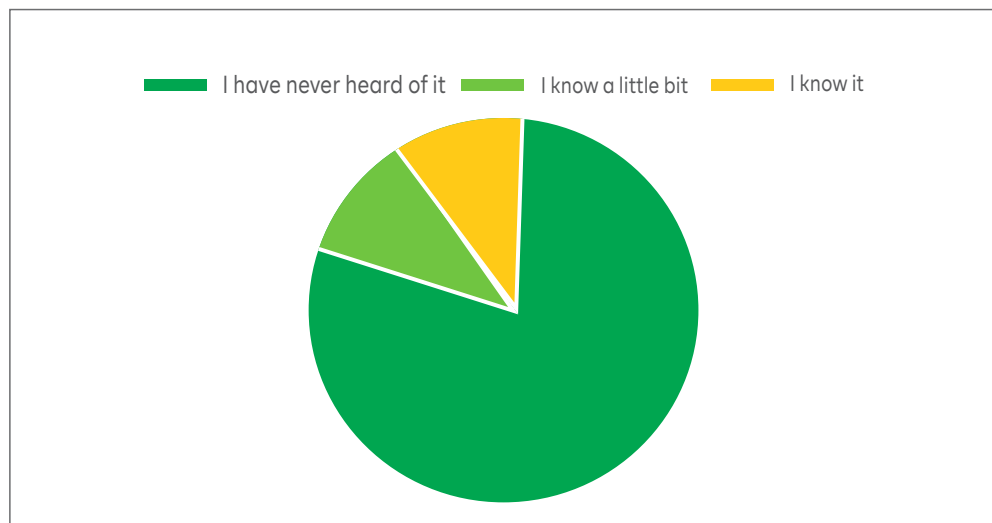


Figure 3.51: Knowledge of EPR

Willingness to Implement EPR, even if it is not a Regulation

A respondent out rightly indicated they will not implement EPR even if it is not a regulation, and another respondent that answered this question is not so sure they will implement the EPR program even if it is not a regulation.

Ability to Cope with EPR when it becomes a Regulation

A respondent showed they will be able to cope with EPR when it becomes a regulation.

3.7.5 Packaging Producers

A total number of twelve (12) packaging producers were interviewed and completed the questionnaire.

Plastic Products and Recycling Business Operation

Table 3.25 shows the plastic products they deal with.

Table 3.25: Plastic Products in Operation

SN	Plastics	Respondents (%)
1	Lightweight plastic carrier bags	57.14
2	Lightweight plastic food wrappers	57.14
3	Food containers	57.14
4	Plastic bin bags	28.57
5	Sachet beverage packaging	28.57
6	Food packets	14.29
7	Beverage (PET) bottles, their caps and lids	14.29
8	Paint buckets	14.29

Type of Business in Value-Chain

Some respondents are into other areas of the value-chain including recycling and compounding.

Year Business Started

All respondents started business between years 2000 and 2010.

Business Capital

Many respondents indicated that their packaging/product production businesses started with more than N500,000 investment capital with just two of them indicating that they financed theirs with N100,000–N200,000.

Employment Capacity

The survey data result showed respondents employment capacity, 8 respondents have more than 100 employees working with their organization, one has between 26 and 35 employees, another one with 10 to 25 employees and two respondents have above 50 employees working in their organization. Workers are engaged in different types of employment ranging from full time employment to part time and informal employments

Revenue

Revenue generated in the last three years, between 2017 and 2019, is above N1billion for 7 respondents while the others indicated their revenues were above N1,000,000 in the stated years.

Net Sales

Data gathered from the survey shows 7 respondents indicated they made above N1billion within the last three years (2017 – 2019) as net sales.

Brief Description of Company's Business, Responsibilities and Operations

Some responses include:

- 'Packaging company committed to providing quality packaging solutions all over Nigeria'.
- 'Manufacture a variety of laminates (solvent-based and solvent less) structures for food and non-food applications'.

- 'Producers of plastic bags, bread wrappers and carrier bags. Sellers of plastics bags, bread wrappers and carrier bags'.
- 'Manufacture of all kinds of flexible packaging materials like pure water sachet film, shrink film, stretch wrap, shopping bag, poky bag, industrial wrapper, laminate for food, soap, oil, detergent powder'.
- 'A prominent polyethylene converter based in Lagos, Nigeria. A family run business engaged in plastic film extrusion, with over 25yrs of experience with capability to extrude polyethylene into film ranging from a thickness of 3-300 microns or more'.
- 'Produce packaging and storage containers used by pharmaceuticals companies, drug stores and hospitals, food & beverages producers. Also regular household plastic wares and dedicated plastic components'.

List of single-use Plastic packaging/products manufactured

Majority answered this question, indicating plastic packaging products as their produce.

Raw Materials and Technology used in the Manufacturing Process

Table 3.26 shows the raw materials and technologies used by respondents in the manufacture of plastic packaging products.

Table 3.26: Raw Materials and Technology Used		
S/N	Raw Material	Technology
1	LDPE and Additives	Polymer Extrusion Gravure and Flexographic printing process Bag making machinery
2	BOPP ; CPP ; LDPE ; HDPE	Asia Technology
3	LLDPE, LDPE, HDPE, GPPS	Extrusion blown film Extrusion sheet Thermoforming
4	Polyethylene Polypropylene Technology: Blown film extrusion Recycling	Blown film extrusion Recycling
5	PPCP, PPHP, PPCP Random, HDPE	Injection Moulding, and Blow Moulding
6	HDPE Blow, LLDPE. PPCP	Injection moulding, Blow Moulding

Source of Materials Used For Manufacturing

Survey result indicated that 71.43% respondents locally source for materials used for the manufacturing of the packaging products, while 42.86% stated that they import the raw materials they use in their manufacturing processes.

Amount of locally Sourced Materials

For locally sourced materials, 3 respondents indicated that more than 50% of materials

are sourced locally while the remaining 5 companies indicated that less than 20% of materials are sourced locally.

Amount of Imported Materials

For imported materials, 6 respondents indicated that more than 50% of materials are imported, while the remaining 3 respondents indicated that less than 20% of materials are imported.

Manufactured Products from Recycled Plastics

Majority (66.67%) of the respondents indicated they manufacture packaging products from recycled plastics while 33.33% respondents claimed they do not manufacture products from recycled products.

Those that manufactures their products from recycled plastics claimed the recycled plastic products are locally sourced with two of them indicating that the recycled plastics are mixed.

Respondents indicated that the use of recycled plastic for the manufacturing process of packaging product does not affect the products in terms of quality, cost, price and market perception as the recycled plastic is obtained from own production process and recycled back into the manufacturing processes with minimal percentage required as an addition to virgin raw materials to achieve hygienic products.

Respondents who don't make use of recycled plastic for the manufacturing process of their packaging products stated that most packaging containers are used for food grade storage and usage, outsourced recycled material does not meet the quality threshold.

Alternative Material for Production

Ten respondents do not make use of the alternative material for their packaging product manufacturing process while two indicated use of alternative material during their manufacturing processes.

Challenges encountered using Alternative Materials

The major challenges identified are the cost of importation and cost of the raw material. Majority of the respondents indicated that they have never considered using alternative materials for the manufacturing process.

Technology Planned to be applied for Plastic Production with Alternative Raw Material

Extrusion blown film was indicated by a respondent as the technology planned to be applied for plastic production with alternative raw material.

Challenges Encountered in Applying Technology for Plastic Production with Alternative Material

Cost of alternative material sourcing is a major challenge identified by the only respondent that answered this question.

Types of Bio-plastics

Ten respondents answered this question, four of them know the meaning of bio-plastics, two of them partially have an idea of bio-plastics while four do not know bio-plastics.

Majority of the respondents are willing to know more about bio-plastics and the different options available for their businesses.

Environmental Impacts of Single-Use Plastics

They are all aware of the environmental impacts of plastics waste, in particular single-use plastics.

Waste Collectors Company's Future Vision and Strategy to Reduce or Tackle Single-Use Plastic Waste

Some respondents indicated their vision/strategy to be:

- Investment in recycling machines to eradicate the fossils from the environment;
- Reuse, Recycle;
- Educate the masses, increase recycling incentive for collections; and
- Identify possible alternate uses of recycled products, invest in appropriate recycling system.

Reason Hampering the Reduction of Plastic Use

Majority of the respondents indicated price competitiveness of plastic products, product characteristics of plastics and lack of awareness on the side of plastic producers as major reasons hampering the reduction of plastic use, particularly single use plastics in Lagos.

Plastic Waste Management Responsibility

Majority of respondents indicated Local Government, plastic producers/industries and individuals should be responsible while about half indicated that the Federal Government and State Government and NGOs and civil organizations should be charged with plastic waste management.

Type of Policy Measures Considered Effective to Reduce the Use of Single-Use Plastics

Nine respondents chose laws and acts mandating single-use plastic producers for waste recovery of their products as an effective policy measure while three preferred ban the use and sale of certain single-use plastics as the best policy measure to reduce the use of single-use plastics in our environment.

Extended Producer Responsibility (EPR)

Most of the respondents (8) know EPR and what it stands for only one of them doesn't know much about EPR and three respondents know a little bit of EPR. All of them are willing to implement EPR, 8 respondents indicated they are willing to implement EPR voluntarily even if it is not a regulation while 4 respondents indicated rather yes to this question.

Ability to Cope with EPR should it become a Regulation

More than half (7 out of 12, 58.3%) of the respondents indicated that they might be able to cope with the implementation of EPR should it become a regulation, four of them indicated that they will cope and only one respondent claimed it will be with difficulty to be able to cope with the implementation of EPR should it eventually become a regulation. Many respondents also indicated they might consider product redesign, should EPR become a regulation, with few of them being very certain of product redesign.

Challenges Businesses Might Face with EPR

With the implementation of EPR becoming a regulation, value-chain players especially the packaging producers envisaged the following probable obstacles:

- Huge investment quality of waste collection;
- Increase in product price as its effect will be passed to end consumers, resulting in inflation;
- Implementation should be across the industry, not just to a handful of manufacturers as this will lead to loss of competitors and incentives to shy away from EPR.

3.7.6 Compounders

A total number of five compounders were interviewed and completed the questionnaire.

Type of Businesses in Value-Chain

They are all compounders with one respondent involved in packaging production.

Year of Business Establishment

Two respondents indicated that their businesses were established between years 2006 and 2010 and, between 2011 and 2020, respectively.

Business Capital

The capital investment in the compounding business is more than N500,000.

Employment Capacity

Three respondents have more than 50 employees while two respondents employed more than 100 workers with more than 20 females, most (75%) of them fully employed.

Revenue

The net sales revenue generated in the last 3 years showed three respondents generated above N1billion between 2017 and 2019 and one respondent generated above N1m in the space of the indicated years 2017-2019.

Brief Description of Company's Business, Products and Operations

Compounders are mainly involved in the manufacturing of household plastics, ball pen foam pack and domestic pet jars, thermoforming cup, plate and bowl - coolers/warmers. They are produced using injection moulding technology, blow moulding, polyurethane foaming, pet blowing and thermoforming. Injection moulding manufacturing process is used to produce plastic furniture.

Raw Material and Technology used in Compounding Process

Table 3.27 presents the raw materials and technology indicated by the respondents for their compounding processes.



Table 3.27: Raw Material and Technology used in Compounding Process

S/N	Raw Material	Technology
1	PolypropyleneGranules	Through injectionmoulding machines
2	High density polyethylene(HDPE) Polypropylene HOMO (PP) Polypropylene Copolymer (PPCP) Polyvinylchloride (PVC)	Injection moulding
3	Homo-polypropylene Impact polypropylene copolymer General purpose polystyrene Polypropyleneraphes/ Polyethylene terephthalate	Injection moulding Thermoforming Pet blowing

Source of Materials Used for Compounding

Raw materials used for compounding processes are locally sourced as indicated by all the respondents, three of them claimed the materials are imported, about 20% of the materials are locally sourced by three respondents with more than 50% of the materials imported as indicated by other two respondents.

Alternative Materials for Production

All the respondents indicated that they do not use alternative materials for their production processes. They have also not considered using alternative materials for their production.

Challenges (Technical, Economical and Environmental) Encountered Using Alternative Materials

Price of raw materials increases on a regular basis.

Challenges Encountered in Applying Technology for Production of Alternatives to Plastics

Non-availability of trained personnel and equipment has been singled out as the main challenges encountered in applying technology for the production of plastics using alternative raw materials.

Future Vision and Strategy to Reduce Fossil Based Plastic Productions

Some of the respondents indicated that they are committed to using recyclable plastics and collaborating with relevant authorities to practice environmentally friendly operations and are also committed to embracing bio-plastics in the future.

Types of Bio-Plastics

Majority of the respondents know bio-plastics while only one of them has partial idea of bio-plastics.

Environmental Impacts of Single-Use Plastic Waste

All the respondents are aware of the environmental impacts of plastic wastes.

Reason Hampering the Reduction of Plastic Use

Most respondents (4 out of 5, 80%) indicated lack of regulatory framework, 3 respondents chose price competitiveness of plastic products, two of them said lack of awareness on the side of plastic producers are some of the reasons hampering the reduction of plastic use in Lagos state.

Responsibility in Reducing Plastic Waste

Respondents that answered this question indicated that the Federal government, State Government and the Local Government as the major institutions that should shoulder the responsibility of reducing plastic wastes.

Effective Policy Measures to Reduce the Use of Single-use Plastics

Laws and acts mandating single-use plastic producers for waste recovery of their products, levy on single use plastic producers/suppliers and levy on consumers were the responses of compounders as effective policy measures considered to reduce the use of single-use plastics.

Extended Producer Responsibility (EPR)

Four respondents answered this question, out of which one respondent knows a little bit of EPR, another one claimed to have never heard of it and two respondents know EPR.

Willingness to Implement EPR, Even if it is not a Regulation

Two respondents out rightly indicated they will not implement EPR even if it is not a regulation and the other two respondents that answered this question were not so sure if they will implement the EPR program even if it is not a regulation.

Ability to Cope with EPR when it becomes a Regulation

Four out of the five compounders responded to this question, 3 indicated that with difficulty they would cope with the guidelines of the EPR as it affect plastics and plastic waste when it becomes a regulation, while one compounder showed that they won't be able to cope with EPR should it become a regulation. Three out of the four respondents that answered this question indicated they would consider redesigning their product if EPR on plastics products becomes a regulation.

3.8 Findings

Findings from this survey carried out on available sustainable alternative materials to plastics and innovative packaging and recycling technologies that meet market needs in Africa to reduce plastics leakages to the Nigerian environment delving into the activities of the plastic value-chain players, both in FCT and Lagos are presented as specific and general findings.

3.8.1 Specific Findings

Findings that are specific to each of the value-chain categories are that:

- Product quality of recycled plastic is the major challenge discouraging its use, especially for food contact;
- The cost of raw materials, availability of technology and lack of knowledge on production are the major challenges discouraging availability of alternative raw materials in Nigeria;
- Most retailers provide plastic bags for free and the feasibility of charging for the

bags is generally negative, 14 out of the 23 retailers (60.9%) indicated not feasible/may not be feasible.

- Majority of retailers (11 of 17, 64.7%) perceive alternative bags to plastics to be feasible for provision to customers;
- Most retailers in FCT (6 of 9, 66.7%) suggested bio-based material as against paper material put forward by most retailers in Lagos (6 of 8, 75.0%).
- Most waste collectors conduct manual sorting with possible mechanization requiring training of workers for better sorting knowledge;
- Bio-plastic is not well known among single-use plastic value chain companies as 72 of 99 surveyed companies (72.7%) do not know at all;
- There is high level of interest (63.6%) on bio-plastic and available options (63 of 99 surveyed companies);
- Awareness raising and promotional activities are needed for PVC players;
- Most retailers (13 of 23, 56.5%) do not sell products from recycled plastics nor consider selling alternative plastic products.
- There is a wide gap between retailer wares and consumer needs;
- Most of the plastic value-chain companies (68 of 99 surveyed companies, 68.7%) are aware of the environmental impacts of plastic wastes;
- Policy measures considered to be effective in reducing usage of single-use plastics include the following in order of priority: laws and acts mandating the producers for waste recovery, ban of use and sales of certain SUP, levy on SUP producers/suppliers, levy on consumers and retailers;
- 50 out of 68 companies in FCT and Lagos (73.5%) know about EPR;
- Most of the companies in FCT and Lagos (76%) can cope with EPR, if it becomes a regulation
- Almost all those companies in Lagos (95%) will consider redesigning their products in terms of collectability and use of alternatives if EPR becomes a regulation, whereas, in FCT 60% are in the affirmative;

There is the need to circulate the NESREA's EPR Guidance document among all the plastic value-chain actors so they can understand their roles and responsibilities under the programme.

3.8.2 General Findings

Findings that are general to the various areas of this survey carried out on the alternative, sustainable and innovative packaging materials within the plastic value-chain players in FCT and Lagos, Nigeria include:

- Value-chains players (stakeholders and regulators) are enthusiastic about the project outcomes for necessary funding on plastic waste management programmes, particularly single-use plastics in the study areas.
- Majority of the plastic value-chain players have heard about bio-plastics and want to know more about it, so as to know how well it can improve their businesses and products' performance.
- Respondents are aware of environmental impacts caused by plastics, particularly single-use plastics on the environment, are ready to cooperate with the authority that will be charged with the responsibility to reduce the usage of plastics.
- They have clear vision in protecting their businesses in line with global green economic practices

- They want to be fully involved in all policy measures targeting plastic pollution but with no adverse economic returns;
- There is need for continuous education and awareness campaign for customers and consumers on the benefit of environmental friendly plastic products to our environment;

Value-chain players in the plastic industry are aware of the Extended Producer Responsibility (EPR) but afraid of the implications it will have on their businesses.



