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Research Article

Evaluating Consumer Perceptions and Involvement in Waste Management at Port Harcourt Superstores to Advance Sustainable Development

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Abstract: Nigeria's rapid population growth and industrialization have escalated waste generation, particularly in urban areas, where the inefficient waste management system poses severe environmental and health risks. Effective waste management is critical for sustainable development and achieving the Sustainable Development Goals (SDGs). This study focuses on consumer perceptions and engagement in waste management at Port Harcourt Superstores, aiming to advance SDGs related to waste management. Port Harcourt, known for its economic activity, particularly in the oil and gas sector, serves as the study's backdrop. A descriptive research design involved 112 customers surveyed through structured questionnaires and interviews. Data analysis, utilizing SPSS version 26, combined statistical tools such as Chi-square and correlation analysis. Results indicate a respondent demographic skewed towards young, single, highly educated, and predominantly employed individuals who frequently shopped weekly. Consumer perceptions and involvement in waste management practices were found statistically significant ($p < 0.002$), highlighting a strong awareness and engagement among shoppers. Demographic factors such as education, marital status, occupation, age, and shopping frequency significantly influenced these perceptions ($p < 0.002$), whereas gender did not ($p = 0.71$). The study concluded that addressing perceptual disparities and promoting sustainable practices are crucial for fostering an environmentally conscious community aligned with SDGs. Stakeholders should leverage these findings to inform policies and practices that support resilient and sustainable development in urban settings like Port Harcourt.

Keywords: Consumer, Perceptions, Involvement, Waste Management, Sustainable Development Goals

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1. Introduction

In Nigeria, the quantity and variety of waste have been steadily increasing due to rapid population growth and industrialization (1). Despite this growth, the solid waste management system, primarily based on traditional practices of collection, transportation, and disposal, remains inefficient and ineffective, particularly in urban centers (2). Nigeria, known as the most populous country in Africa with over 201 million people in 2019 (United Nations), faces significant challenges in managing its solid waste, which spans a diverse array of materials generated from industrial, commercial, mining, agricultural, and community activities. This surge in waste generation is closely intertwined with economic expansion, urbanization, and shifts in consumption patterns, exacerbating environmental pollution and presenting a critical environmental challenge.

The retail sector, encompassing diverse commercial activities from vehicle sales to household goods, plays a pivotal role in waste generation within Nigeria. The sector predominantly produces non-metallic waste, including packaging materials and organic waste,

influenced directly by the types of materials sold (3). These dynamics underscore the importance of considering consumption patterns and resource efficiency in product manufacturing to achieve environmental sustainability.

Globally, inadequate waste management poses a significant challenge for municipalities, exacerbated by the environmental and health risks associated with plastic pollution (4);(5). Efforts to address these challenges emphasize sustainable waste management strategies that prioritize energy and material recovery, waste reduction, and reuse, aiming to decouple waste generation from economic growth (6). However, despite the emphasis on recycling, challenges such as inadequate infrastructure and consumer waste separation practices often limit the effectiveness of recycling efforts. Moreover, while recycling is crucial, it alone is insufficient to entirely replace virgin plastic usage due to associated material losses and quality degradation during the recycling process (7).

This study focuses on evaluating consumer perceptions and involvement in waste management within Port Harcourt superstores to advance sustainable development goals. Understanding consumer perceptions is crucial as it influences behaviors related to waste management practices, aligning with behavioral perspectives that underscore the importance of attitudes and perceptions in waste management approaches.

The Port Harcourt superstores, like many urban centers in Nigeria, grapple with the challenges of waste management amidst rapid urbanization and consumption patterns. Consumer perceptions towards waste management are pivotal in shaping individual behaviors and community practices (8).Positive environmental perceptions among residents have been correlated with responsible waste management practices, including proper waste collection and disposal (8). In the context of Nigeria's waste management landscape, the retail sector serves as a critical focal point due to its significant contribution to non-metallic waste production (3). Supermarkets, as part of the retail sector, have been encouraged to adopt recycling and reuse practices to manage waste effectively and potentially reduce operational costs. Plastic pollution remains a global concern, threatening ecosystems worldwide and posing health risks to humans (9);(5). The extensive demand for virgin plastic, particularly in packaging, underscores the need for sustainable alternatives and innovative packaging technologies to mitigate environmental (10) impacts Sustainable waste management strategies that encompass material recovery, waste reduction, and reuse are essential to addressing these challenges and achieving environmental sustainability goals (6). While recycling plays a vital role in waste management, its effectiveness is hampered by infrastructure limitations and consumer behaviors. This study seeks to explore consumer perceptions and involvement in waste management at Port Harcourt superstores, aiming to contribute empirical insights to the discourse on sustainable development goals. By understanding consumer behaviors and attitudes towards waste, this research endeavors to inform strategies that enhance waste management practices and environmental sustainability.

1.1 Justification of the Study:

Environmental degradation persists globally, exacerbated by inadequate waste management practices and a lack of data on hazardous waste in many African, Middle Eastern, and Latin American countries. Nigeria, experiencing rapid economic development and improved living standards, faces escalating challenges with solid waste, including diverse materials like plastics, metals, and chemicals, contributing significantly to environmental pollution((1).