CHAPTER FOUR

RESIDENTS' SURVEY
ON SINGLE-USE PLASTIC
PRODUCTS IN FCT
AND LAGOS

4

RESIDENTS' SURVEY ON SINGLE-USE PLASTIC PRODUCTS IN FCT AND LAGOS

4.1 Overview of the Survey

Residents' survey on waste management and plastic litters was conducted in FCT and Lagos. The objective of this survey is to establish a baseline data of awareness level and attitudes of the residents in FCT and Lagos on plastic pollution, plastic waste management, and 3Rs (reduce, reuse, and recycle) promotional activities. This was used to establish a baseline data for comparison with future project as well as take into account the current attitude of residents to three popular recycling activities. The residents' survey questionnaire, developed in consultation with UNIDO and FMEnv, is incorporated into the KoBoCollect software.

4.2 Scope and Methodology

The scope and methodology of residents' questionnaire administration in FCT and Lagos is as follows:

- For residents, the required data was obtained primarily through face-to-face administration of resident questionnaire embedded with electronic application;
- Questionnaires were administered to 2,034 respondents in FCT and 1,985 respondents in Lagos making a total of 4,019 respondents;
- The survey made use of open-source software, Kobo Toolbox for collection, management and data usage;
- The software allows offline data collection with mobile devices in remote areas. The data collected was submitted to a designated server through internet connection;
- The project, for this exercise, employed and trained enumerators for the purpose of the survey in order to achieve accurate application of the software and ensure

- total coverage of the study areas during administration of the questionnaire;
- Activities of the enumerators were monitored on the open-source software to avoid duplication of data and ensure transparency on the path of the enumerator while on field;
 - Enumerators were allocated to the six area councils in FCT and the twenty LGAs in Lagos;
 - Identified respondents including stores, supermarkets, restaurants/eateries, markets, residents, hawkers, plastic retailers, distributors were interviewed to obtain more information;
 - Enumerators that were employed are primarily university graduates with adequate understanding of the environment; and
 - All enumerators had an android device for upload of survey data.

4.3 General Overview of Residents' Survey in FCT and Lagos

Questionnaires developed for residents. There were two study teams; FCT and Lagos. Field surveys, interviews were conducted physically for residents in FCT and Lagos. Interviews were conducted by visiting offices/homes/places and in strict adherence to COVID-19 protocols. KoBoCollect data collection system was used for instant administration and analysis of the data.

Objective of the residents' survey is to establish a baseline data of awareness level and attitudes of the residents in FCT and Lagos, The questionnaire is composed of information on plastic pollution, plastic waste management and 3Rs (reduce, reuse, recycle).

The total number of residents interviewed in FCT is 2,034 consisting of 1,158 males and 876 females. The total number of residents interviewed in Lagos is 1,985 consisting of 1,083 males and 902 females. The overall total for the two areas of study is 4,019 respondents made up of 2,241 males and 1,778 females. This is presented in Table 4.1 and shown in Figures 4.1, 4.2, 4.3 and 4.4 for gender, age group, education and occupation, respectively.

Table 4.1: Demographics of FCT and Lagos Residents' Survey

Item	Category	Respondents		
		FCT	Lagos	Total
Sex	Male	1,158	1,083	2,241
	Female	876	902	1,778
Age	< 20	80	147	227
	20's	401	555	956
	30's	906	705	1,611
	40's	412	373	785
	50's	135	122	257
	60's	39	22	61
	> 70	21	1	22

Cont. Demographics of FCT and Lagos Residents' Survey				
	Mute	40	60	100
Education	Primary	91	78	169
	Secondary	647	748	1,395
	Tertiary	1,065	1,014	2,079
	Not Educated	171	72	243
	Mute	60	73	133
Occupation	Government employee	224	53	277
	Student	206	279	485
	Private employee	424	457	881
	Own business	728	693	1,421
	Street vendor/informal	266	321	587
	Unemployed	122	105	227
	Mute	64	77	141
Total		2,034	1,985	4,019

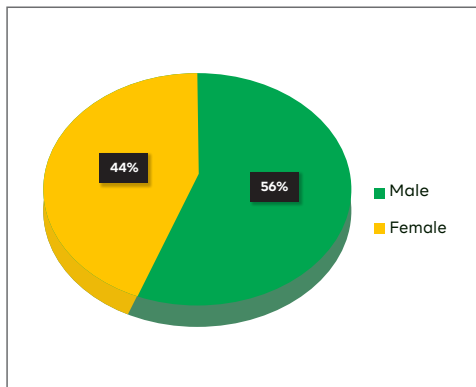


Figure 4.1: Gender of FCT + Lagos Respondents

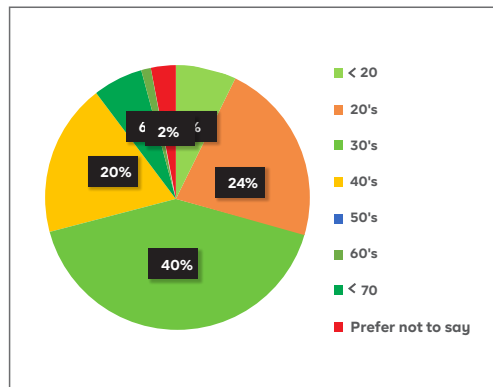


Figure 4.2: Age Group FCT + Lagos Respondents

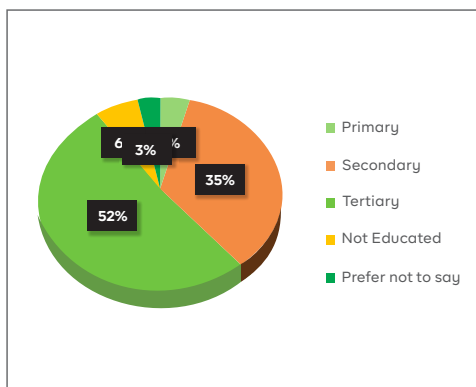


Figure 4.3: Education of FCT + Lagos Respondents

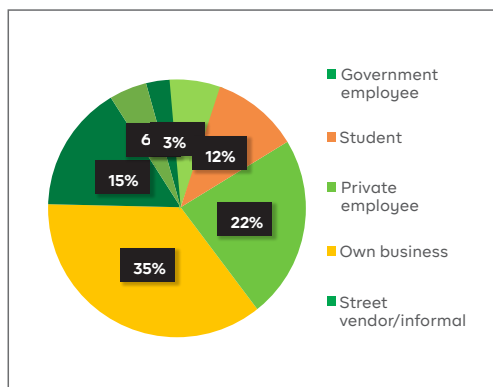


Figure 4.4: Occupation of FCT + Lagos Respondents

Institutions Responsible for Plastic Waste Reduction

Institutional responsibilities for reducing plastic wastes as indicated by the residents in FCT and Lagos is shown in Table 4.2 and presented in Figure 4.5. Undoubtedly, the Federal Government is saddled with the primary responsibility for reducing plastic wastes, this is followed by State and Local Governments' neck-to-neck, then the individuals and NGOs, civil organizations, with volunteers having the least responsibility.

Table 4.2: Institutions Responsible for Plastic Waste Reduction

Institutions	FCT (%)	Lagos (%)	Total (%)
The Federal Government	59.34	57.78	58.6
State Government	27.14	62.27	44.7
Local Government	32.4	56.17	44.3
Plastic producers/industry	24.7	15.31	20.0
Retailers	16.1	16.62	16.4
Individuals	38.3	43.02	40.6
NGOs, civil organizations, volunteers	8.2	9.63	8.9

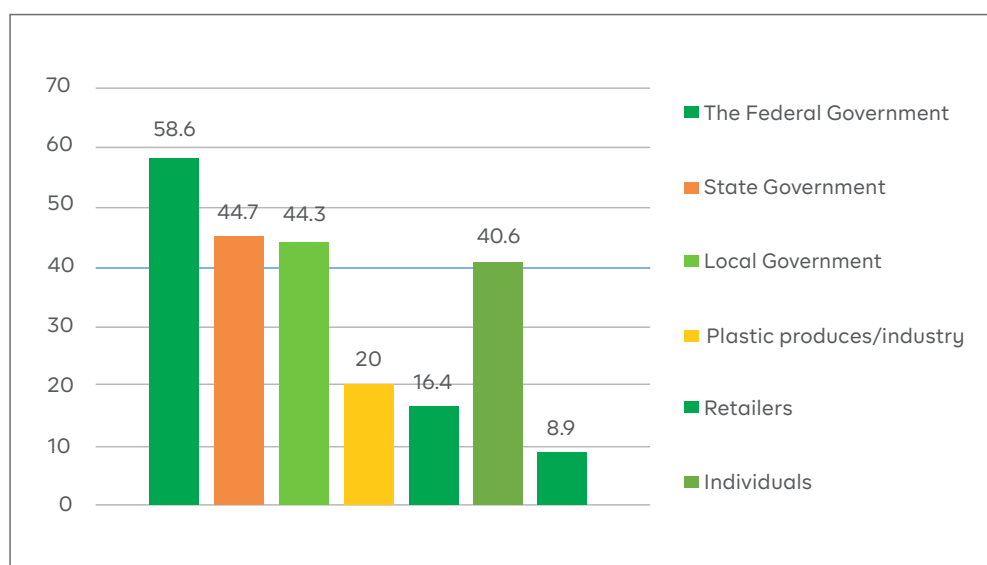


Figure 4.5: Institutions Responsible for Plastic Waste Reduction

Awareness on Environmental Impact of Plastic Wastes

The largest proportion of the 4,019 respondents (2,964, 73.75%) are aware of the environmental impacts of plastic wastes, in particular single-use plastics, shown in Figure 4.6.

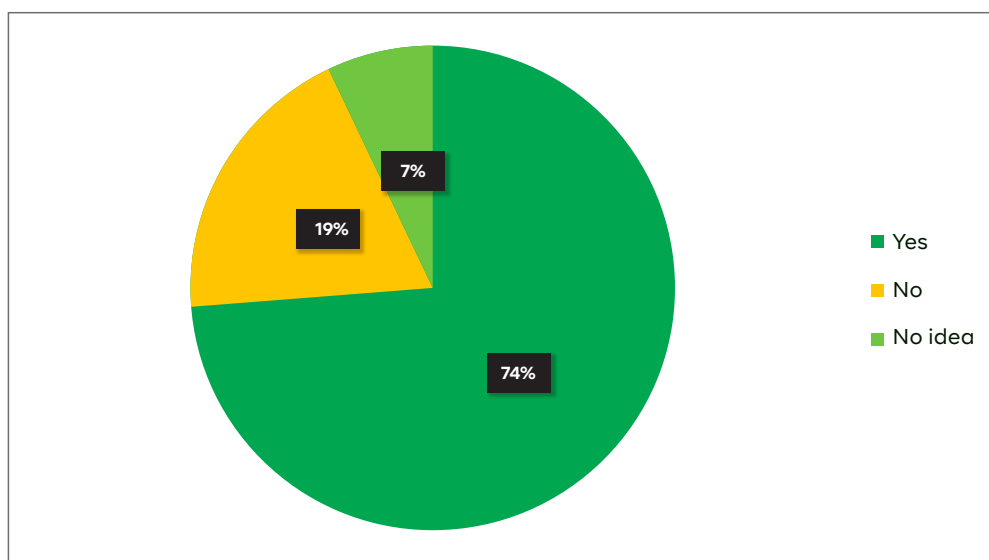


Figure 4.6: Awareness of Environmental Impacts

4.4 Analysis of FCT Residents' Survey

4.4.1 Sampling Techniques, Data Collection and Analysis

Data was collected from 2,034 FCT respondents consisting of 1,158 males and 876 females. Sampling technique used for this study was random and was carried out in the six area councils of the Federal Capital Territory, namely; Abaji, Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje and Kwali Area Councils. The targeted respondents and sectors for the survey are, hotels and restaurants, stores and supermarkets, residences in the area, plastics retail stores and every other businesses that their activities generate and consume plastics, particularly single-use plastics. Survey and questionnaire administration were carried out using KoboCollect, an open data kit available on Android phones. Analysis of the data collected was carried out using the KoboCollect software version 1.28.0.

4.4.2 FCT Area Councils Survey

The total number of residents interviewed in FCT were 2,034 consisting of 1,158 males and 876 females. Enumeration was carried out in the six Municipal Area Councils in FCT, namely: Abaji, Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kwali and Kuje. Two enumerators were engaged for each Area Council with a Supervisor making a total of thirteen (13) Personnel. Table 4.3 presents the number of residents interviewed in each of the area council and is depicted in Figure 4.7 showing uniform spread of respondents across the area councils. The number of respondents ranges between a minimum of 334 in Abaji/Gwagwalada/Kwali and a maximum of 354 in AMAC with an approximate average number of respondents being 339 corresponding to 16.67%.

Table 4.3: Number of Respondents in FCT Area Councils

S/N	Municipal Area Council	Number of Respondents	Respondents (%)
1	Abaji	334	16.42
2	Abuja Municipal Area Council (AMAC)	354	17.40
3	Bwari	339	16.67
4	Gwagwalada	334	16.42
5	Kuje	339	16.67
6	Kwali	334	16.42
TOTAL		2,034	100.00

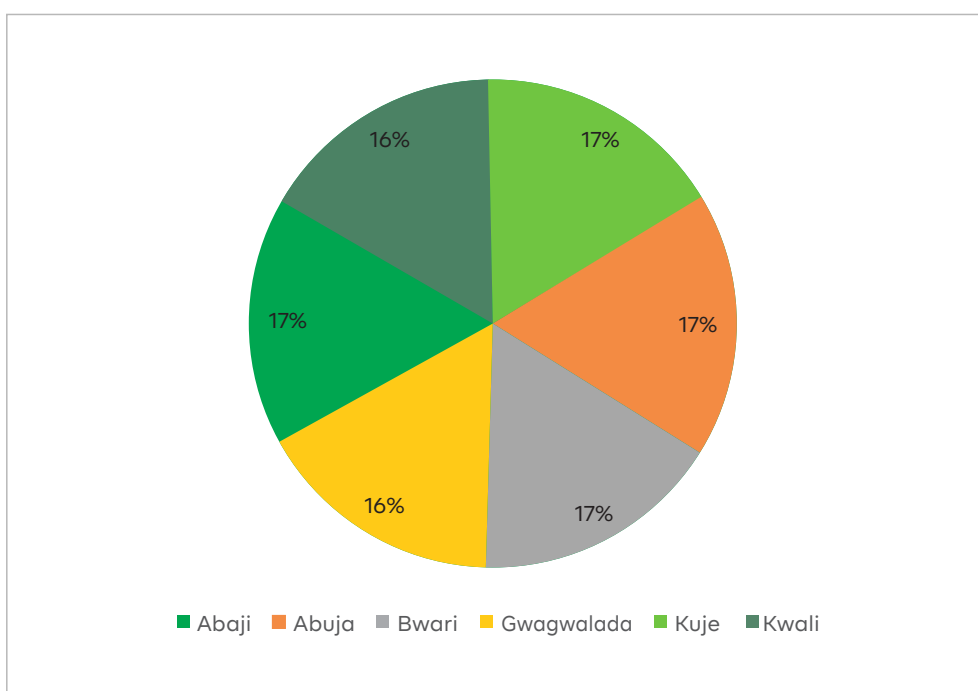


Figure 4.7: Survey in FCT Area Councils

4.4.3 Demographics of FCT Respondents

The demographic data obtained for FCT respondents is presented in Table 4.4 and depicted in Figures 4.8, 4.9, 4.10 and 4.11 for gender, age, education and occupation, respectively.

Table 4.4: Demographic Profile of FCT Respondents			
Variable	Categories	Number	Percentage (%)
Sex	Male	1,158	56.93
	Female	876	43.06
Age	<20	80	3.93
	20's	401	19.71
	30's	906	44.54
	40's	412	20.26
	50's	135	6.64
	60's	39	1.92
	<70	21	1.03
	Prefer not to say	40	1.97
Education	Primary	91	4.47
	Secondary	647	31.81
	Tertiary	1,065	52.36
	Not Educated	171	8.41
	Prefer not to say	60	2.9
Occupation	Government employee	224	11.01
	Student	206	10.13
	Private employee	424	20.85
	Own business	728	35.78
	Street vendor/informal sector	266	13.08
	Unemployed	122	6
	Prefer not to say	64	3.15

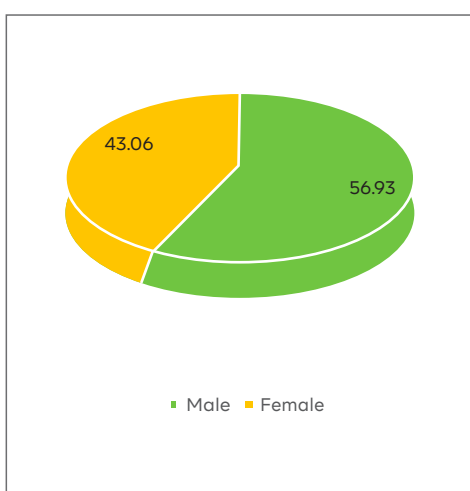


Figure 4.8: Gender of FCT Respondents

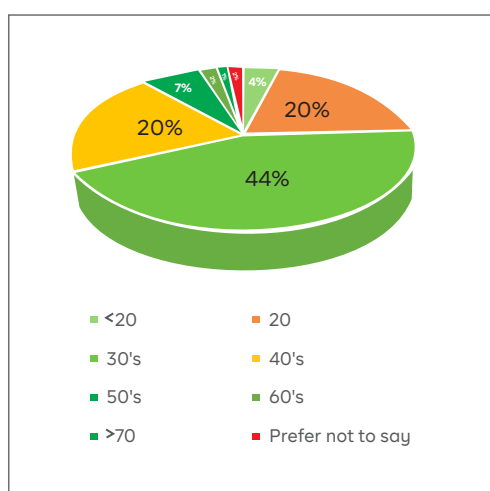


Figure 4.9: Age Group of FCT Respondents

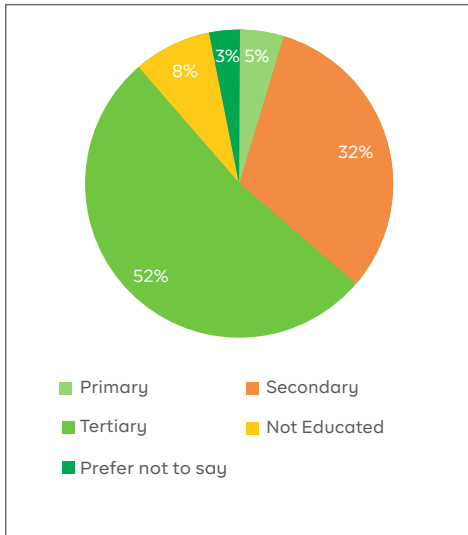


Figure 4.10: Education of FCT Respondents

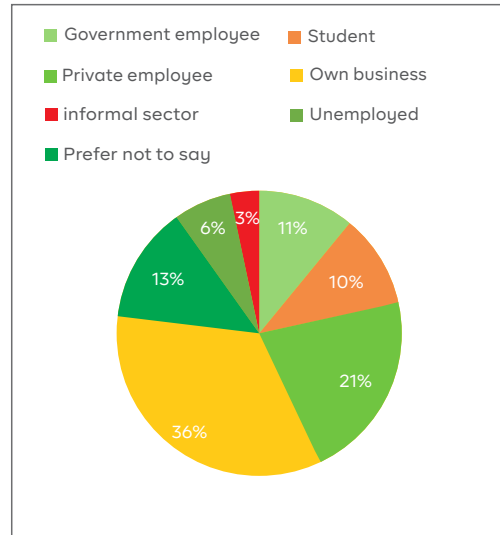


Figure 4.11: Occupation of FCT Respondents

4.4.4 Awareness of Environmental Impacts of Plastics Wastes

The largest proportion of the 2,034 respondents (1,455, 71.53%) are aware of the environmental impacts of plastics waste, in particular single-use plastics, while (230, 11.31%) has no idea what the impacts are. This is shown in Figure 4.12. This was followed by where they heard about it, shown in Figure 4.13. This result revealed respondents' level of awareness to impacts of plastic wastes and how the campaign against inappropriate disposal and management of plastic waste has been effective.

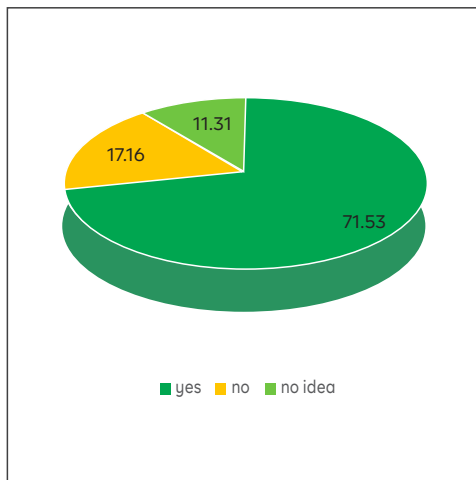


Figure 4.12: Awareness of Impacts of Plastic Wastes

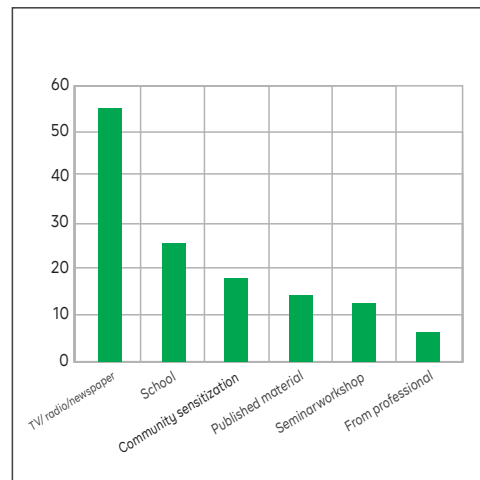


Figure 4.13: Source of Awareness of Impacts

4.4.5 Problems Associated with Single-Use Plastics

Some of the major problems identified by the respondents are blockage of sewage/drainage (1,463, 71.93%), deterioration of natural beauty of environment, human health problems (881, 43.31%) and marine pollution (459, 22.57%). Figure 4.14 shows the results. People are much concerned about their environment, as result of this, some respondents in their areas tries as much as they can to ensure waste is managed in an environmentally sound manner, the result shows that 949 respondents (46.66%) are very much concerned, 646 respondents (31.76%) are somehow concerned while 89 respondents (4.38%) are not concerned at all, as shown in Figure 4.15.

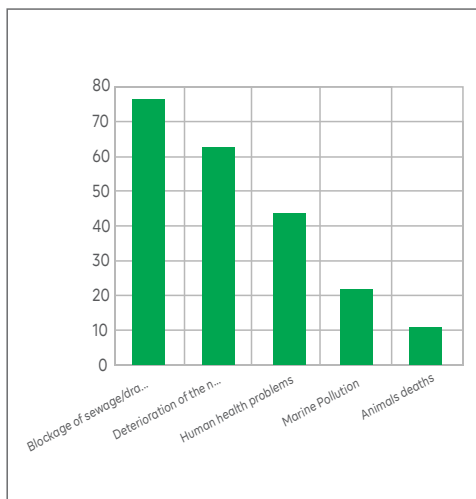


Figure 4.14: Problems with Plastics Wastes

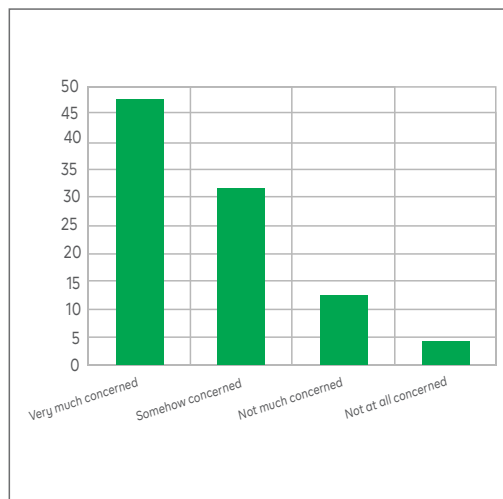


Figure 4.15: Concerns About Negative Impacts

Civil societies, waste management authorities, community based organizations as well as the government have a lot to do in the aspect of awareness and education campaign on the impacts of indiscriminate disposal and inappropriate management of plastic wastes as people are still fairly well informed (795, 39.09%), while (578 respondents, 28.42%) are very well informed as shown in Figure 4.16.

There is a need to improve on the waste management services at market places, waste dumping sites and effective cleaning of sewages, gutters and drainages. Survey result indicated that sewages, gutters and drainages (1,233, 60.62%), market places (1,186, 58.31%) and waste dumping sites (1,147, 56.39%) are seriously polluted by plastics and single use plastic wastes, this shows that high usage and indiscriminate disposal of single use plastic products are found to be common in these areas. As shown in the results, crowded residential areas (680, 33.43%), parks (706, 34.71%) and roadsides (459, 22.57%) recorded as less polluted by single use plastics. It is depicted in Figure 4.17.

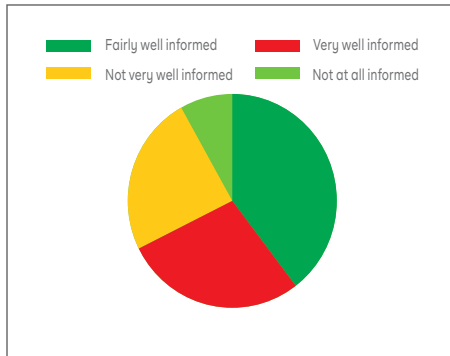


Figure 4.16: Awareness on Mismanaged Plastic Wastes

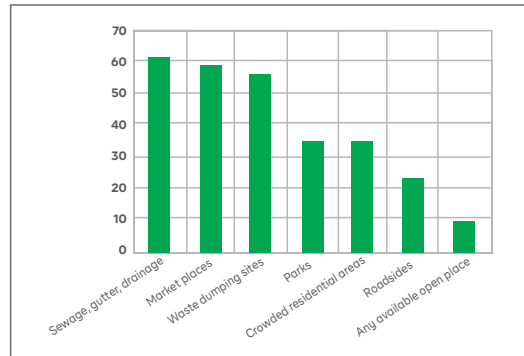


Figure 4.17: Parts of City Plastics-Polluted

Majority of the respondents do not know that marine plastic litter is a serious global environmental challenge as indicated by the result. 774 respondents claimed not to know the impacts of marine plastic litter while 672 respondents are aware of the impact single-use plastic has on marine body.

Our institutions need to start teaching on the impact of marine litter especially single-use plastics, as most of the information about marine litters are being disseminated through the media; that is, TV/radio/newspapers; which reflected in the survey result (694 respondents, 34.12%) while 293 respondents (14.41%) were only informed about marine litters and its impacts at school, this is shown in Figure 4.18.

The survey result indicates that the Government should be charged with the responsibility of reducing plastic wastes (1,207 respondents, 59.34%), the result also shows that individuals (779, 38.3%), Local (666, 32.74%) and State (552, 27.14%) Governments respectively should also be held responsible for the reduction of plastic wastes in our environment. This is presented in Figure 4.19.

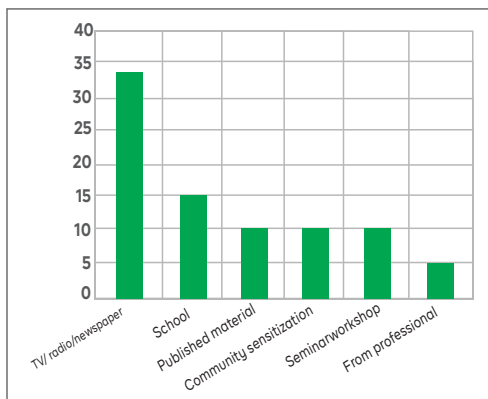


Figure 4.18: Source of information on Marine Litter

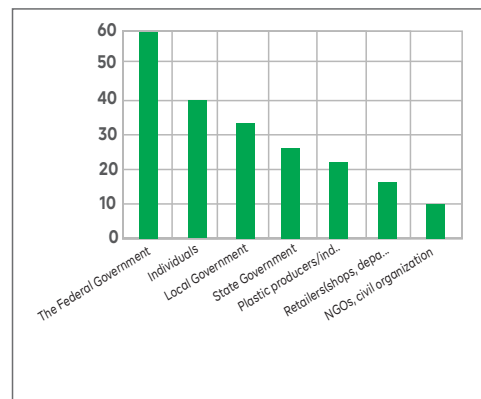


Figure 4.19: Responsibility to Reduce Plastics Usage

It was observed that majority of the respondents (1,173, 57.67%) strongly support enactment of laws and acts mandating the responsibility to single-use plastic producers for waste recovery of their products in order to achieve the significant reduction in the use of single-use plastics, while a sizeable number of respondents (861, 42.33%) are of the opinion that levy on single-use plastic producers might just be the right policy measure. If people are well educated about plastics and its negative effect on the environment, the attitude to its management will be positive and effective as suggested by 1,748 respondents (85.94%). If people have the knowledge about the negative impacts of plastics in the environment, it will be easy to adopt the 3Rs as many of the respondents (1,053, 51.77%) throw away their plastic shopping bags, confident that they would easily be given another plastic bag on their next shopping trip. It was however observed that some respondents (979, 48.13%) use them as waste bin bags, while others (879, 43.22%) re-use them for shopping.

The responsible institutions need to put in more efforts in the awareness and education campaign about the negative impacts of the single-use plastics in our environment as it was observed in the survey that most of the respondents (1,001, 49.21%) are doing little or nothing to tackle plastic waste problems. Result shows that 880 respondents (43.26%) are acting to tackle plastic waste problem by not disposing it on the street or in the environment, making use of reusable water bottles, some (289, 14.21%) use grocery bags and plastic alternatives. Some other respondents participate in cleaning activities organized by the community, for municipality/NGOs (228, 11.21%). Few respondents separate wastes at home (174, 8.55%), bring in their own shopping bags for shopping (199, 9.78%), actively choose to buy products with less plastic packaging (172, 8.46%) and very few choose recycled products because of their quality (107, 5.26%).

4.4.6 Plastic Waste Management

The waste collection system in the FCT is fair enough, as some of the respondents (790, 38.84%) dispose their waste through waste management companies operating in their zones, ineffective waste management service made some other respondents (711, 34.96%) resolve to open dumping of waste generated in their immediate environment, while some other respondents (385, 18.93%) practice the open burning method which is dangerous and might lead to them having respiratory diseases. This is shown in Figure 4.20.

There needs to be implementation and enforcement of the policies developed on solid waste as well as plastic waste management in Nigeria. Though these policies made emphasis on waste segregation at source, it was observed that 79.11% of the respondents (1,609 respondents) still don't see the need for waste segregation. Indeed, majority of these respondents (1502, 73.84%) will comply if instructed by the waste collection service to segregate their wastes at source. Therefore, enforcement is key to achieving the waste management strategies and implementation of its policies. Most respondents consider waste sorting as too much work to be handled (96.93%), majority of the respondents (1655, 81.37%) believe it is time consuming while few respondents

(191, 9.39%) actually don't have any reason for not wanting to comply or segregate their waste at source. Figure 4.21 presents these findings.

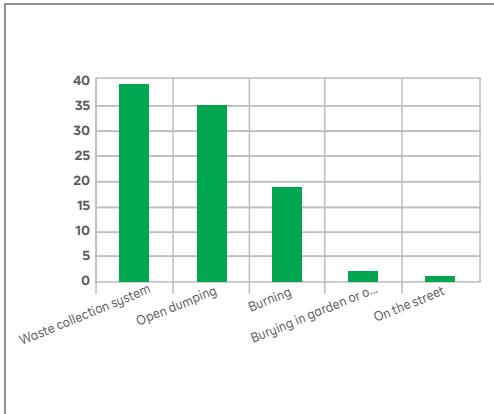


Figure 4.20: Waste Disposal Method

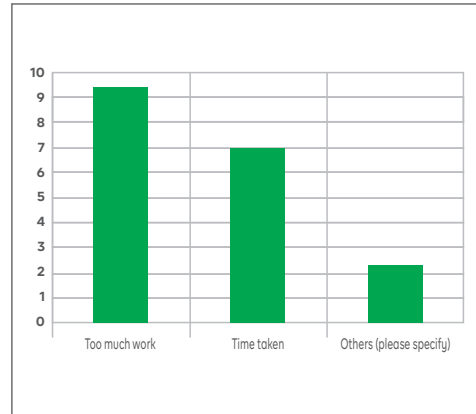


Figure 4.21: Reasons for not Sorting at Source

The survey result shows that respondents are willing to pay more to their waste collection service provider if their wastes are not well sorted. There is a need for Abuja Environmental Protection Board to improve on their coverage and services as many respondents (1,103, 54.23%) do not enjoy regular waste collection service in their areas, which leads to open dumping of waste, open burning and indiscriminate disposal of waste in the drainages near them. However, some respondents (804, 39.53%) indicated that they enjoy regular waste collection services in their area, out of which many of them (55%) place the waste in the front of their houses on specific days as agreed by their waste collection service companies while some of them (42%) make use of the large waste container on the street collection system. This is shown in Figure 4:22.

It was observed in the survey that wastes are collected at least once a week across the FCT, while in some areas it is once in two weeks. This leads to collection areas being overfilled with wastes spilling to the surrounding areas from the container in which they are kept. Therefore, environmental pollution results through scattering of wastes by scavengers with animals going there in search of food. During rain season, these wastes are washed into water bodies which will in turn lead to street litter and drainage pollution. Respondents are somehow satisfied with current collection system as indicated in the survey results, which means that collection system can be improved by increasing waste collection frequency and making collection charge/rates affordable. Figure 4:23 presents this finding.



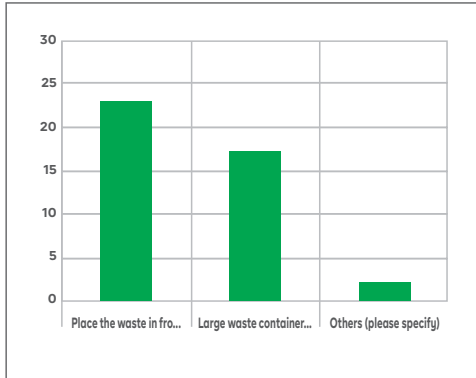


Figure 4.22: Waste Collection System

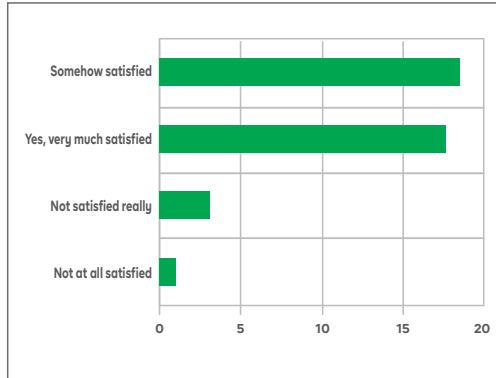


Figure 4.23: Satisfaction with Collection System

4.4.7 3Rs (Reduce, Reuse and Recycle)

The survey result shows that 661 respondents (32.5%) do not know the meaning of 3Rs, 27.68% (563 respondents) know the meaning somehow, while 368 respondents are not sure of the meaning and 337 respondents know the meaning very well. Respondents opinions were sought on their willingness to practice 3Rs in their everyday life, 647 respondents were eager to do so, some were not sure they can do it (528, 25.96%), while 664 respondents (32.65%) prefer partial and occasional 3R practice if possible. Figure 4.24 presents this result.