Nigeria generates approximately 32 million tonnes of solid waste annually, with plastic waste alone accounting for 2.5 million tonnes and contributing to ocean pollution (10) (Marken and Horisch, 2020). Despite investments in waste management, urban areas often lack organized waste services, leading to environmental and health hazards from uncollected waste(3)

Effective waste management is essential for sustainable development, balancing economic growth with environmental conservation (11). Public perception and engagement are crucial for improving waste management practices and achieving Sustainable Development Goals (SDGs) (12). This study aims to address gaps in waste management knowledge and

practice in Nigeria, following the assessment of Port Harcourt Superstores' contributions to SDGs through consumer waste management behaviors conducted by (13). By exploring consumer perceptions and behaviors, the research seeks to inform policies that promote sustainable waste management and enhance environmental sustainability.

1.2. Research Objectives:

The aim of this research is to assess how consumers perceive and engage in waste management practices at superstores in Port Harcourt, with the intention of enhancing the achievement of sustainable development goals. However, the specific objectives are:

1. To assess consumer perception of SDGs related to waste management within Port Harcourt Superstores.

2. To assess the level of consumer engagement in waste management practices while shopping at Port Harcourt Superstores.

1.3. Research Questions:

The research questions are as follows:

1. What is consumer perception of SDGs related to waste management within Port Harcourt Superstores to waste management?

2. To what extent do consumers actively engage in waste management practices while shopping at Port Harcourt Superstores?

1.4. Research Hypothesis:

The research hypotheses are as follows:

H01: There is no statistically significant association between consumer perception of SDGs in waste management and the socio demographic factors in the study.

H02: Consumer perception of SDGs related to waste management does not significantly influence consumer engagement in waste management practices during shopping at Port Harcourt superstores.

1. 5. Literature Review

Sustainable Development Goals (SDGs)

Sustainable development encompasses the intricate balance between economic advancement, environmental stewardship, and societal well-being. It necessitates collaborative efforts among stakeholders and participatory agencies (14);(15). In 2015, over 150 world leaders adopted the SDGs as part of the global plan of the United Nations' 2030 Agenda for Sustainable Development, comprising 17 goals and 169 targets designed to guide global actions toward improving societal, environmental, and economic conditions (16).

Sustainable development depends on the interrelationship between economic progress, environmental management, and individual well-being. Sustainability initiatives involve substantial interaction among stakeholders and concerted involvement of participatory agencies (14). The SDGs could help nations and stakeholders worldwide align their actions with the urgent need for improving the condition of society, environment, and the economy. The SDGs provide a shared framework for prosperity and peace for humanity and the planet, encompassing prosperity, peace, and partnership. However, there is scope for competition among these goals, whereby the achievement of some goals can be at cross purposes with the achievement of others (16). The SDGs can be useful to policymakers in setting policies that could affect a larger number of stakeholders (17). Entrepreneurs and public-private partnerships have the capacity to drive the push toward sustainability using the SDGs (18); (14). Advances in organization and management research on waste management would contribute to the achievement of several SDGs (19). Waste management businesses have the inherent

advantage of helping to improve the environment, create employment opportunities, and generate profits for entrepreneurs.

Globally, the proportion of foods sourced from supermarkets has increased (20). A global "supermarket revolution" has been taking place for the last 30 years, with phenomenal growth in supermarket sales in developing countries (21). Supermarket Corporate Social Responsibility (CSR) commitments to protect public health should encompass managing a healthy and sustainable food supply, including taking responsibility for food waste. An analysis of publicly available CSR commitments to reducing waste by the top ten US supermarket chains has recently been conducted (22). Comparisons were made with Tesco in the UK, which was used as an exemplar. Tesco was commended for extending its food waste efforts throughout the supply chain, tracking and reporting on progress, and focusing on prevention and partnerships (22). In comparison, all but one US supermarket, Ahold Delhaize, failed to transparently report food waste, and only four had food waste reduction commitments (22).

The identification of sustainable alternative materials to plastics, along with innovative packaging and recycling technologies, is exemplified by the 2020 National Policy on Plastic Waste Management. This policy aims to ensure that all plastic packaging in the market is recyclable, biodegradable, compostable, or reusable by 2025, and that all plastic packaging meets at least two criteria of being recyclable, biodegradable, compostable, or reusable by 2030. It also aims to phase out single-use plastic bags and Styrofoam, effective December 2028, particularly in packaging used for shopping in supermarkets. For this study, as earlier stated, SDGs 11 and 12 will be considered important aspects regarding sustainable and resilient societies, including affordability, access to services, employment and education, a clean and healthy environment, adequate social infrastructure, gender equality, and respect for human rights.

SDG 11- Sustainable cities and communities

This goal encompasses improvement in several factors to ensure sustainability in habitations. All the targets as listed below are to improve basic services, transportation, living environment, green spaces, pollution levels and links between urban and rural areas.