For effective 3R education to be disseminated across the FCT, residents have different views on this, while some respondents indicated they get information better from the media, that is, TV/radio/newspaper (1,551, 76.25%), community sensitization (1,283, 63.08%), schools (1038, 51.03%) and seminar and workshop (6,86, 33.73%). Many respondents (1,074, 52.8%) do not actively choose to buy products with less packaging or packaging that can be recycled, 593 respondents (29.15%) sometimes do so. This is depicted in Figure 4.25.

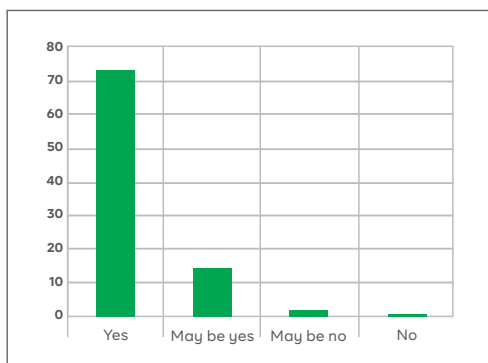


Figure 4.24: Knowledge about 3Rs

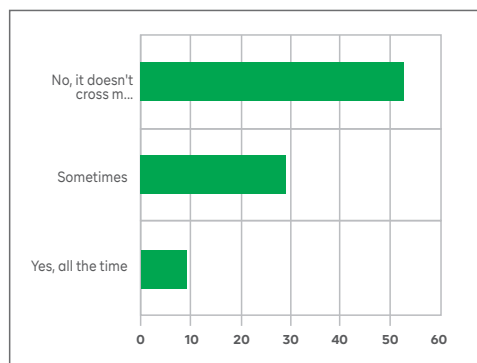


Figure 4.25: Purchase Product with Less Packaging

Respondents are likely and very likely to choose and embrace more environmentally friendly alternatives to single-use plastics, presented in Table 4.5 and shown in Figure 4.26.

Table 4.5: Likelihood of Embracing Environmentally Friendly Alternatives

Value	Respondents	Percentage (%)
Likely	848	41.69
Very Likely	549	26.99
I do not know	223	10.96
Unlikely	165	8.11
Very Unlikely	78	3.83

Results also indicated that respondents are not willing to pay more for services or businesses that use environmentally friendly single-use plastic alternatives, some respondents that have experienced environmental pollution and the impacts of single-use plastics, are more than willing to make use of any environmentally friendly alternative to single-use plastics. For those willing to pay more for alternatives, 461 of them prefer 1-5% increase for a product with plastic-free alternative while 81 respondents prefer 5-10% increase on a proposed alternative material.

The survey indicated that some of the respondents (870, 42.77%) do not know the meaning of bio-based plastics and biodegradable plastics. It is also noteworthy that some respondents (596, 29.3%) have heard either one of it, be it bio-based plastics or biodegradable plastics. Figure 4.27 presents this finding.

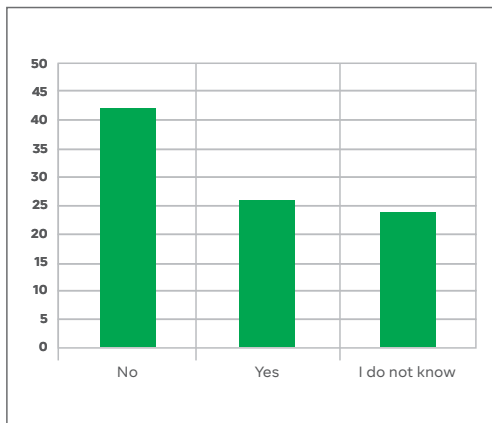


Figure 4.26: Payment for Friendly Alternatives

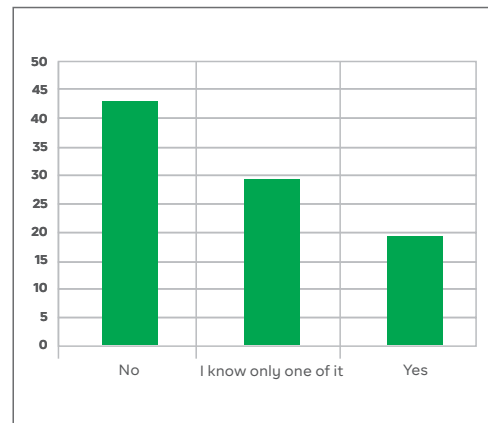


Figure 4.27: Knowledge about Bio-Plastics

The price of single-use plastic products compared to the usual plastic products are perceived to be less expensive as indicated by the respondent in the survey as shown in Figure 4.28.

Sizeable number of respondents (672, 33.04%) believe that recycled single-use plastic products are of lower quality when compared with usual plastic products, while about the same number of respondents (648, 31.86%) claimed they are of the same quality based on consumer experience with few respondents having the impression that recycled single-use plastic are of higher quality. Result of the survey shows that recycled products are safe, some respondents also think that recycled products are somehow safe for usage with few respondents thinking it is unsafe.

Information obtained from the survey indicates willingness of the respondents to purchase recycled plastic products, 900 respondents (44.25%) might like to buy, 711 respondents (34.96%) claimed they might not like to buy recycled plastic products while 887 respondents (43.61%) care to know the material and composition of the product they purchase if it contains recycled plastics, 587 respondents (28.86%) actually do not care. This feature is depicted in Figure 4.29.



Figure 4.28: Compare Recycled Plastic with Usual One

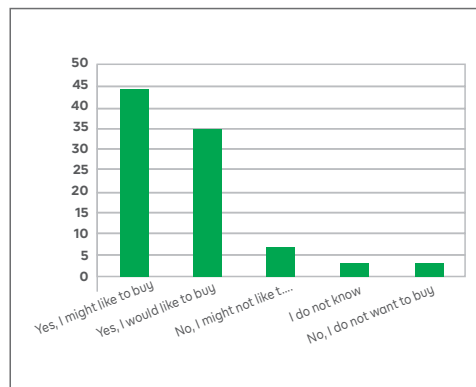


Figure 4.29: Willingness to Buy Recycled Plastic

4.5 Lagos

4.5.1 Sampling Techniques, Data Collection and Analysis

Data was collected from 1,985 respondents that consisted of 1,052 males and 874 females, while 59 respondents preferred not to mention their gender. Sampling technique used for this study was random and was carried out in the twenty Local Government Area councils of Lagos State. The targeted respondents and sectors for the survey are from hotels and restaurants, stores and supermarkets, residences in the area and every other businesses that their activities generate and consume plastics.

The number of male respondents were higher than female respondents due to the fact that the men showed more readiness to be interviewed and fill the survey questions. Survey and questionnaire administration was carried out using KoboCollect an open data kit. Analysis of the data collected was carried out using the KoboCollect software version 1.28.0.

4.5.2 Lagos State Local Government Areas Survey

The total number of residents interviewed in Lagos were 1,985 consisting of 1,083 males and 902 females. Enumeration was carried out in the twenty (20) Local Government Areas in Lagos State, namely: Agege, Ajeromi-Ifelodun, Alimosho, Amuwo-Odofin, Apapa, Badagry, Epe, Eti-Osa, Ibeju-Lekki, Ifako-Ijaye, Ikeja, Ikorodu, Kosofe, Lagos Mainland, Lagos Island, Mushin, Ojo, Oshodi-Isolo, Somolu and Surulere LGAs. One enumerator was attached to two LGAs with a Supervisor making a total of eleven (11) Personnel. Table 4.6 presents the number of residents interviewed in each of the Local Government Area and is depicted in Figure 4.30. The number of respondents ranges between a minimum of 82 in Mushin and a maximum of 145 in Alimosho with an approximate average number of respondents being 95 corresponding to 5%.

Table 4.6: Number of Respondents in Lagos State Local Government Areas

S/N	Local Government Area	Number of Respondents	Respondents (%)
1	Agege	90	4.53
2	Ajeromi-Ifelodun	100	5.04
3	Alimosho	145	7.3
4	Amuwo-Odofin	97	4.89
5	Apapa	92	4.63
6	Badagry	86	4.33
7	Epe	99	4.99
8	Eti-Osa	100	5.04
9	Ibeju Lekki	98	4.94
10	Ifako-Ijaye	100	5.04
11	Ikeja	96	4.84
12	Ikorodu	100	5.04
13	Kosofe	96	4.84
14	Lagos Mainland	100	5.04
15	Lagos Island	95	4.79
16	Mushin	82	4.13
17	Ojo	112	5.64
18	Oshodi-Isolo	120	6.05
19	Somolu	88	4.43
20	Surulere	89	4.48
TOTAL		1,985	100

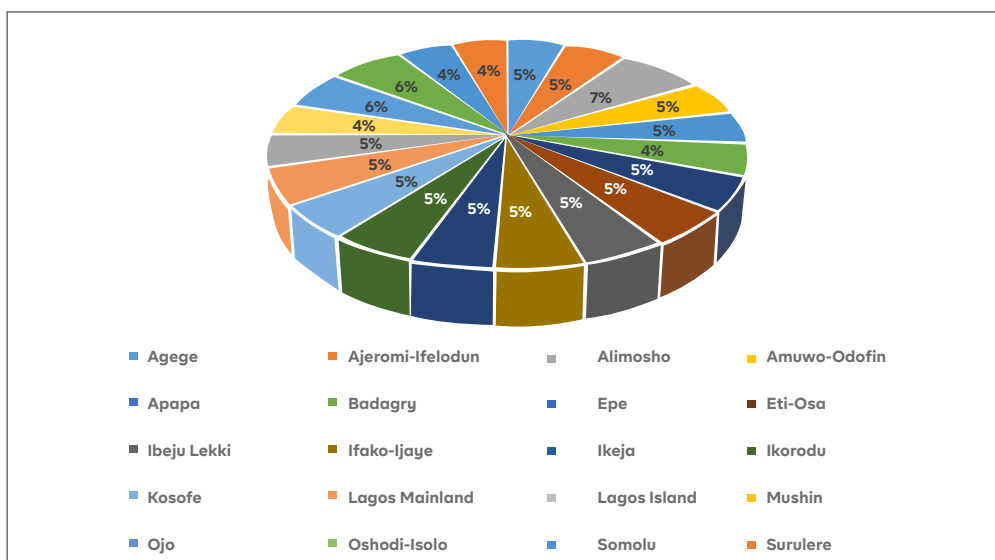


Figure 4.30: Survey in Lagos LGAs

4.5.3 Demographics of Lagos Respondents

The demographic data obtained for Lagos respondents is presented in Table 4.7 and depicted in Figures 4.31, 4.32, 4.33 and 4.34 for gender, age, education and occupation, respectively.

Variable	Categories	No	%
Sex	Male	1,083	54.56
	Female	902	45.44
Age	<20	147	7.41
	20's	555	27.96
	30's	705	35.42
	40's	373	18.79
	50's	122	6.15
	60's	22	1.11
	<70	1	0.05
	Prefer not to say	60	3.12
Education	Primary	78	3.93
	Secondary	748	37.68
	Tertiary	1,014	51.08
	Not Educated	72	3.63
	Prefer not to say	73	3.68
Occupation	Government employee	53	2.67
	Student	279	14.06
	Private employee	457	23.02
	Own business	693	34.91
	Street vendor/informal sector	321	16.17
	Unemployed	105	5.29
	Prefer not to say	77	3.88

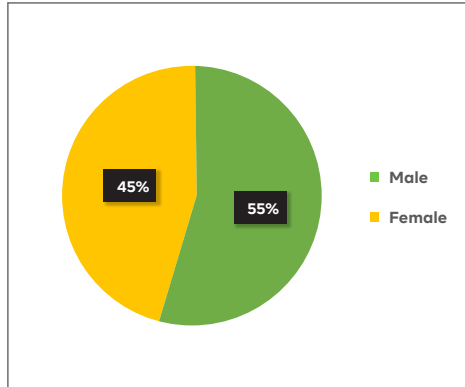


Figure 4.31: Gender of Lagos Respondents

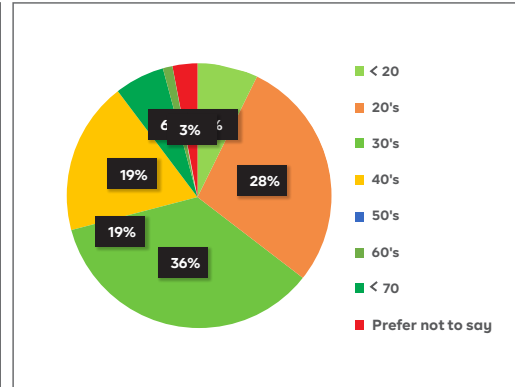


Figure 4.32: Age Group of Lagos Respondents

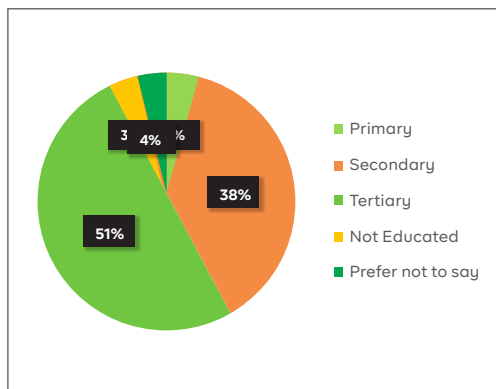


Figure 4.33: Education of Lagos Respondents

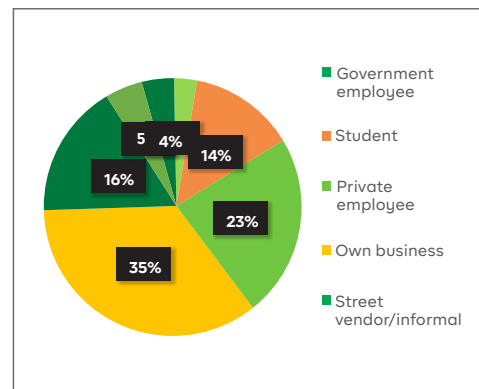


Figure 4.34: Occupation of Lagos Respondents

4.5.4 Awareness of Environmental Impacts of Plastics Wastes

Of the 1,985 respondents the largest proportion of the respondents (1,509, 76.02%), shown in Figure 4.35, are aware of the environmental impacts of plastics wastes. Among those who know the environmental impacts, the information sources indicated the media, that is, TV/Radio/Newspaper (1,314 respondents), community sensitization (411 respondents), shown in Figure 4.36. This result suggests that the campaign against inappropriate disposal and management of plastics waste has been effective.



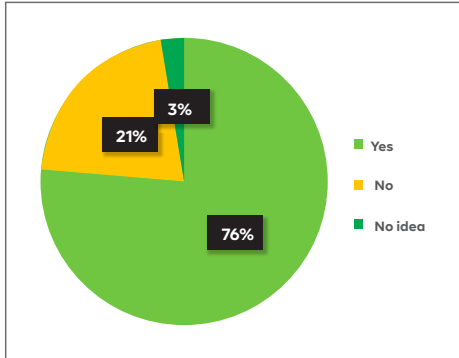


Figure 4.35: Awareness of Impacts

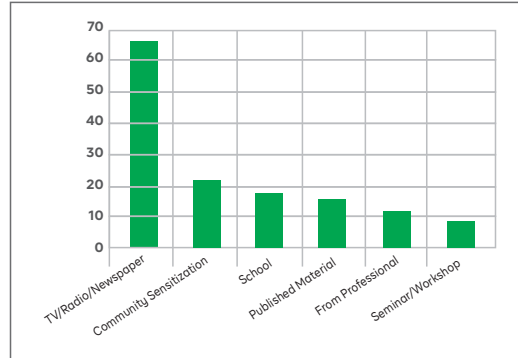


Figure 4.36: Information Source Awareness

4.5.5 Problems Associated with Single-use Plastics

Data collected indicated some of the major problems identified by the respondents are blockage of sewage/drainage (1,648, 83.02%), deterioration of natural beauty of environment, human health problems (1269, 63.93%) and human health problems (758, 38.19%), shown in Figure 4.37. People are so much concerned about their environment, therefore, some respondents in their areas tries as much as possible to ensure waste is managed in an environmentally sound manner. The result shows that 1,220 respondents (61.46%) are very much concerned, 396 respondents (19.95%) are somehow concerned while 64 respondents (3.22%) are not concerned at all. This is shown in Figure 4.38.

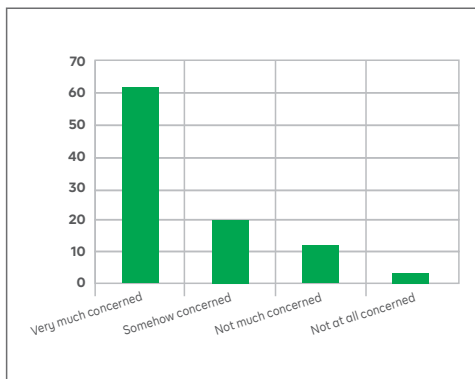


Figure 4.37: Problems with Single-Use Plastics

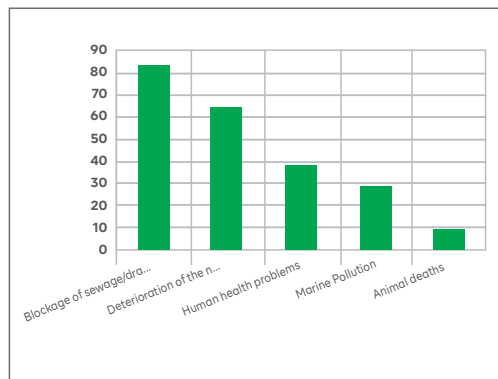


Figure 4.38: Level of Concern with Plastic Problems

The Lagos state civil societies, waste management authorities and community based organizations efforts in community sensitization and education awareness on plastic waste management are really reflected in the information obtained as many people are very well/fairly well informed (1,508 respondents, 75.97%) while very few respondents (146, 7.36%) claimed not to have been informed at all. This is shown in Figure 4.39.

Respondents find problems associated with single-use plastics and packaging wastes in places such as sewage, gutter and drainage (1,459, 73.4%), market places (1,262, 63.58%), waste dumping sites (1,194, 60.15%) and roadsides (1,071, 53.95%). As shown in Figure 4.40, crowded residential areas (680, 33.43%), parks (706, 34.71%) and roadsides (459, 22.57%) recorded low areas with associated problems by single use plastics.

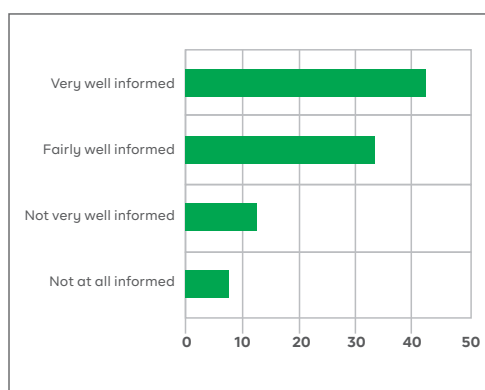


Figure 4.39: Information on Plastic Management

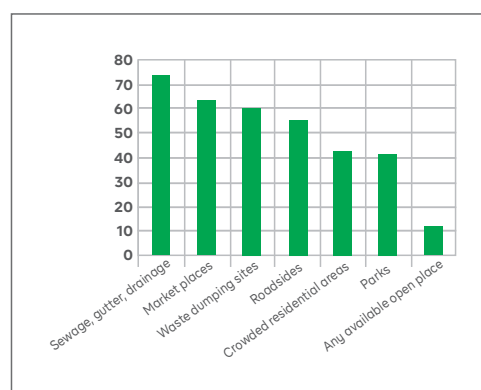


Figure 4.40: Problems with Plastic Wastes

Majority of the respondents do not often visit the beach, but see plastics lying around the beach as result of indiscriminate disposal of waste and poor waste management services of the beach management. During the enumeration exercise, we also gathered that many of the respondents (889, 44.79%) know that marine plastic litter is a serious global environmental challenge as indicated by the result, 746 respondents (37.58%) claimed not to know the impacts of marine plastic litter while 268 respondents (14.50%) are aware of the impacts of single-use plastics on marine bodies.

In terms of awareness and education campaign, the residents in Lagos study area have a sound knowledge on the marine plastic litter as a serious global environmental challenge, especially single-use plastics, as most of the information have been disseminated through the media, that is, TV/radio/newspaper which reflected in the survey result (925 respondents, 46.60%) while 303 respondents (15.26%) gained their knowledge during community sensitization and 266 respondents indicated that they were only informed about marine litters and its impacts at school.

Lagos state residents, from the results shown in Figure 4.41, consider that the state government should be charged with the responsibility in reducing plastic waste (1,236 respondents, 62.27%), followed by the Federal Government (1,147 respondents, 57.78%), Local Government (1,115 respondents, 56.17%). In addition, the result also shows that responsibility for reduction of plastic waste should be borne by individuals (854 respondents, 43.02%), retailers (330 respondents, 16.62%) and plastic producers (304 respondents, 15.31%). This is shown in Figure 4.42.

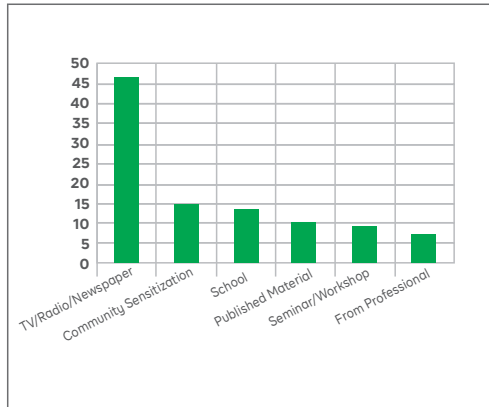


Figure 4.41: Information Source on Marine Litters

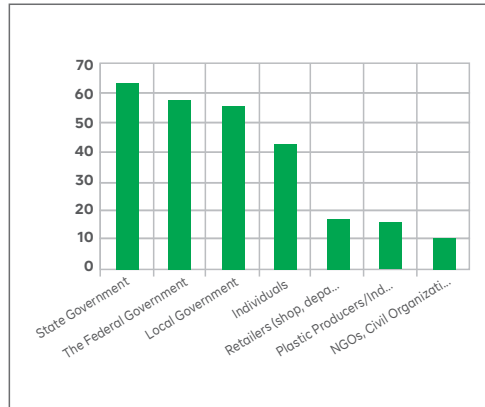


Figure 4.42: Responsibility to Reduce Plastics Use

Majority of Lagos respondents (1,343, 67.66%) strongly believe in the enactment of laws and acts mandating the responsibility to single-use plastic producers for waste recovery of their products in order to achieve the significant reduction in the use of single-use plastics while others are of the opinion that levy on single-use plastic producers might just be the right policy measure. Figure 4.43 shows that many respondents know 3Rs (1,641, 82.67%) indicating that if people are well educated about plastics and its negative effect on the environment, the attitude to its management will be positive and effective.

Figure 4.44 shows that many of the respondents (1,127, 56.78%) use shopping bags as waste bin bag, 41.66% of respondents (827) throw shopping bags away while 41.11% (816) re-use it for shopping while about 30% use it for some other purposes like food packaging.

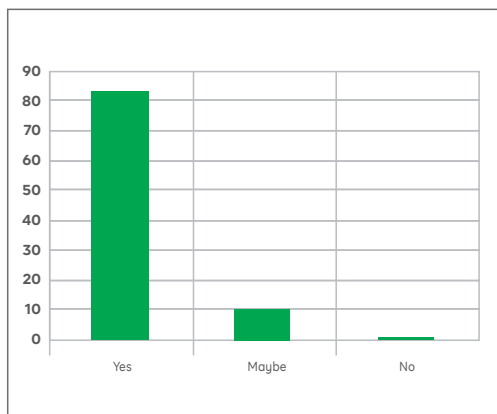


Figure 4.43: Knowledge of 3Rs

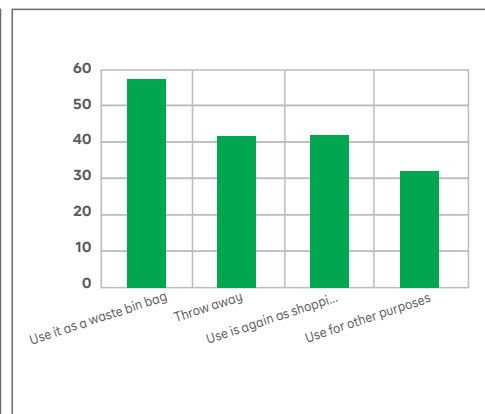


Figure 4.44: What you do with Shopping Bags

Most of the respondents (1,147, 57.78%) have started taking actions to tackle plastic waste problems through appropriate waste disposal, reuse of reusable water bottles, grocery bags and plastic alternatives. Some participate in cleaning activities organized by the community, municipality/NGO, only few respondents separate wastes at home, bring in their own shopping bags for shopping, actively choose to buy products with less plastic packaging and also choose recycled products because of their quality.

4.5.6 Plastic Waste Management

Figure 4.45 shows that majority of Lagos respondents (1,451, 73.1%) dispose their waste through waste management companies operating in their zones, some other respondents (269, 13.55%) resolve to open dumping of waste generated in their immediate environment, while very few respondents (142, 7.15%) practice the open burning method. The waste collection system in Lagos state therefore seems to be organized and well-coordinated.

There needs to be implementation and enforcement of the policies developed on solid waste as well as plastic waste management in Nigeria. Though these policies made emphasis on waste segregation at source, it was observed that 81.11% of the respondents (1,610 respondents) still don't see the need for waste segregation. Indeed, majority of these respondents (1,495, 75.31%) will comply if instructed by the waste collection service to segregate their wastes at source. Therefore, enforcement is key to achieving the waste management strategies and implementation of its policies. Most respondents consider waste sorting as too much work to be handled (60%), majority of the respondents (37%) believe it is time consuming while few respondents (3%) actually don't have any reason for not wanting to comply or segregate their waste at source. Figure 4.46 presents these findings.

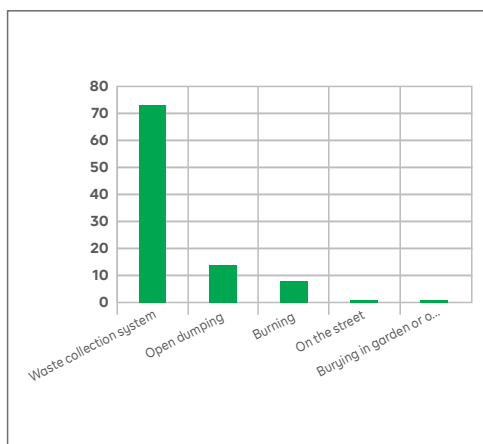


Figure 4.45: Waste Disposal Method

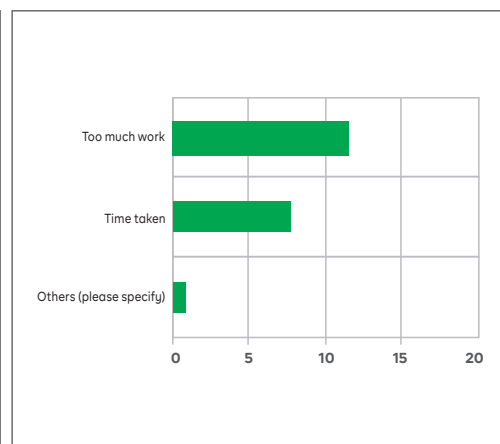


Figure 4.46: Reason for not Segregating at Source

The survey result shows that respondents are willing to pay more to their waste collection service provider if their wastes are not well sorted. LAWMA and every other registered waste collection services companies have been up to the task and effective in the waste collection and management services in Lagos, this was shown in the result as many respondents (1,531, 77.13%) enjoy the regular waste collection service in their areas.

For those residents having waste collection systems, Figure 4.47 shows that half of the respondents place their wastes in front of their houses on specific dates agreed with the waste collection companies or LAWMA for waste collection, which seems to have been an effective and convenient mode of waste disposal for residents. Few other residents (21.51%) make use of the large waste containers located at strategic locations along the streets for collection system, where they deposit their daily wastes and the waste collection provider will come and evacuate the waste for disposal.

It was observed in the survey that wastes are collected at least once a week across the twenty (20) LGAs in Lagos state, however, some respondents confirmed in their areas that wastes are being collected once in every two weeks. This leads to collection areas being overfilled with wastes spilling to the surrounding areas from the container in which they are kept. Therefore, environmental pollution results through scattering of wastes by scavengers with animals going through the dumps in search of food. During rain season, these wastes are washed into the water bodies which will in turn lead to marine litter and pollution.

While some of the respondents are very much satisfied with waste collection system in their area, some still feel disgruntled but somehow satisfied with the current collection system as shown in Figure 4.48, which means that collection system can be improved by increasing waste collection frequency and making collection charge/rates affordable.

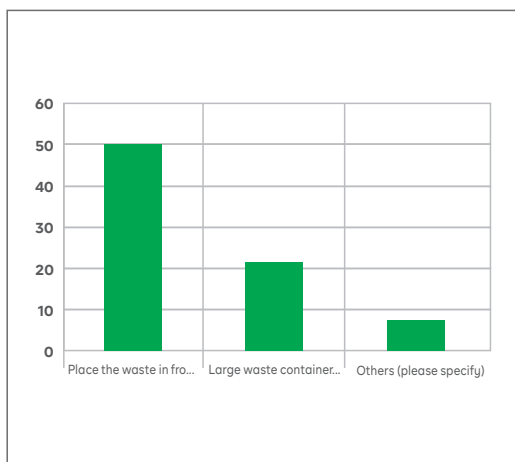


Figure 4.47: Waste Collection System

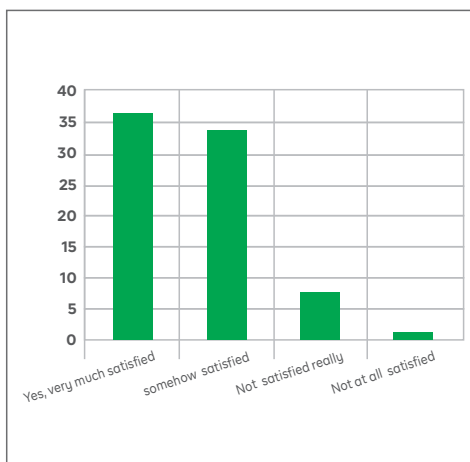


Figure 4.48: Satisfaction Level of Waste Collection

4.5.7 3Rs (Reduce, Reuse and Recycle)

Figure 4.49 shows that 588 respondents (29.62%) knows very well the meaning of 3Rs, 28.36% (563 respondents) knows the meaning somehow, while 332 respondents (16.73%) are not sure about the meaning and 399 respondents (20.10%) do not know the meaning at all. Respondents opinions were sought if they are willing to practice 3Rs in their everyday life, 808 respondents (40.71%) were so eager to do so, some (435, 21.91%) were not sure if they can do it, while 532 respondents (21.91%) prefers partial and occasional 3R practice if possible. The Nigerian populace should therefore be educated on 3Rs and its impacts as a management tool.

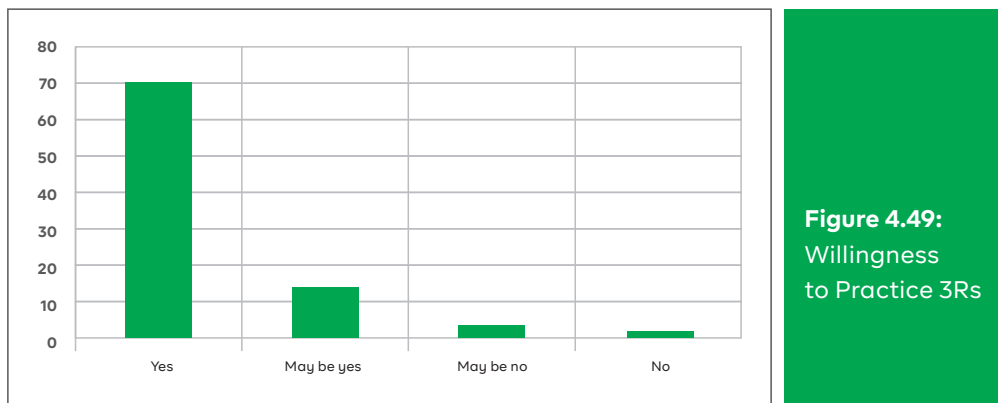


Figure 4.49: Willingness to Practice 3Rs

For effective 3R education to be disseminated across the state, respondents indicated they get information better from the TV/radio/newspaper (1,572, 79.19%), community sensitization (1,189, 59.9%), schools (987, 49.72%) and seminar and workshop (674, 33.95%). It was observed that many respondents (975, 49.12%) do not actively choose to buy products with less packaging that can be recycled, 718 respondents (36.15%) sometimes prefer to go for products that cannot be recycled and with much packaging. This indicates that awareness creation and sensitization of the residents on the relevance of making use of recycled product should be emphasized to achieve an effective and efficient management of plastic wastes in our environment.

Table 4.8 shows that respondents are very likely and likely (1,504, 75.77%) to choose and embrace more environmentally friendly alternatives to single-use plastics.

Value	Respondents	Percentage (%)
Very Likely	796	40.1
Likely	708	35.67
Unlikely	263	13.25
I do not know	65	3.28
Very Unlikely	31	1.56

Figure 4.50 indicates that about half of respondents are not willing to pay more for services or businesses that use environmentally friendly single-use plastic alternatives while about one-quarter of respondents are willing to do so.

For those willing to pay more for environmentally friendly services, 481 respondents (24.23%) prefers 1-5% increase for product with plastic-free alternative, while 88 respondents (4.43%) prefers 5-10% increase on a proposed alternative material. This is shown in Figure 4.51. However, 1,400 respondents (70.53%) did not respond to this question as they do not know if this is the right step in the right direction.

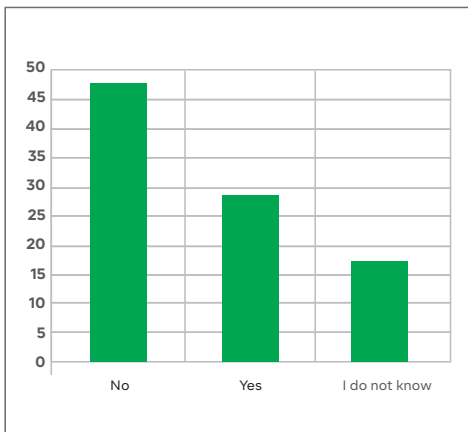


Figure 4.50: Willing to Pay for Friendly Services

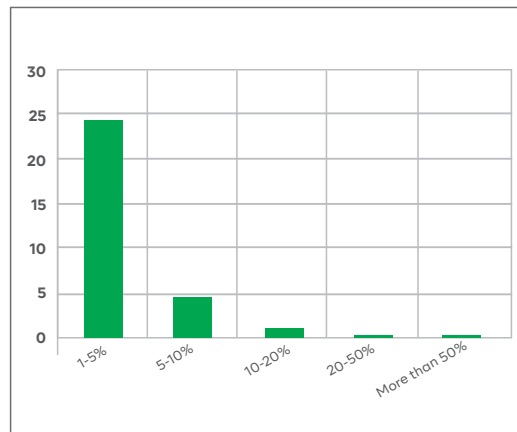


Figure 4.51: Paying More for Friendly Plastics

Figure 4.52 indicates that 1,123 respondents (56.57%) in Lagos study area do not know the meaning of bio-based plastics and biodegradable plastics, it is also noteworthy that 349 respondents (17.58%) have heard either of bio-based plastics or biodegradable plastics.