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities. The pledge of Goal 11 to make cities and human settlements inclusive, safe, resilient and sustainable provides an unparalleled opportunity for the attainment of collective and inclusive progress, and for the achievement of sustainable development in the world. Managing solid waste remains a major environmental challenge in cities in several regions. The safe collection,

removal, treatment and disposal of solid waste are among the most critical services in the urban environment. As urban populations grow, income levels rise and economies become more consumer oriented, the volume of solid waste generated will only get larger. Data from 214 cities or municipalities in 103 countries show that about three quarters of municipal solid waste generated is collected. In sub-Saharan Africa, less than half of all municipal solid waste generated is collected, with adverse effects on the health of residents. Moreover, even when waste is collected, it is often not treated and disposed of in a sustainable and environmentally sound manner. Managing such waste continues to be a major challenge facing urban areas in several regions (23)

SDG 12 - Ensure Sustainable Consumption and Production Patterns

The practice of waste management falls within Goal 12 of the SDGs, with a 2020 target to achieve environmentally sound management of waste throughout its life cycle in order to significantly minimize its adverse impact on human health and the environment by reducing its release to air, water, and soil (23). To elucidate this concept, Environmental Justice Organisations Liabilities and Trade (2019) suggested that sustainable consumption can be seen as "an umbrella term that brings together a number of key issues, such as improving efficiency, minimizing waste, taking a lifecycle perspective, but also taking into account the equity perspective, meeting needs, and enhancing quality of life, improving resource efficiency, increasing the use of renewable energy sources, minimizing waste, taking a life cycle perspective and taking into account the equity dimension(24). More specifically, the United Nations Environment Programme has identified nine elements that characterize sustainable consumption: "waste management, sustainable resource management, design for sustainability, cleaner production and resource efficiency, sustainable transport, eco-labeling and certification, sustainable procurement, sustainable marketing, and sustainable lifestyles (23).

(25) suggested that by the 1990s, sustainable consumption and production essentially "meant re-engineered consumption, not reduced or constrained consumption. (26) further argued that the dominant institutional consensus sees sustainable consumption being achieved primarily through improvements in the efficiency with which resources are converted into economic goods. At the same time, a distinction has been made between "weak" and "strong" sustainable consumption. Lorek and Fuchs suggested that the former "can be achieved via improvements in efficiency resulting from technological solutions and, frequently, that these technical solutions will spread through markets due to consumer demand." The latter definition "is based on the assumption that changes in consumption levels and patterns are necessary to achieve sustainable consumption" and "emphasizes the need for a reduction in overall resource consumption instead of product-based individual consumption (27).

Arguably more, (28) argued that current thinking on sustainable consumption (and production) is framed by two generic positions. The first, described as "the reformist position," focuses on "firms pursuing green eco-innovations and consumers buying eco-efficient products, representing the political and academic orthodoxy." This echoes the belief that "underlying SDG 12 is a faith in human ability to manage the adverse environmental impacts of unending economic growth" (25) and more generally that "organizations can harness the 17 SDGs to drive growth" (29). The second is described as "the revolutionary position," namely "a radical critique," which "advocates the abolition of capitalism, materialism, and consumerism and promotes values such as frugality, sufficiency, and localism"(28).

Achieving SDG 12 through environmentally sound management of plastic products and waste throughout their life cycle would reduce the amount of plastic litter ending up in the ocean and would help countries implement the 2030 Agenda. (30) specified eight specific targets, three related to means of implementation, and thirteen indicators for SDG 12, all of which are, in principle, universally applicable. However, (25) argued that "the SDG indicators show major deficiencies, in particular inadequate coverage of corresponding targets and a checklist orientation which privileges counting of reports over examination of their content and quality." Almost all leading retailers produce an annual sustainability report, which addresses their commitments and achievements across a wide range of environmental, social,

and economic arenas. However, attempts to directly map the retailers' achievements in addressing sustainable consumption are conspicuous by their absence from these reports.

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, with all countries taking action, developed countries taking the lead, and considering the development and capabilities of developing countries.

12.2 By 2030, achieve the sustainable management and efficient use of natural resources.

12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production.

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products.

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.

Waste management and resource recovery is an ongoing challenge, particularly with the large number of relevant supply chains and the complexity of national and state regulatory frameworks. Reducing waste and improving our use of waste will achieve broader environmental, economic, and social benefits and will become increasingly important as the population continues to grow. Waste generation is projected to increase from 1.3 billion tons per year to 2.2 billion tons per year by 2025, with significant increases in middle-income developing countries.

While business organizations in a range of commercial sectors are addressing the SDGs (31), retailing can be seen as fundamental for any move toward sustainable consumption. There is certainly a growing awareness that retailers have a vital role to play in promoting more sustainable patterns of consumption, not least because they effectively act as gatekeepers between producers and consumers. As such, large retailers may be seen to be in a uniquely powerful position to drive sustainable consumption in three ways: through their own activities, through their relationships and partnerships with suppliers, and through their daily interactions with consumers. (32), for example, argued that large retailers "can greatly influence changes in production processes and consumption patterns.

Case Study Contribution to SDGs: Policy Interventions to Minimize Plastic Pollution and Waste Management

This section discusses plastics management strategies, challenges, and policy interventions to mitigate micro- and nano-sized plastic pollution. Each year, nearly 320 million tons of plastic waste are generated, and this number is expected to triple by 2050. Jiang has discussed the initiatives taken to mitigate microplastic pollution through by-laws, levies, policies, and the roles of government, non-governmental organizations (NGOs), and international institutions in controlling detrimental impacts and protecting the ecosystem. Several government agencies, research organizations, and institutions have coordinated mitigation and management strategies to protect the ecosystem from plastics exposure and monitor harmful impacts on aquatic animals and humans . In Germany, the Netherlands, Switzerland, Sweden, and Norway, supermarkets charge for the use of plastic bags (33), and a tax on plastic bags was imposed in Portugal in 2015, resulting in a 74% reduction in plastic consumption (34).