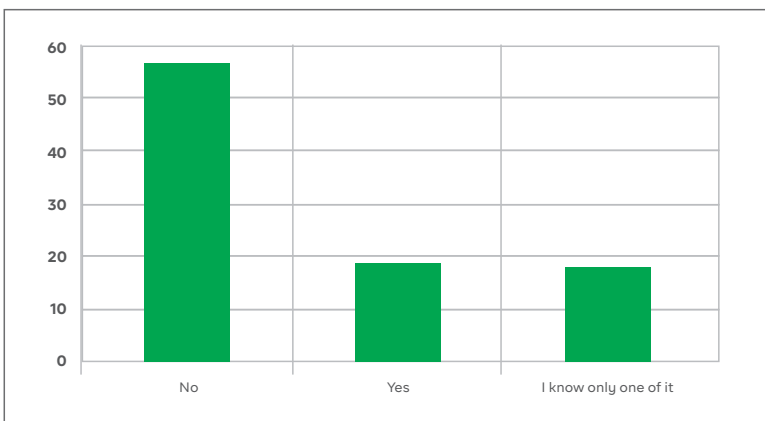


Figure 4.52: Knowledge about Bio-plastics

The price of single-use plastic products compared to usual plastic products is perceived to be the same in the Lagos study area, while some respondents believe it is less expensive due to its quality as shown in Figure 4.53.

More than half of the respondents (1,014, 51.08%) are of the opinion that recycled single-use plastic products are of the same quality when compared to usual plastic products, while some of the respondents (427, 21.51%) claimed they are of lower quality based on consumer experience with very few respondents thinking that recycled single-use plastic are of higher quality. Table 4.54 shows that over 80% of the respondents are of the opinion that recycled products are safe/somehow safe with less than 10% having the feeling that they are somehow unsafe/unsafe.

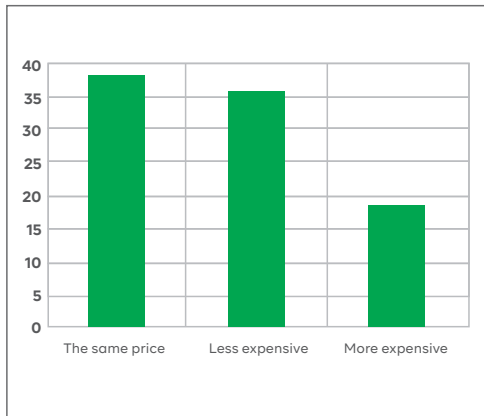


Figure 4.53: Price of Recycled Compared to Usual Plastic

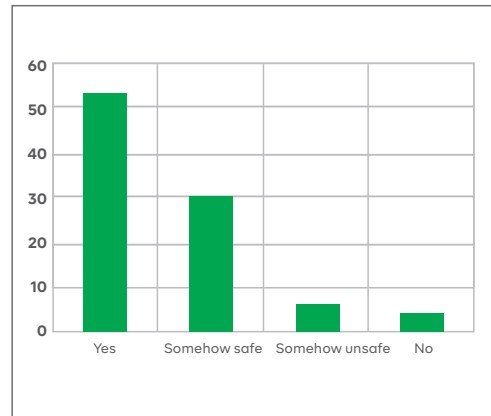


Figure 4.54: Safety of Recycled Products

Information obtained from respondents shows that recycled products are environmentally friendly (57.83% of the respondents).

Table 4.9 indicates willingness of respondents to purchase recycled plastic products, 1,587 respondents (79.95%) are willing while 226 (11.38%) are unwilling with 51 respondents (2.57%) undecided.

Table 4.9: Willingness to Purchase Recycled Plastic Products		
Value	Respondents	Percentage (%)
Yes, I would like to buy	1,004	50.58
Yes, I might buy	583	29.37
No, I might not like to buy	173	8.72
No, I do not want to buy	53	2.67
I do not know	51	2.57

Results show that 1,089 respondents (54.86%) are interested in knowing the material and composition of the product they purchase if it contains recycled plastics while 429 respondents (21.61%) actually do not care.

4.6 Summary of Residents' Survey

Findings from the residents' survey carried out in the study areas (FCT and Lagos) in Nigeria are:

- Most residents in FCT and Lagos (2,901 of 4,019 residents, 72.2%) are ready to choose a more environmentally-friendly alternative to single-use plastics, 27.6% (1,111 of 4,019 residents) of them are even willing to pay more for such products and services;
- Residents level of education and awareness on the impacts of the plastic waste management on the environment and the campaign against inappropriate disposal and management of plastic waste particularly single-use plastics, are quite impressive;
- Residents are more concerned about their environment, so they ensure wastes are being disposed in an environmentally sound manner;
- The need to improve on the waste management services at market places, waste sites and effective cleaning of sewage, gutter and drainage must be emphasized;
- Most residents do not know that marine plastic litter is a serious global environmental challenge
- Residents strongly believe in the enactment of laws and acts mandating the responsibility of plastic waste management particularly single-use plastic to a designated agency/authority to achieve significant reduction in the usage of single-use plastic; and
- There is the need to implement and enforce policies developed for solid waste management and plastic waste management in Nigeria.



CHAPTER FIVE

INTERVENTIONS TO
REDUCE PLASTIC
POLLUTION IN
NIGERIA

5

INTERVENTIONS TO REDUCE PLASTIC POLLUTION IN NIGERIA

5.1 Nigerian Government

The Federal Government of Nigeria promotes sustainable use of plastic as a resource through its life cycle management. It is committed to circular economy in the management of plastic wastes. In this regard, the Nigerian Federal Executive Council approved the 2018 National Policy on Solid Waste Management on 15th of July, 2020. Also, the January 2020 National Policy on Plastic Waste Management, which is the most current and comprehensive effort to promote the sustainable use of plastic through life cycle management, was approved by the Federal Government on 21st of October, 2020. Currently, Nigeria is not amongst the over 30 African countries that have banned or restricted use of plastic bags. There is a mechanism in place to restrict some plastic products.

The following general measures can also be adopted to ensure that the amount of single-use plastics generated at all levels are controlled and effectively monitored:

- Efficient solid waste management incorporating circular economy with EPR;
- Promotion of eco-friendly alternatives to SUP in collaboration with MDAs and industries;
- Institution of sound policy instruments to reduce SUP and packaging at all levels;
- Advocacy, education and social awareness to promote friendly consumer response;
- Awareness campaign strategies integrating responsible reuse and recycling messages;
- Voluntary reduction strategies and amicable agreements with value-chain actors.

5.2 Ministries, Departments and Agencies (MDAs)

The Federal Ministry of Environment (FMEnv)

The overall goal of the National Policy on Plastic Waste Management is to promote sustainable use of plastic as a resource through its life cycle management. Measures proposed for implementation include:

- Ban on single use plastic bags, levy on thicker plastic bags and promote use of alternatives to plastics (e.g. jute bags, leaves, paper, etc.) effective May 2020.
- All plastic packaging in the market been recyclable or biodegradable or compostable and reusable by 2025.
- National and state-wide targets for 65% recycling rate for municipal waste, 75% recycling of packaging waste, reduce landfill to maximum of 10% of municipal waste, 50% recycling of all plastic waste, and use of plastic bags per person reduced by 50% by 2030.
- Mandatory EPR schemes most notably on all packaging items and introduce by law a nationwide bottle deposit requirement, a 5% deposit refund schemes for beverage containers; 5% charge on all single use grocery bag by 2021.

Presently, there has not been any pronouncement on the implementation but there are signals that it will soon receive priority attention.

Lagos State Government (LASG)

Lagos State now has a Plastic Waste Management Policy 2021, following the inadequacies of the Lagos State Environmental Management and Protection Law 2017 to adequately address solutions to plastic waste management. The document is yet to be made public.

Lagos State Environmental Protection Agency (LASEPA)

LASEPA in November 2019 commenced an in-house advocacy and awareness program on the adverse effect of plastic pollution within its premises and the Lagos environment. The sensitization lasted for three months before an ultimate ban was placed on the use of single-use nylons and plastic bags within the Agency premises on 20th January, 2020 and still operational to date. In addition, LASEPA has started banning PET bottles in its offices and has advocated for the ban to be gradually extended to all Lagos State Government (LASG) offices, towards gradual phase out of single-use plastics.

Prior to this, LASEPA celebrated the World Environment Day on Thursday 7th June, 2018 with the theme 'Beat Plastic Pollution', recommending ban on use of polythene plastic nylon bags and that if plastic use is to be reduced, reused or refused, there should be adequate publicity and awareness on alternative methods and solutions to plastic pollution. This has culminated in the Lagos State Plastic Waste Management Policy to be unveiled soon in Lagos State.

In this regard, LASEPA is fully prepared and ready to carry out adequate publicity and awareness on alternative methods and solutions to plastic pollution in Lagos State.

LASEPA Commissions Green Projects

LASEPA's clean environmental practices projects, namely; World Bank sponsored Air Quality Monitoring (AQM) stations, a mini Effluent Treatment Plant (ETP), LASEPA Digital Directory and the first hybrid vehicle/bus (using hydrocarbon fuel and CNG) were commissioned by the Honourable Commissioner of the Ministry of the Environment and Water Resources at LASEPA premises, Alausa Secretariat, Ikeja on Friday 26th March, 2021.

There are six AQM stations located across the State, one within LASEPA premises and the others located at the Nigerian Conservation Foundation Lekki, University of Lagos Akoka, Abesan Estate Ipaja, Odo Kekere Primary School Jankara Lagos Island and King Ado Secondary School Ikorodu. This intervention would ensure a comprehensive knowledge of the Air Quality of the Lagos environment, identifying pollution and their sources, notably from indiscriminate burning of waste plastic materials. Figures 5.1 and 5.2 show the AQM stations. Some of the parameters to be measured at the stations include sulphur dioxide (SO₂), nitrous oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO₂), particulate matter, etc. which are indicative of open burning of plastics.

The effluent treatment plant is semi-automated, indigenously made with a capacity of 7.5m³ per day, which came about because of the need to treat wastewater and leftover samples of industrial wastewater from LASEPA laboratory. The digital directory consists of three basic features, namely; digital e-Library, ePayment portal and complaints dashboard portal. LASEPA is the first environmental protection agency (EPA) in the country to embark on a hybrid powered eco-efficient vehicle transportation using both hydrocarbon fuel and compressed natural gas as sources of energy. The bus is first of such vehicles in the Lagos State Ministry of Environment and Water Resources and will serve as a model to promote clean energy and carbon safe environment for public and private organizations to emulate.

AIR MONITORING STATION AT LASEPA



Figure 5.1:
Air Quality
Monitoring
Station Within
LASEPA
Premises



Figure 5.2: Location of the Six Air Quality Monitoring Stations in Lagos

Lagos Waste Management Authority (LAWMA)

LAWMA is actively involved in a lot of plastic reduction activities as it is the key agency charged with the responsibility of waste management in Lagos State. Some of the recent interventions are stated below.

Global Recycling Day 2021

LAWMA on 20 March 2021 partnered with African Cleanup Initiative to create awareness on the importance of waste recycling as part of events marking Global Recycling Day 2021 (18 March), themed 'Recycling Heroes'.

New branded PSP uniforms

Lagos State Government demonstrated capacity to improve the waste management system through provision of over 7,000 branded uniforms for about 417 PSP operators in the state. The new branding arrangement commenced on 1st of March 2021 throughout the State and will be extended to street sweepers with the names of the companies boldly emblazoned on them. Lagos residents have been seeing PSP operatives appearing in

unique and professional uniforms in the course of their duties. Each of the PSP operatives has their trucks branded and manned by operators wearing branded uniforms unique to their respective organizations, as shown in Plates 5.1 and 5.2.



Plate 5.1: PSP Uniform



Plate 5.2: PSP Operators in Uniforms with Trucks

Smokeless Medical Waste Incinerator

Test-running of locally fabricated smokeless medical waste incinerator took place at Agege TLS on 17 March 2021 in the presence of the Permanent Secretary, Ministry of the Environment & Water Resources, Mrs. Belinda Odeneye with the management of LAWMA, led by the MD/CEO, Mr. Ibrahim Odumboni. Pictures taken during the test-running exercise are shown in Plates 5.3 and 5.4.



Plate 5.3: Medical Waste Being Offloaded



Plate 5.4: LAWMA Team Test-Running Incinerator

National Agency for Food and Drug Administration and Control (NAFDAC)

NAFDAC is in support of the plan to phase out single-use plastic with the objective to reduce plastic waste and promote biodegradable plastics usage. NAFDAC advocates adoption of 'Green Chemistry and Nano Technology' with use of materials that are cost-effective, available, affordable and ecologically friendly.

NAFDAC suggested that the following alternative areas should be explored by the project team including bio-based plastics, molded fibre and pulp packaging, optimizing wood packaging in transportation logistics and supply chain, developing lightweight and durable glass packaging, green packaging of bio-based degradable plastics and minimal adoption of silicone packaging.

On conclusion of this study and adoption of the report, NAFDAC is ready to activate stringent regulations in reducing import of plastics, updating packaging and labelling regulation and guidelines, and engaging in sensitization of stakeholders in phasing out SUP in Nigeria.

The National Environmental Standards and Regulations Enforcement Agency (NESREA)

The Extended Producer Responsibility (EPR) programme is in operation in Nigeria with the overall objective of ensuring a decrease in the total negative environmental impact from a product including its packaging. The primary responsibility of EPR lies with the producer, who makes designs and marketing decisions. The NESREA Act (FGN, 2007) empowers the Agency to be responsible for enforcing all environmental laws, guidelines, policies, standards and regulations in Nigeria. NESREA has registered several operators in the EPR programme, including producers, PROs, recyclers and collectors.

There exists four types of operators of the EPR programme in Nigeria, namely:

1. **Producer:** the most responsive entity which may include but is not limited to the brand owner, manufacturer, franchisee, assembler, filler, distributor, retailer or first importer of the product who sells, offers for sale, or distributes the product;
2. **Producer Responsibility Organization (PRO):** a third party organization formed to enable producers to collectively manage on their behalf, the mandatory take-back scheme or other product stewardship programmes;
3. **Recycler:** a person or organization who reprocesses waste for the original purpose or for other purposes; and
4. **Collector:** a person or organization that operates a centre or point where wastes are collected or stored temporarily for the purpose of recycling.

EPR emphasizes use of hierarchical, integrated approach involving reduction, reuse, recover, repair and recycle, depicted in Figure 5.3.

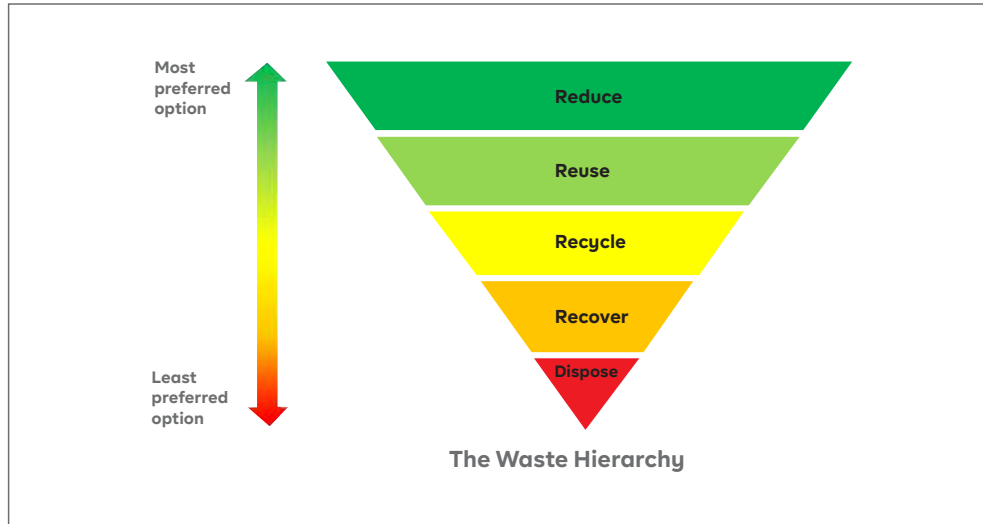


Figure 5.3: Waste Management Hierarchy of Reduce, Reuse, Recycle, Recover

The EPR model involves separating wastes into different components shown in Figure 5.4.



Figure 5.4: EPR Waste Separation Model

The benefits of a properly implemented EPR programme include:

- Acts as a driving force for effective pollution prevention and waste avoidance.
- Promotes reuse and recycling of products packaging materials and parts thereof.
- Reduces or eliminates potentially hazardous substance or chemicals in production.
- Promotes cleaner production technologies and eco-friendly products.
- Promotes more efficient use of natural resources.
- Improves relations between industries and their host communities.

- Promotes a more integrated management of the environment by placing emphasis on the product's lifecycle
- Promotes attainment of a cleaner and healthier environment for present and future generations

The Nigerian Maritime Administration and Safety Agency (NIMASA)

NIMASA, is the Nigerian Government Agency responsible for marine environment management. NIMASA collaborated with UNEP Global Partnership Action 2(GPA) in 2015 to carry out a scientific study on marine litter challenge in Nigeria culminating in the development of the National Action Plan on Marine Litter and its campaign concept.

NIMASA participated in the World Oceans Summit resulting in a Ministerial Declaration "Toward a Pollution Free Planet", adopted by the UN Environment Assembly in 2017. NIMASA is implementing International Maritime Organization (IMO) instruments such as the MARPOL-Annex V, London Convention and its Protocol as well as the Nigerian Merchant Shipping Act 2007. These global efforts align with the objectives of the UN Sustainable Development Goals 6, 11, 12, 14 and 17.

The Nigeria Customs Service (NCS)

The Nigeria Customs Service is on its toes because of importation of plastic wastes into Nigeria, mostly from Asian countries, as alerted by World Customs Organization (WCO). NCS is actively engaging the government on the need to prohibit manufacturing of non-degradable plastics and also to prohibit importation or impose higher tariff on the raw materials (resin).

Raw Materials Research and Development Council (RMRDC)

RMRDC is involved in the following plastic-related collaborative projects:

- Development of bioplastic cassaplastic from cassava starch, in collaboration with Youth Scientific Association Uyo, Akwa Ibom State, South-South Nigeria on the upgrade of technology;
- Recycling of expanded polystyrene (EPS) plastic waste for re-use as sensor device, in partnership with Centre for Energy Research and Development, Obafemi Awolowo University, Ile-Ife, Osun State and Department of Industrial Chemistry, First Technical University, Ibadan, Oyo State. The project seeks to develop a device which domesticates the monitoring of pollutant gases, their control and management through application of material science;
- Conversion of waste polypropylene (PP) into usable liquid fuel using ahoko kaolin (abundant clay in Kogi State, close to FCT) as catalyst for pyrolysis reaction. It is a cheaper local alternative to the very expensive synthetic zeolite cracking catalysts. RMRDC therefore seeks collaboration to promote use of ahoko kaolin in establishing pilot production plant; and
- Upgrade of technology for development of interlocking tiles from plastic waste for use in the construction industry. RMRDC is in partnership with ECOHAVEN Solutions, Mr. Ahmed Jibrin Ahmed, Ms Aliyu Amina Adamu located at House 16,

69 Road Gwarimpa, Abuja. R&D was carried out at the Ahmadu Bello University (ABU) Zaria by mixing the waste polyethylene with polypropylene as a binder, melted and mix with varying proportions of sand and stabilizers to produce the floor tiles. Further R&D is required by upgrading and fine-tuning the technology to pilot stage, employing the most energy efficient option to produce the tiles.

5.3 Recyclers/Collectors

Wecyclers

Wecyclers is a Lagos-based waste recycling company and a pioneer indoor-to-door waste collector since 2012 with over 17,000 subscribers, pays N15 per kilo of collected waste PET bottles. The company collects about four tonnes of plastics daily (EnviroNews Nigeria, 2019). Wecyclers has pickup locations scattered all over Lagos and includes Ebute Metta Hub, Surulere Hub, Makoko Hub, Magodo Hub, Ogba Hub, Ejigbo Hub, Ikorodu Hub, amongst others. Wecyclers gives households a chance to capture value from their waste while providing a reliable supply of materials to the local recycling industry. There is a school in Ajegunle where Nigerians pay school fees with waste plastic bottles.

Wecyclers won the 2019 King Baudouin African Development Prize worth €220,000 (N104 million) for its contribution to solving waste management problems not only in Nigeria but Africa. The company has collected several thousand tonnes of recyclable waste since 2012 with over 17,000 subscribers (EnviroNews Nigeria, 2019).

Wecyclers is in partnership with Unilever and Fair Plastic Alliance. From eight Unilever partner collection centres, Wecyclers was able to collect over 1.8 million kg in 2019 and 2020, equivalent of 34.9 million PET. Fair plastic alliance supports 3,000 Waste Workers across Lagos, Ogun and Abuja. Wecyclers teamed up with BASF in turning the tide with the "Waste-2-Chemicals Project". BASF West Africa turns collected plastics into chemicals through pyrolysis, thereby creating environmental, social and economic impact.

Wecyclers selected seven franchisees in 2020. In Ejigbo LCDA, Mrs Taiwo, (a Wecyclers Franchisee) is a female entrepreneur making money from trash, providing jobs and giving residents an opportunity to earn from their waste. Also, Yemisi Rasaan earned N250,000 from 4 months of recycling which she uses to pay for rent, fees and increase her business capital. Ms. Iya Lara operating, under Wecyclers at Ijora, close to LAWMA Headquarters is a popular collector of plastic wastes, notably used PET bottles. She started on a low level looking around and picking waste PET and other plastics in the Ijora slum areas. She has now developed her franchise that she no longer moves around but people bring the wastes to her and gives them back foodstuffs like rice, beans, gaari, etc. She has already acquired two land spaces at Ikorodu, eastern part of Lagos State, ready for expansion of the waste collection business.



Plate 5.5: Wecyclers Truck
Offloading Wastes at Hub



Plate 5.6: Employees Working on
PET Bottles



Plate 5.7: Typical Wecyclers
Collection Hub



Plate 5.8: Bailed Plastics at
Wecyclers Hub

RecyclePoints

RecyclePoints is a waste recycling and social benefit venture that operates an incentive-based scheme which collects recyclable materials from post consumers and in turn rewards them with "Points" which they can accumulate and use to redeem/shop for household items offered through iRecycle store. The company collects the following recyclable materials for further reprocessing into new production raw materials: PET Plastic Bottles and Containers, Pure Water Sachets, LDPE Nylon Packaging, HDPE Packaging Containers, amongst others.



Plate 5.9: Waste Pickers Deliver
Recyclables at RecyclePoints



Plate 5.10: Workers at Igando Hub



Plate 5.11: Youth involved in DOW's ReflexNG



Plate 5.12: Baled PET leaving RecyclePoints Oshodi

Lexsz Plastics Limited

A polyethylene terephthalate plastic bottle recycling firm, Lexsz Plastics Limited, has invested \$8m in establishing a recycling factory on a 10-acre land around Shagamu interchange at km 40 along Lagos - Ibadan expressway, employing 400 direct staff members and about 10,000 indirect staff members. Earlier, Lexsz was established in 2003 to provide recycling collection services for businesses and households for export of PET plastic bottles, preforms tablets and other raw materials to China. On January 1, 2018, China, which is the world's biggest scrap importer, stopped accepting virtually any recycled plastic and unsorted scrap paper from abroad and severely curbed imports of cardboard. Lexsz was exporting most of its products to China just like Omnik was exporting to India and Alkem to Pakistan. Lexsz no longer export its recycled PET bottle to China but directly used in the manufacture of PET bottles in Nigeria at the factory located at Km 40 Lagos – Ibadan Expressway, Owode around Shagamu Interchange.

BASF Waste-2-Chemicals Nigeria Project

BASF is implementing a Waste-2-Chemicals Nigeria project in Lagos. The project allows for the recycling of about 1,300mt/year of plastic waste providing an option for recycling of PE water sachets/bags and PS food containers which otherwise would have ended up as microplastics (BASF, 2019). It seeks to achieve three key objectives:

- Design and deploy a scalable model to aggregate and sort at micro level plastic waste from the streets of Lagos, seeking maximal environmental (clean up) and social (job creation) impact;
- Leverage off the shelf cost-effective pyrolysis technology to regenerate original crude oil content from sorted plastic waste into a potential chemical building blocks; and
- Enable a circular economy by re-engaging those chemical building blocks in BASF value chains (after potential co-processing or direct swap against cracker feeds).

The project is unique because:

- It enables cost-effective collection of sorted waste and guarantee maximum social impact with decent job creation and entrepreneurship;
- It will develop and deploy robust, cost-effective and safe pyrolysis units in the communities where the waste is situated;
- The focus is on sorted PP, PE and PS waste to maximize yields, while minimizing undesirable by-products, and optimize product composition for future use;
- It processes plastic waste into pyrolysis oil and provides opportunity for further development of local chemical value chain; and
- There is solid oil and gas value-chain in Nigeria which will facilitate the conversion into adequate BASF cracker feed.

5.4 Non-Governmental Organizations (NGOs)

The Food and Beverage Recycling Alliance (FBRA)

FBRA is a Non-Governmental Organization (NGO) and the Producer Responsibility Organization (PRO) for the Food and Beverage sector of the Manufacturers' Association of Nigeria (MAN). FBRA was founded in 2013 and ensures the success of the EPR policy of the Nigerian Federal Government.

FBRA currently has 15 members; Nigerian Bottling Companies (NBC)/Coca Cola Nigeria Limited, Nestle Nigeria Plc., Nigerian Breweries Plc., Seven-Up Bottling Company Limited, Guinness Nigeria Plc., International Distillers Limited, International Breweries Limited, Tulip Cocoa, Prima Corporation, DOW Chemicals, Tetra Pak West Africa, LaCasera Company Limited, Engee PET Manufacturing Limited, Omnik Limited and UAC Foods Limited.

FBRA is involved in:

- Community recycling awareness and buy-back schemes;
- Adoption of rPET by Standard Organization of Nigeria (SON);
- Development of National Policy on Plastics Management;
- Engagement with value chain to promote Circular Economy;
- Collaboration to convert rejected waste plastic to energy;
- Cement making through co-processing;
- Engagement of collection partners for waste recovery and collection;
- Clean-up exercise of Arena Market in Oshodi, Lagos, in collaboration with RecyclePoints, in commemoration of the World Cleanup Day on September 15, 2018.

5.5 Other Organizations

'Cash 4 Trash' Initiative Project W.A.S.T.E Africa

The Coca-Cola Foundation (TCCF) is committed to solving plastic pollution problem. TCCF provided funds for the 'Cash 4 Trash' initiative project by an NGO, W.A.S.T.E Africa. The Minister of State for the FCT, Dr. Ramatu Tijjani Aliyu unveiled the 'Cash 4 Trash'

recycling hub in Nyanya area in Abuja Municipal Area Council (AMAC) on Thursday 20 August 2020. The NGO will use the funds to build seven solar-powered recycling hubs in satellite towns such as Nyanya, Zuba, Bwari, Kuje, Gwagwalada, Jikwoyi, and Galadimawa with beneficiaries to include over 3,000 waste pickers including over 1,600 women and youths to be recruited as waste pickers and sorters in these communities as an igneous way of getting money through trash and at the same time clean the environment (The Independent, 2020). The women waste pickers will be provided with financial literacy, safety training, and as well as the provision of Personal Protective Equipment (PPE).

In addition, W.A.S.T.E Africa will be launching the 'Bottles for Books' initiative. Through this project, 800 out-of-school children will be enrolled in the educational system. Using recyclable waste as a currency, out-of-school children in Kabusa, Kpaduma, Gwagwalada and Kubwa communities in FCT will be enrolled in schools guaranteeing their right to quality education. Other projects to be launched by the NGO include Project 'Protect 10,000 (P10K)' initiative which will support 1,000 waste pickers or scavengers with financial literacy, safety training as well as the provision of Personal Protective Equipment (PPEs).

TCCF supports other projects including African Clean-Up Initiative, Recycles Pay and Clean-Up Naija, and the Recycling Scheme for Women and Youth Empowerment (RESWAYE).

The 'Waste in the City' Initiative

Waste in the City is a three-part project encompassing mass mobilization and community advocacy, deployment of waste collection receptacles and provision of sustainable livelihood for community youth within the Surulere LGA, Coker-Aguda and Itire-Ikate LCDAs. The initiative, developed by Statewide Waste and Environmental Education Foundation (SWEEP) and The Coca-Cola Foundation (TCCF), seeks to reduce the number of unemployed youths while effectively tackling plastic waste blocking the canals and drainages in Surulere. The initiative also increases awareness through community town-halls, increased participation of target communities in Environmental Education town-halls and promotion of sustainable plastic waste management at the community level.

It was officially launched across communities in Surulere LGA, Coker-Aguda and Itire-Ikate LCDAs of Lagos State on Thursday, 25 February 2021. The initiative, funded by The Coca-Cola Foundation, is a community-focused project aimed at unclogging blocked drainages and canals by extracting PET bottles, cans and other plastic waste, recycling them through accredited off-takers while providing economic empowerment for community youth and women. A total of 100 recycling receptacles and 10 tricycles will be

deployed across these communities to ensure the collected PET bottles are evacuated in real time to aggregation centres for recycling. Picture taken during the launching ceremony is shown in Figure 5.5.



Figure 5.5: Launching of Waste in the City in Lagos State on Thursday 25 February 2021

Project ReflexNG

A pilot project titled 'Project ReflexNG' was inaugurated on 14th of July, 2020 by renowned packaging company, DOW. The project is in partnership with Nigerian companies, Omnik and RecyclePoints for diversion of 300 million plastic water sachets away from landfill into recycling facilities, while educating a select group of small- to medium-sized waste businesses on sustainability practices at the Lagos Business School Sustainability Centre. RecyclePoints will employ over 200 registered waste pickers to collect the water sachets and set up kiosks where collected waste can be exchanged by residents for groceries, mobile phone credit and cash. The collected waste will be taken to Omnik and processed into post-consumer recycle.

Commitment by World's Top Three Producers of Plastic Wastes

Stakeholders of the World's top three producers of plastic waste for the past three years since 2018; namely Coca-Cola, Nestlé and PepsiCo (BFFP, 2020), met in Lagos in October 2019 to evolve recycled PET (rPET), though more expensive than virgin plastic, it would encourage investment in recycling operations. Nigeria does not have regulation mandating use of rPET.

Coca-Cola Co. was among the first big beverage sellers to share its goals publicly in January 2018, when it announced that its bottles will contain an average of 50% recycled

content by 2030. Coca-Cola is committed to using rPET and is in talks with Mohinani Group and Alkem, a sister company of Johannesburg-based Extrupet SA, sub-Saharan Africa's largest recycler of PET bottles.

Unilever

Unilever on October 7, 2019 announced it would halve its use of virgin plastic by 2025 by various means, including using more recycled plastic.

Planet 3R

This organization deals with conversion of waste 'pure water' nylon sachets into clothes, bags, shoes, etc. The founder, Ms. Adejoke Lasisi, is an entrepreneur based in Ibadan, South-West Nigeria, about 120km North of Lagos. She converts waste nylon from 'pure water', into clothes, bags, shoes with locally made wooden equipment, after thorough sterilization. She emerged as the National MSME of the year 2020 for using her weaving skill to save the planet by converting plastic and textile wastes into eco-friendly products. She also got award by the President of Nigeria as one of the five young innovators in 2020. She recently won the Africa Green Grant Award 2020 organized by Eleven Eleven Twelve Foundation (Linkedin, 2021). Figures 5.1 to 5.3 show Planet 3R products manufactured from waste pure water sachets.



Plate 5.13a: Bag from Pure Water Sachet



Plate 5.13b: Bag Made from Waste Pure Water Sachet



Plate 5.14: Shoe, Cloth from Water Sachet



Plate 5.15: Planet 3R Founder with Sachets/Products

Houses Built with Plastic Bottles

A trail-brazing Nigerian engineer, Yahaya Ahmed, used 14,800 plastic bottles to build a house with three bedrooms, a toilet and a kitchen. Ahmed said the house is 20 times stronger than houses built with brick walls and can last up to 300 years. The engineer said he was motivated to come up with housing initiative in a bid to reduce the volume of plastic polluting the environment. The house was built in Kaduna, North-West Nigeria.

Also, another Nigerian man has built a house with plastic bottles, shown in Figure 5.6.



Figure 5.6: Beautiful House Built with Plastic Bottles

National Union of Road Transport Workers (NURTW)

NURTW is the National Organization of commercial vehicle drivers in Nigeria. A one-day 'NURTW NO-PLASTIC-WASTE DAY' programme was carried out throughout the entire Lagos State on 21st of August 2020, led by the Union Chairman in Lagos State, Mr. Akinsanya, popularly known as MC Oluomo. The total number of plastic bottles counted was 646,596 with thousands not counted as more were still pouring in endlessly (Omereghe, 2020).

Interlocking Tiles from Waste Pure Water Sachets

An Abuja woman, 29-year old Intissar Bashir Kurfi, is turning sachet water plastic waste (popularly called pure water) into interlocking tiles, devising several collection methods across schools in the FCT and giving back by providing solar-powered lighting systems for these schools. She produced over 1,250 pieces of interlocking bricks from 625,000 waste pure water sachets. The Ahmadu Bello University (ABU), Zaria (NorthWest Nigeria) graduate has been collecting plastic wastes and processing them into bricks that could last longer than conventional ones, whilst keeping the environment clean.

She is the founder of Ifrique Design, she engages students in the rural parts of the Federal Capital in picking the waste and rewards them with solar light for night reading in school. In her words, 'If your conventional interlocking tile is going to spend 10 years, this one is going to spend 30 years'. She also said, 'My wish is to rid Nigeria out of plastic and especially Abuja and also to see that our product is being used for making roads that don't have potholes and building houses, building schools, building public toilets out of these plastic wastes that we have'.

Christmas Tree from waste PET Bottles

A Christmas tree was set up in December 2020 by African Creative Hub at Alalubosa Estate in Ibadan, SouthWest Nigeria using about 600 waste PET bottles that could have otherwise ended up in clogging waterways.

Informal Plastic Waste Collectors

Informal collectors retrieving plastic trash, especially PET bottles and sachet water wastes, could make about N60,000 (about \$120) per month or twice what the lowest-paid Nigerian Government worker would have earned.

5.6 Youth Response to Plastic Pollution

The Federal Ministry of Environment organized a webinar on Friday, 4th of June 2021 tagged 'Youth Response to Plastic Pollution' in commemoration of World Environment Day 2021 themed 'Ecosystem Restoration'. The programme was moderated by Mr. Seyifunmi Adebote. Welcome address was delivered by the Honourable Minister of State for Environment, Barrister Sharon Ikeazor, commending the youth for their active engagement in upcycling of solid waste especially plastic pollution. The Director of Pollution Control and Environmental Health of the Ministry presented 'Deep Dive into Nigeria's Plastic Waste Policy, saying Nigeria generates about 1.5 million tonnes of plastic wastes every year and less than 10 per cent is recycled.