The traditional view of waste characteristics is evolving. In Nigerian urban centers, solid waste generation is increasing due to urbanization, rising consumption levels, and product diversity. The growing number of retail outlets, development of large shopping malls, and the re-entry of multinational supermarkets into urban centers are evidence of changes in consumption. Furthermore, Nigeria's GDP growth rate has risen over the years, making it the largest economy in Africa. From USD 297.46 billion in 2009, the nation's GDP rose to USD 460.95 billion in 2012 and USD 568.5 billion in 2014, although its 2021 value of USD 510.59 billion is below the 2014 value but higher than the 2009 value (35). These changes have significant implications for waste generation. Consumers now have a wider range of options, but products are designed with shorter lifespans, as observed by the EU Commission. Additionally, there are more single-use and disposable products, while technological advances have led to more frequent use of personal and updated devices (36). These are global drivers of waste generation, from which developing countries are not immune.

The green economy is a multifaceted concept that encompasses a wide range of sustainable practices, from eco-fashion and eco-building materials to resource-efficient production and consumption patterns. Central to the green economy are concepts like zero waste and circular economy, which seek to reduce waste and promote the reuse and recycling of resources. Overall, the green economy represents a promising vision for achieving sustainable development and improving the well-being of people and the planet.

This paper has discussed the Malaysian experience of strategic planning for a household and supermarket waste management project called vermicompost. The thousands of tons of household waste produced every day in Malaysia pose a significant challenge for the government to collect and dispose of it properly to ensure a clean and fresh environment. If household waste and supermarket waste are not disposed of or recycled properly, it could seriously affect the environment. Millions of tons of organic waste are rotting in landfills and producing toxic substances.

Although studies have revealed that few supermarkets in Nigeria encourage customers to use their reverse vending machines to deposit used containers and receive a refund from the recycling fees.

Retailers, on the other hand, produce less than 3% of food waste in the UK; (3) however, due to their pivotal role in the supply chain, retailers can make significant reductions by collaborating with their suppliers and influencing their customers. (37) suggest that companies can help reduce customers' food waste at home by communicating key messages. Much retailer activity in the UK regarding food waste has been coordinated by the Waste and Resources Action Programme (WRAP) through the multi-stakeholder Courtauld Commitment (38), with the most recent commitment extending to 2025. This is a voluntary industry agreement to help UK consumers cut down on food waste in households through WRAP and retailers' campaigns. The campaigns have focused on shopping smarter (using shopping lists), storing products better, planning meals, using up food that could be thrown away, and composting food waste where possible. However, recent figures by WRAP show that household

food waste has remained unchanged between 2012 and 2015 after dropping by 15% between 2007 and 2012, raising questions about the impact of recent efforts.

By testing the effectiveness of food waste communication campaigns in a supermarket environment, our messages competed with other product and service marketing campaigns. The food waste reduction campaign aimed to test the effectiveness of different communication channels at Asda rather than the messaging itself. The messaging was derived from the standard "Love Food Hate Waste" campaign promoted by WRAP, which Asda and other companies have committed to using as signatories to the Courtauld Commitment (38). The standard messaging covers shopping smarter (using shopping lists), storing products better, planning meals, and using up food that could be thrown away, all of which encourage consumers to reduce their food waste (38).

A number of the world's major retail trade associations have emphasized their commitment to sustainable consumption. In Europe, the Retail Forum was launched in 2009 to "exchange best practices on sustainability within the European retail sector and to identify opportunities and barriers that may further or hinder the achievement of sustainable consumption and production" (36).

Marks and Spencer: In addressing "Product Sustainability, (39) claimed, "we want to lead our sector in terms of sustainable consumption and production offering our customers good value, high-quality products and services," while in addressing "Responsible Sourcing," the company (40) claimed, "we want to be a leader on sustainable consumption and production in our sector.

Tesco: Tesco exemplifies corporate commitment to the SDGs, particularly through initiatives aligned with SDG 12.3 to reduce food waste and the goal of making all packaging recyclable by 2025 (41). By selling imperfect produce and eliminating unnecessary packaging materials, Tesco significantly contributes to sustainable consumption and production practices.

In conclusion, SDGs 11 and 12 provide a comprehensive framework for promoting sustainable urbanization, consumption, and production practices. By addressing these goals, stakeholders can foster inclusive and resilient communities while safeguarding the environment for future generations.

However, there is little consensus in defining sustainable consumption, and it is widely recognized to be a contested concept that embraces "competing discourses"(42), making it an elusive concept. As such, organizations wishing to pursue sustainable consumption policies face major challenges not only in defining but also in operationalizing the concept.

SWM in developing countries is an uncontrollable problem, given the indiscriminately growth of the slums(43). Present in most big cities, slums are characterized by the absence of government plans and services, illegal occupations, and the lack of proper sanitation systems (44). Finally, there is a need for more sustainable waste management strategies (45), involving all relevant stakeholders, from government officials, industry and formal private sector services providers to local communities and rag pickers(46).

Most previous studies on waste management methods for food waste, or organic waste including food waste, describe and sometimes compare landfill, incineration, composting and anaerobic digestion (47).

Consumer Perceptions and Involvement in Waste Management

Supermarket Cooperate Social Responsibility (CSR) commitments to protect public health should encompass managing a healthy and sustainable food supply, including taking responsibility for food waste. Analysis of publicly available CSR commitments to reducing waste by the top ten US supermarket chains has recently been conducted (48). Comparisons

were made with Tesco in the UK, which was used as an exemplar. Tesco were commended for extending their food waste efforts throughout the supply chain, tracking and reporting on progress, and focusing on prevention and partnerships. In comparison, all but one US supermarket, Ahold Delhaize, failed to transparently report food waste and only four had food waste reduction commitments(48).

Foundation, and Sustainable Seafood Coalition. Commitments to reduce food waste were made by 22 supermarkets (22/69 food and packaging waste CSR statements). Three supermarkets, Ahold Delhaize, J Sainsbury Plc and Tesco Plc, committed to transparently reporting food waste. Tesco Plc had taken this a step further by making a joint commitment with 24 of their largest suppliers to reduce overall food waste across the supply chain. US supermarkets referred to the Environmental Protection Agency's food recovery hierarchy which prioritises source reduction, followed by feed hungry people, feed animals, industrial uses, composting, with landfill or incineration at the bottom.

Reducing and recovering food waste Food waste is a significant global problem, described as a structural symptom of the 'broken globalised food system. Globally, a third of the food produced is never eaten(49). Food is wasted throughout the global food system, including from growers, processors, manufacturers, distributors, retailers, food service operators, and end consumers (50). For example, a UK study showed that most (70%) losses occurred in the home (51). The World Resources Institute provides companies with guidance on food loss and waste reporting. Committing to reduce food waste throughout the whole of the food system forces supermarkets to address their own practices which contribute to generating waste. These practices include setting cosmetic standards for fresh produce that mean imperfect looking produce is discarded (52); providing inappropriate packaging formats (e.g. oversized) (53) encouraging increased food purchases with offers such as 'buy one get one free' (38); or labelling foods with 'best before' dates to indicate optimal product quality not required by food regulations (51). Tesco Plc have been commended for their actions on transparently reporting food waste (48). They have reported waste profiles for the most commonly purchased foods, including levels and causes, to create tailored waste reduction plans (41). Recently, they announced removing best before dates from packaging (54). Only two other supermarkets have committed to transparently reporting food waste, so there is much room for improvement in the scale and impact of global supermarket food waste reduction efforts. Working on solutions that encompass the whole of the food system rather than passing the problem onto other actors is essential (42).

Consumer Behavour Studies

Various studies studied ethical consumer (55), moral norms and packaging choice. In this study, it has emerged that most Danish consumers have developed personal standards regarding the choice of environmentally friendly packaging and personal standards, which was an important predictor of their tendency to declare themselves to choose ecofriendly packaging in the supermarket. In another development, (56) studied the effect of ecolabeling on consumer behavior. The primary cause of the observe become to assess the relative significance of labeling in packaging over other attributes of the product (such as emblem, charge, color, and so forth.) to make selections on shopping for a customer.

Close to 100 million plastic bags are given out every year in Kenya by supermarkets, most of which end up in garbage bins polluting the environment. These plastics bags block drains and gutters, which create storm waters; they provide breeding habitats for mosquitoes and this can lead to a malaria outbreak in a country (57).

There is an important question here about how supermarkets come to know their consumers' concerns about the food that they waste. We return to this in the conclusion but for now, the pertinent point is that the retailers who participated in our study drew on the vocabulary of 'the consumer' in order to account for their responses to the challenge of food waste reduction.

In addition to engaging with their customers to help them waste less food, many retailers invoked 'the consumer' as the figure for whom they take action. For example, one

supermarket that we spoke to told how they were leveraging their position in the food system to reduce waste in supply chains 'on behalf' of their consumers. Again, they accounted for this through recourse to 'the consumer' and what they perceived to be customer expectations of their supermarket. This lends further support to Jane Dixon's arguments concerning the ways in which supermarkets seek to build relationships with their customers, but it is also an interesting variation on (58) suggestion that supermarkets can improve the sustainability of food systems by effecting changes 'behind the consumer's back'.

Here, more nuanced approaches to knowing and mobilizing the real and discursive figure of 'the consumer' began to take hold, and the responsibilities of other actors particularly supermarkets in the food chain came to the fore.

At issue here is the point that the emergence of the food waste discourse coalition was contingent on the involvement of supermarkets. Their apparent willingness to assume responsibilities for their own contribution to the problem as well as 'acting at a distance' to reduce waste that arises elsewhere was a key factor in enabling the emergent sense of distributed responsibility. This invites questions about how and why supermarkets became active in the project of food waste reduction, and why they assumed responsibilities rather than passing them along the chain.

Theoretical framework:

This work is anchored on Cradle-to-Cradle theory developed by William McDonough. As posited by (59) It is designed to stop the cycle of use-waste-pollute, which suggests that certain products could be reused endlessly to make similar products (cradle-to-cradle), rather than recycled into lower-grade products until the last stop is a landfill (cradle-to-grave). This means that products can be used, recycled, and used again without losing any material quality-in cradle-to-cradle cycles. Therefore, it could be a good way for reducing the waste from the raw materials of the products instead of using more and more virgin materials. Besides, considering the waste hierarchy, it also increases the proportion of waste reuse. Hence, when we face the problems of municipal solid waste, this theory can bring us the possibility for the breakthrough. All in all, "cradle-to-cradle" plays an important role in developing China's waste treatment and management system.