A Youth Speaker, Ms. Doyinsola Ogunye, made a presentation on 'Eliminating Plastic Pollution – Youth Action, stressing the need for sustained advocacy by the youth for a behavioural change. World Bank representative, Ms. Ozgul Calicioglu; an Environmental Engineer for World Bank West and Central Africa Region, delivered a presentation on 'Plastic Pollution: Opportunities for Local Economies, saying the World Bank supports creation of circular economy for plastics and improved solid waste management in Nigeria, with special focus on Lagos State under its 'PROBLUE' programme. Mr. Oluyomi Banjo, UNIDO Environment Expert, presented 'Opportunities for Youths in Plastic Pollution', making reference to youths participation in this study. Presentations were made by nine selected youth organizations in the areas of innovations for reducing plastic pollution in Nigeria.

5.7 Stakeholders' Survey Results

Stakeholders were interviewed and completed the questionnaires both in FCT and Lagos.

Eight stakeholders participated in the survey. Majority of the respondents that completed the questionnaire on behalf of their establishments are top ranked personnel in their organizations and are mostly female.

Advocacy and Knowledge Management

Record from the survey indicated that the mandates of some stakeholders are waste management, advocacy and awareness, enforcement, policy development, regulation and legislation. These are some of the responsibilities of the stakeholders.

Stakeholders indicated that the waste management system is not effective, even though there are aware of the policies guiding solid and plastic wastes in the country there has been poorly implemented. Monitoring and enforcement measures for sustainable waste management practices in Nigeria has been poor according to the stakeholders, strategies need to be in place for compliance by the people. Even though there programmes like the Extended Producers Responsibility (EPR) Implementation, and other Compliance monitoring exercise and sensitization and awareness campaign programmes.

The existing policies/regulations guiding manufacture of plastics in Nigeria as stated by stakeholders are:

- National Environmental (Domestic & Industrial Plastic) Regulations 2011
- National Policy on Plastic Waste Management, and
- Lagos State Plastic Waste Management Policy

Stakeholders indicated that the solid and plastic waste management services in Nigeria has not been effective, despite their awareness of the impact of plastic waste, particularly single-use plastic waste pollution on the environment. Most of the stakeholders are not aware of the amount of plastic waste generated annually in FCT and Lagos as there are no accurate data to this effect,

The survey result indicates that people should be more educated about plastics and its effects on the environment, emphasis should be placed more on education on the use of coded waste bins (yellow, green, brown, and black) for segregation of waste types at the point of waste generation.

NESREA indicated that their organization mandate to reduce waste attributed to single-use plastics are embedded in the Extended Producer Responsibility Programme (EPR), implementation and registration of some companies for collection, recycling of PET bottles.

The stakeholders are of the view that the strategies to enforce, reduce and manage single-use plastic wastes in FCT and Lagos include:

- Carryout enforcement activities;
- Create awareness on the impacts of single-use plastics on the environment;

- Enforce compliance starting from the household wastes such that failure to sort wastes from households or restaurants should attract fine.

As recorded in the survey result, the strategies that will be more effective in reducing single-use plastics in FCT and Lagos are:

- Adoption of re-use strategy;
- Levy on single-use plastics in major outlets; and
- Voluntary ban or levy on use of any identified single-use plastics.

While the most considered policy tools that will be effective on plastic waste management, particularly single-use plastic in both FCT and Lagos, as indicated by the stakeholders are;

- Regulatory instrument-ban;
- Economic instruments- levy on suppliers; and
- Combination of regulatory and economic policies.

The stakeholders showed with these tools, or either of the tools in place, there will be reduction in the amount of single-use plastic waste generated in FCT, Lagos and in Nigeria as a whole.

Suggestions for improving compliance with single-use plastic waste management rules in Nigeria as indicated by the stakeholders is presented in Table 5.1.

Table 5.1: Suggestions for Improving Compliance with Single-Use Plastic Waste Management Rules

SN	Suggestions	Respondents (%)
1	Improved primary collection	78.2
2	Improvement of secondary storage	50
3	Improvement of transportation system	64.4
4	Provide alternative packaging materials	50
5	Encourage plastic manufacturers innovations on the use of bio-plastics	78.2
6	Improved waste management services	100
7	Improved education and awareness campaign	
8	Improvement of cost recovery mechanisms	30
9	Development of functioning, collection, sorting and recycling schemes	40
10	Training and capacity building of identified plastic value chains	56.8
11	Enhancing community participation	78.2

Monitoring and Enforcement

The monitoring procedure put in by some stakeholders for the management of plastic waste, particularly single-use plastic waste in Nigeria is the compliance monitoring programme nationwide. Although there are no monitoring indicators and reporting standards on the plastic wastes generated annually, but they ensure quality and

comparability in statistics of plastics wastes and recyclables reported in the country especially in the FCT and Lagos through the Producer Responsibility Organization (PRO).

The authorization procedures for plastic manufacturers and recyclers in Nigeria are registration of plastic recyclers with the designated agency like NESREA, NAFDAC and identification of recycling centres for plastics.

The degree of compliance with legislations guiding materials used in the manufacture of plastics in Nigeria has been good, as indicated in the survey result by the respondents, while the degree of compliance with legislations guiding importation of raw materials used for manufacturing plastics in Nigeria has also been good.

The information gathered also stated that the value-chain players' compliance level to legislations guiding plastic waste, particularly single-use plastic management in Nigeria is also good and the quality of data and reporting by the enforcement team has also been good.

Partnership and Alliance Building Capacity

Respondents indicated that the value-chains are partially aware (50%) about this study on single-use plastics assessment in Nigeria, while other respondents indicated that value-chains are not aware (25%). All respondents indicated that there has been sensitization program on plastic waste and single-use plastics management among the value-chains.

While most respondents (60%) rated the private sector participation in the implementation of innovative alternative packaging materials to single-use product in Nigeria good, few stakeholders (20%) believed it has been bad. The private sectors' contribution has been impressive towards the implementation of innovation packaging and recycling technologies of plastics product, this is due to the environmental impact and menace caused in form of pollution on the environment by single-use plastics; although respondents indicated that there has not been any project on plastics, innovative packaging, single-use plastics and recycling technologies done and sponsored by any developmental organization in the past.

Plastic Waste Management Facilities and Alternative Technologies

Respondents indicated from the survey records that there are controlled facilities for the treatment of plastic wastes in Nigeria, while some indicated they don't know if there are safe controlled facilities.

It is a thing of concern as respondents indicated that plastic waste that are not recycled are found in water bodies (70%), other showed that such plastics ended up in landfills (10%).

There are established infrastructural facilities for the treatment of plastic waste, privately owned, in Lagos.

Respondents do not know if there are measures put in place to reduce the use of petroleum-based raw materials for manufacture of plastics in Nigeria, while some respondent out rightly claimed there are no measures in place.

Most respondents (60%) indicated that they do not know the difference between bio-based, biodegradable, compostable and marine degradable plastics.

The survey report showed stakeholders opinions to be considered for implementation if alternative materials to plastics come into the Nigerian market as follows:

- Enforce all environmental laws, guidelines, policies standards and regulations in Nigeria and Use of equipment or technology; and
- Use of bio-plastics should be encouraged since they are mostly biodegradable.

As indicated in the survey result, respondents prefer glass (60%), paper (45%) and 25% respondents indicated wood for non-plastic based alternative packaging materials.

Alternative to plastics should be popularized, put into use, produced in quantities for easy accessibility; were recommendations suggested by some respondent as a way to effectively put into force the use of alternative materials for plastic manufacturing.

CHAPTER SIX

CONCLUSION
AND THE WAY
FORWARD

6

CONCLUSION AND THE WAY FORWARD

6.1 Summary of Project Implementation

The following project activities have been completed, in accordance with the TOR of the study:

- Desktop literature review;
- Submission and acceptance of inception report;
- Consultation with steering committee members;
- Consultation with key stakeholders;
- Consultation with plastic value-chain payers;
- Development and finalization of questionnaires;
- Questionnaire administration to national steering committee members;
- Submission of revised preliminary report;
- Questionnaire administration to PVC players;
- Retrieval of questionnaires from steering committee members;
- Retrieval of questionnaires from value-chain players;
- Use of KoBoCollect for residents' questionnaire administration and analysis;
- Visits to waste management facilities in FCT and Lagos;
- Analysis of field data and questionnaires;
- Use of KoBoCollect for analysis of administered PVC and stakeholders questionnaires;
- Assessment of data gathered from the study;
- Preparation of draft final report;
- Submission of draft final report;
- Validation of the Assessment; and
- Submission of Final Report.

All the activities are expected to be completed in June 2021 with Project Steering Committee Meeting scheduled for Wednesday 30 June 2021.

6.2 Questionnaires Administered

An overall total of 4,132 questionnaires were successfully administered and analyzed during the course of this assessment. This is made up of 59 value-chain players in Lagos and 40 in FCT including 1,985 Lagos residents and 2,034 residents in FCT as well as 6 steering committee members in Lagos and 2 in FCT. Two PVC companies in Lagos and one in FCT are actively involved in two categories. Table 6.1 gives an overall summary of the questionnaires.

Table 6.1: Summary of Questionnaires

VALUE-CHAIN QUESTIONNAIRES			
Value-Chain	Lagos	FCT	Total
Recycler	5	11	16
Collector	20	10	30
Retailer	13	10	23
Distributor	8	10	18
Packaging	12	-	12
Compounder	5	-	5
Polymer	-	-	-
Raw Material	1	-	1
Total	64	41	105
ALL QUESTIONNAIRES			
Value-Chain	61	41	102
Residents	1,985	2,034	4,019
Stakeholders	6	2	8
Overall Total	2,055	2,077	4,132

6.3 Findings from Plastic Value-Chain Players

The results of the analysis of questionnaires administered with the 99 PVC players together with deductions from interviews, interactions and literature documentation at our disposal revealed the following findings:

- Value-chains players (stakeholders and regulators) are enthusiastic about the project outcomes for necessary funding on plastic waste management programmes, particularly single-use plastics in the study areas;

- Majority of the plastic value-chain players have heard about bio-plastics and wants to know more about it, so as to know how well it can improve their business products performance;
- Respondents are aware of environmental impacts caused by plastics, particularly single-use plastics on the environment, are ready to cooperate with the authority that will be charged with the responsibility to reduce the usage of plastics;
- They have clear vision in protecting their businesses in line with global green economic practices;
- They want to be fully involved in all policy measures targeting plastic pollution but with no adverse economic returns;
- There is need for continuous education and awareness campaign for customers and consumers on the benefit of environmental friendly plastic products to our environment;

Value-chain players in the plastic industry are aware of the Extended Producer Responsibility (EPR) but afraid of the implications it will have on their businesses.

6.4 Findings from FCT and Lagos Residents' Survey

The following findings are evident from the analysis of the administered questionnaires coupled with results of observations and interviews conducted with the residents:

- Most residents in FCT and Lagos (2,901 of 4,019 residents, 72.2%) are ready to choose a more environmentally-friendly alternative to single-use plastics, 27.6% (1,111 of 4,019 residents) of them are even willing to pay more for such products and services;
- Residents level of education and awareness on the impacts of the plastic waste management on the environment and the campaign against inappropriate disposal and management of plastic waste particularly single-use plastics, are quite impressive;
- Residents are more concerned about their environment, so they ensure wastes are being disposed in an environmentally sound manner;
- The need to improve on the waste management services at market places, waste sites and effective cleaning of sewage, gutter and drainage must be emphasized;
- Most residents do not know that marine plastic litter is a serious global environmental challenge
- Residents strongly believe in the enactment of laws and acts mandating the responsibility of plastic waste management particularly single-use plastic to a designated agency/authority to achieve significant reduction in the usage of single-use plastic; and
- There is the need to implement and enforce policies developed for solid waste management and plastic waste management in Nigeria.

6.5 Policy Recommendations

Based on the outcome of the plastic value-chain, residents' and stakeholders' questionnaires analysis and findings, the following policy recommendations are

presented for action by appropriate authorities:

- Awareness raising and promotional activities for adequate sensitization of the plastic value-chain players;
- Producers should be encouraged to bridge the gap between retailers and consumers in provision of alternatives to plastics;
- Authorities should institute adequate publicity and awareness programmes on plastics alternatives and environmental impacts of plastic wastes;
- All stakeholders must be involved in reducing plastic waste pollution;
- Most significant policy measures considered effective in reducing use of SUP include laws and acts mandating the producers for waste recovery and ban on use and sales of certain SUP;
- Government should make EPR a regulation after dealing with fears and concerns of the operators in redesigning their products;
- Gradual implementation of the national policy on plastics waste management;
- Provision of infrastructures for plastic waste management across the cities;
- Capacity building, training of personnel in current trends in waste management; and
- High-time Nigeria started being part of the global world in reducing plastic pollution with alternatives and environment-friendly technologies.

6.6 Recommendations of this Study

Following the findings, it is important to state that mitigation measures can be put in place to reduce, if not completely eradicate plastic litters in the environment, through:

1. Awareness and sensitization campaign in Abuja and Lagos to sensitize the populace on the importance and hazards of plastic waste in our environment
2. To eradicate plastic in the environment, plastic Recycling plants should be procured and installed at localities with huge plastic waste to recycle already existing plastic waste.
3. Data was not release because data on plastic waste are not available. Therefore, it is recommences to establish plastic waste or waste Data Bank in Abuja and Lagos.
4. Plastic production should be in line with the provision of the National Plastic Waste Policy.
5. Periodically, workshop and symposium should be organized to improve and educate the plastic value-chain players.

Other recommendations include:

- Polythene plastic nylon bags are a big menace to the environment and as much as possible should be banned;
- If plastic use is to be reduced, reused or refused, there should be adequate more publicity and awareness on alternative methods and solutions to plastic pollution;
- A national waste recycling program should be designed;
- There should be more publicity and awareness on plastic recycling to the populace;
- Incentives should be provided to the youths and the unemployed to collect plastics;

- Tax rebates should be given to companies implementing safe and friendly workplace environment;
- Polythene plastic nylon bags, as much as possible, should be banned;
- Zero waste should be promoted and technologies that promote circular recycling economy should be encouraged in Nigeria in order to save jobs;
- Regulatory bodies should close the gap of waste management through research and value chains, data gathering and provision of social amenities;
- Plastic waste collection centres should be established in all the districts in the FCT and all LGAs and LCDAs in Lagos State;
- Promotion of waste segregation and sorting at all levels;
- Plastic shopping should be discouraged and replaced with responsible friendly shopping;
- Enact law prohibiting disposal of plastics into the marine environment;
- Recycled plastics can be used to make park benches, trash cans, playground equipment, etc.; and
- Boycott plastic food containers, lids and utensils and buy re-usable water bottles.

Suggestions

In the areas of alternatives to plastics:

- Bio-based plastics considered as a viable alternative for conventional plastics;
- Molded fibre and pulp packaging as an Alternative to the HDPE-based rigid packaging;
- Optimizing wood packaging in the transportation, logistics and supply chain industry through bio-resin coating technologies;
- Developing lightweight and durable glass packaging;
- Green packaging of bio-based degradable plastics; and
- Minimal adoption of silicone packaging due to limited knowledge on its safety aspects.

6.7 Recommendations for Further Studies

Based on the findings of this study, we recommend that:

- An urgent inventory of all plastic value-chain players in Nigeria should be carried out, especially for the packaging producers, compounders, collectors and recyclers;
- It is indeed necessary to carry out a detailed inventory of activities and interventions by various stakeholders and youth organizations involved in plastic reduction in Nigeria;
- As funds become available through budgetary allocations and interventions by multilateral donor partners, establishment of plastic waste data bank in future plastic waste or waste projects should be carried out for Nigeria, inclusive of all the major cities in the six geopolitical zones;
- In addition, it is quite important to extend residents' survey to the six geopolitical zones in the country in order to have a more enlarged view towards progressive implementation of the national policy on plastic waste management.

6.8 The Way Forward

In addition to making our environment pollution-free, recycling and adoption of alternative sustainable materials to single-use plastic and packaging would boost the economic situation of our country by adopting appropriate policies, strategies and technologies.

In order to achieve sustainable plastic waste management in Nigeria;

- Nigerian government should involve stakeholders in the decision-making process to address improper disposal of plastic wastes;
- Grants should be provided to value-chain actors interested in recycling, alternatives to single-use plastics and waste-to-wealth scheme of plastic waste streams through multilateral organizations for purchase and acquisition of technologies and equipment;
- Tax incentives should be made available for value chain companies and other investors interested in the plastic waste recycling business;
- Seminars, workshops should be organized to educate people on the opportunities in the recycling of single-use plastics and the entire plastic polymer sector;

In this regard, the following action items are suggested for adoption;

- New legislations should be put in place restricting ban on import of plastic raw materials, standards and information requirements;
- Introduce tax and charges on plastics and plastic products;
- Clean-up measures should be put in place for plastic littered areas like drainages, waterways, etc.;
- New research and development for plastic alternatives, product innovation and design should be put in place to facilitate reuse, repair, re-manufacture and recycling of plastics;
- Federal Government's EPR policy domiciled with NESREA, should be implemented with stringent enforcement actions;
- Fees and fines should be put in place for companies/industries that discharge plastic waste, micro-plastics into the environment;
- Raise awareness on plastic waste management through mass media, social media, etc.

6.9 Conclusion

Rethinking recycling, availability of biodegradable packaging materials and integrated solid waste management will create a plastic pollution free environment, providing better alternatives to either plastic, paper or cotton reusable packaging bags. We should think globally, cooperate regionally and act locally to combat the menace of plastic pollution.

Policy is good but action is better than words. Beating plastic pollution must start now and government must develop a strategic action plan. Single-use plastic bags must undergo waste conversion into other useful products such as interlocking blocks, building materials, production of energy, arts and crafts and lots more.

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