Empirical Framework:

A number of related research has been conducted along these lines (60) conducted a study on residents' perception of solid waste disposal practices in Sokoto, Northwest Nigeria here they resolved that proper waste disposal is a key to protecting public health. Thus, poorly managed and disposed waste encourages breeding of insect vectors and exposed public to increase risk of infection. This study aimed at determining the residents' perception about waste disposal in Sokoto metropolis. This was a descriptive cross-sectional survey conducted in Sokoto metropolis. A two stage sampling technique was used to select the survey participants. A set of interviewer-administered questionnaires were used to collect field data. Ethical clearance was obtained from state research ethics committee and in addition, individual informed consent was obtained before questionnaires were administered. Average age of the respondents was 30 years with 50% aged between 25 and 44 years. Large proportion (47.4%) of the respondents had only Quranic education. Majority (94.1%) of the respondents expressed worries about the indiscriminate littering of the metropolis with waste and more than half (55%) reported that residents were responsible for the state of poor sanitation while 38% felt it was fault of government. Although, 91% of respondents said it is appropriate for residents to clean own surroundings, 41% felt residents alone should take sole responsibility for the cleaning; while 40% felt government and residents should take joint responsibility. Less than half (46%) of respondents reported that improper waste disposal have health related problems. Although, majority respondents were disturbed with the way refuse litters the state metropolis, many are unaware of its health related problems. There is need to create awareness among general public of consequences of poor refuse disposal. Residents' perception of solid waste disposal practices in Sokoto, Northwest Nigeria.

Conclusively, (61) conducted a study aimed at providing a general review of the reporting process adopted by some of the world's leading retailers along with the sustainability agendas, which they have publicly reported. They, also, tried to provide a wider exploration of the ways these retailers are currently addressing and pursuing sustainability agendas. In order to achieve this, they reviewed the most recent sustainability reports as well as information, which have been posted on the webpages of the eight out of ten retailers. Their findings suggested that the structure of the sustainability reports vary considerably among the retailers, while three broad sets of schemes can be identified, the environmental, the social and the economical. In general, the authors argue that the world's leading retailers are, at best, adopting weak models of sustainability. In addition, they point out that during the pursuing of consumption and continuing growth, retailers are ignoring the fact that the present patterns of consumption are unsustainable in the long term. In their own research, (62) explored the perceptions of young consumers about the sustainable development initiatives of French food retailers and evaluated their impact on the brand image of retailers and their relationships with their consumers. Their methodology included the review of the corporate websites of the retailers and a press review as well as eight in-depth interviews and one faceto-face survey. Their results suggested that young consumers seem to relate sustainable development more to ecology and less to social and economic issues. In addition, they report the five dimensions that seem to best describe brand image in relation to sustainable development, which include sympathy, innovativeness, human touch, responsibility and opportunistic behavior.

2.0. Materials and Methods

2.1 Study Area

The study focuses on Port Harcourt, the capital city of Rivers State, Nigeria. Situated in the Niger Delta region, Port Harcourt is renowned for its vibrant economic activities, particularly in the oil and gas sector. Established in 1967, Rivers State comprises 23 Local Government Areas, each characterized by unique socio-economic and environmental dynamics. Across the various Local Government Areas are supermarkets of different sizes and capacities, patronized by urban and rural dwellers in the state. Port Harcourt boasts several superstores offering a diverse range of products. Examples include Spar Nigeria, known for groceries, household items, electronics, and clothing; Shoprite, offering groceries, fresh food, household items, and electronics; Next Cash and Carry, providing wholesale options for groceries, household goods, and electronics; Everyday Emporium, popular for competitive prices on groceries, household items, electronics, and clothing; and Park 'n Shop, known for groceries, fresh produce, household goods, and electronics. These superstores cater to various needs, providing a convenient one-stop shopping experience for residents and visitors in Port Harcourt.

2.2 Research Design

Employing a descriptive research design, this study aims to provide a comprehensive understanding of the variables related to waste management in superstores across Port Harcourt. Descriptive research design is a type of research methodology used to describe characteristics or behaviors of a population or phenomenon. It focuses on observing and documenting the existing state of affairs without attempting to manipulate or control variables. Descriptive research is chosen for its ability to elucidate consumer awareness and engagement in waste management practices without manipulating variables, thereby allowing for an in-depth exploration of complex societal phenomena.

2.3 Study Population

The population of the study refers to the entire group or set of individuals, items, or phenomena that the researcher is interested in examining or drawing conclusions about. The study targets customers of superstores in Port Harcourt, encompassing a diverse demographic. A random sampling approach was employed to ensure the representation of various consumer profiles and preferences. In total, 112 customers participated in the study, providing a robust sample size for thorough analysis and meaningful insights. This population was made up of both male and female genders, with ages ranging from 18 years and above, and included married and single respondents of diverse occupations, different levels of education, and frequencies of shopping at superstores

2.4 Study Instrument

Data collection involved a combination of primary and secondary sources. Primary data were gathered through structured questionnaires and interviews administered to the selected sample (Appendix A). The questionnaire, designed with a summative rating scale ranging from 1 to 5 in Likert scale format, facilitated nuanced responses. The Likert scale is a commonly used psychometric scale for gauging attitudes or opinions of respondents in surveys or questionnaires. It typically consists of several statements or items to which respondents indicate their level of agreement or disagreement on a scale, often ranging from "Strongly Disagree" to "Strongly Agree." Section A of the questionnaire collected demographic information, while Section B addressed specific research inquiries. Secondary data sources, including libraries, journals, articles, textbooks, and online databases, contributed to the literature review and contextual understanding of waste management issues. The instruments used in data collection for this study are structured questionnaires. The questionnaire was designed in Likert scale (5 points) format. It was divided into two parts: Section A deals with the personal information about the respondents, while Section B addresses the research questions. The questionnaire was distributed to customers of superstores.

2.5 Data Analysis

The data analysis process involved several steps to extract comprehensive insights. Data was organized into tables and percentages to present key findings clearly. Statistical techniques like Chi-square and correlation analysis were used to test hypotheses and explore relationships between variables. Advanced statistical analyses, including standard deviation and correlation coefficient calculations, were conducted using SPSS version 26. This software facilitated thorough examination of the data, providing deeper understanding of variability and relationships within the dataset. The combination of structured data organization, hypothesis testing, and advanced statistical analyses ensured robust interpretation of results, leading to valuable insights and informed conclusions.

2.6 Validity and Reliability of Instrument

Ensuring the validity and reliability of the research instrument was paramount. To validate the questionnaire, it underwent rigorous evaluation by the institutional ethical committee to ensure it effectively covered the study variables. Additionally, reliability assessment was conducted using Cronbach's alpha, a measure of internal consistency, to confirm the reliability and consistency of the questionnaire responses. These measures contribute to the credibility and trustworthiness of the study findings.

3. Results

This section presents the findings from the comprehensive data analysis conducted to evaluate consumer perceptions and involvement in waste management at Port Harcourt superstores, aimed at advancing Sustainable Development Goals (SDGs). The analysis was meticulously structured to facilitate clear communication of key insights, employing various statistical techniques to ensure reliability. Data were systematically organized into tables and percentages, allowing for straightforward interpretation of the results.

The data obtained was analyzed as follows

Table 1 below describes frequency tables of the distribution of respondents based on gender, age, and marital status. The Gender table indicates that out of the 112 respondents, 58 identified as male (51.8%), and 54 identified as female (48.2%). The percentages represent the proportion of each gender category relative to the total number of respondents. Age table provides information on the distribution of respondents across different age groups. The majority of 67 respondents (59.8%) within the 18-33 age range, followed by 36 respondents within 34-49 (32.1%), 8 respondents within age 50-65 (7.1%), and a single respondent in the 82 and above age category (0.9%). Marital Status table indicates that 33.0% of respondents are married (37 individuals), while 67.0% are single (75 individuals).

Table 1: Frequency distribution table of gender, Age, and marital status

Gender	Frequency	Percentage (%)
Male	58	51.8
Female	54	48.2
Total	112	100.0
Age	Frequency	Percentage
18-33	67	59.8
34-49	36	32.1
50-65	8	7.1
82& above	1	0.9
Total	112	100.0
Marital Status	Frequency	Percentage
Married	37	33.0
Single	75	67.0
Total	112	100.0

Table 2 show frequency and percentage distribution for level of education, occupation and frequency of shopping with total subjects of 112. The Level of Education table shows that the majorities of subjects (98.2%) have tertiary level of education (110 individuals), while only small percentage (1.8%) have secondary level of education (2 individuals). The Occupation table provides information on the occupational distribution of subjects. The majority are employed 61 (54.5%), followed by students 30 (26.8%), self-employed individuals 14 (12.5%), unemployed individuals 6 (5.4%). Retired subject is 1 (0.9%). The Frequency of Shopping table indicates the shopping habits of subjects. The most common frequency is once a week 23 (38.4%), followed by 2-3 times a month 27 (24.1%), once a month 23 (20.5%), and 19 subjects rarely shop (17.0%)

Table 2: Frequency distribution table of level of Education, occupation, and Frequency of shopping

Level of Education	Frequency	Percentage
Tertiary	110	98.2
Secondary	2	1.8
Total	112	100.0
Occupation	Frequency	Percentage

Employed	61	54.5
Unemployed	6	5.4
Self employed	14	12.5
Retired	1	0.9
Students	30	26.8
Total	112	100.0

Frequency of shopping	Frequency	Percentage
Once a week	43	38.4
2-3 times a month	27	24.1
Once a month	23	20.5
Rarely	19	17.0
Total	112	100.0

Table 3 provides insights into the levels of perception among male and female consumers regarding various aspects of sustainable development goals related to waste management. The mean scores indicate patterns and differences in perception across different questions asked. The mean score for item 1 is 2.33±1.39 for males and 2.50±1.53 for females. Males have a higher awareness level than females regarding waste reduction campaigns within the superstores having a positive impact on the environment. Item 2 measures plastic bag packaging reduction within the superstores contributing to sustainable development. Both male and female have mean and standard deviation of 2.03±1.28 and 2.69±1.15 respectively, females have a higher level of perception compared to males. Also, for items 3, 5 and 6 with mean scores (2.31±1.13, 2.80±1.45), (2.14±1.29, 2.24±1.30) and (2.74±1.31, 3.00±1.36) respectively for both male and female indicated that female had a higher level of perception except for item 4 with mean score (2.90±1.25, 2.65±1.22) that shows that the male respondents are believe superstores encouraging donation of excess food lead to the achievement of sustainable development goals more. Additionally, the p-value of the 6 variable responses revealed they were all statistically significant.

Table 3: Consumer Perceptions of Sustainable Development Goals (SDGs) in Relation to Waste Management

S/N	Description	Male $\bar{x}$±SD	Female $\bar{x}$±SD	p-value	Remarks
1	I believe waste reduction campaigns within the superstores have a positive impact on the environment	2.33±1.39	2.50±1.53	0.00	S

2	I think plastic bag packaging reduction within the superstores contributes to sustainable development	2.03±1.28	2.69±1.15	0.001	S
3	I feel recycling stations within the superstore cannot contribute to the achievement of sustainable cities and communities.	2.31±1.13	2.80±1.45	0.000	S
4	I believe superstores encouraging donation of excess food lead to the achievement of sustainable development goals.	2.90±1.25	2.65±1.22	0.000	S
5	I think sustainable consumption and production can be achieved as superstores fail to communicate waste management practices.	2.14±1.29	2.24±1.30	0.000	S
6	I feel superstores supporting environmentally friendly practices improve the living environment	2.74±1.31	3.00±1.36	0.000	S

Key: $\bar{x}$ = Mean; SD = Standard Deviation; S = Significant

Table 4 provides insights into the Consumer involvement in waste management practices. The mean scores indicate patterns and differences in consumer involvement in waste management practices across different questions asked. The mean score for waste reduction campaigns within the superstores having a positive impact on the environment is 2.22±1.37 for males and 2.37±1.39 for females respectively reveals females have a higher participation in waste reduction and recycling practices while shopping. Item 2, 3 and 6 measures separate waste when shopping at superstores, making of conscious choices that align with proper waste disposal while shopping and providing feedback or suggestions to Superstores regarding their waste management, their responses with mean score (2.17±1.40, 1.89.46±1.0), (2.07±1.43, 2.28±1.14) and (2.50±1.43, 2.87±1.35) respectively for both male and female indicated that female had a higher level involvement in waste management practices. Also, item 4 and 5 that measures seeking information and resources related to waste management and advocating for waste reduction at the superstores among friends and family, their responses with mean score (2.34±1.41, 2.02±1.28) and (2.47±1.48, 2.15±1.05) respectively for both male and female indicated that male had a higher level involvement in waste management practices. Additionally, the p-value of the 6 variable responses revealed they were all statistically significant.

Table 4: Consumer involvement in waste management practices

S/N	Description	Male $\bar{x}$±SD	Female $\bar{x}$±SD	P-value	Remarks
1	I participate in waste reduction and recycling practices while shopping	2.22±1.37	2.37±1.39	0.000	S
2	I do not separate waste when shopping at superstores	2.17±1.40	1.89.46±1.0	0.001	S

3	I make conscious choices that align with proper waste disposal while shopping	2.07±1.43	2.28±1.14	0.000	S
4	I seek information and resources related to waste management	2.34±1.41	2.02±1.28	0.000	S
5	I advocate for waste reduction at the superstores among friends and family	2.47±1.48	2.15±1.05	0.000	S
6	I provide feedback or suggestions to Superstores regarding their waste management	2.50±1.43	2.87±1.35	0.000	S

Key: $\bar{x}$ = Mean; SD = Standard Deviation; S = Significant

Table 5. Chi-square table of association between consumer perception of SDGs in waste management and the socio demographic factors

Perception	X^2	Df	p-value	Remarks
Gender	0.143	1	0.71	N/Sig
Level of Education	96.90	3	0.00	Sig
Marital Status	12.89	1	0.00	Sig
Occupation	104.14	1	0.00	Sig
Age	104.69	4	0.00	Sig
Frequency of Shopping	11.86	3	0.008	Sig

Key: $\mathbf{X^2}$= Chisquare; Df = degree of freedom; S = Significant

Table 5 represents the chi-square table of association between perception and social demographics. The chi-square test for gender and awareness yields a chi-square statistic of 0.143 with 1 degree of freedom. The p-value is 0.71 which indicates that there is no statistically significant association between gender and awareness at 0.05 levels. The chi-square test for marital Status and awareness value is 96.90 with 3 degrees of freedom. The p-value is 0.00, representing a significant association between Marital Status and Awareness. The chi-square test for level of education, occupation, age and frequency of shopping with awareness shows a chi-square statistic value of 12.89, 104.14, 104.69 and 11.86 respectively. Also, their degree of freedom is 1, 1, and 4 respectively. Additionally, the p-value for the variable of marital status, occupation and age is 0.00 while frequency of shopping is 3. As such there is statistically significant association between level of education, marital status, occupation, age and frequency of shopping with the consumer perception of sustainable development goals related to waste management.

4. Discussion

The findings of this study underscore significant disparities in perception and consumer engagement regarding Sustainable Development Goals (SDGs) related to waste management among male and female respondents. These disparities reflect ongoing challenges in areas characterized by inadequate waste disposal infrastructure, insufficient human resources, and ineffective enforcement of regulations against indiscriminate waste disposal practices such as

littering, burning, and open dumping (63). Effective waste management goes beyond the provision of infrastructure and operational efficiency; it necessitates stringent enforcement of environmental laws and policies to foster a cleaner and healthier environment. The enforcement of regulations plays a critical role in shaping positive attitudes and behaviors towards solid waste management, complementing efforts by governmental and non-governmental entities alike(64); (65). Moreover, the study reveals substantial consumer involvement in waste generation within retail settings, with significant quantities of waste attributed to various products such as fruits, baked goods, seafood, and packaging materials (66). These findings highlight the economic implications of waste management for superstores, necessitating strategic interventions to optimize resource utilization and minimize environmental impacts. Corporate commitments to reduce single-use plastic packaging underscore the evolving landscape of sustainable business practices (67);(68). However, the diverse interpretations of "reduction" underscore the need for standardized frameworks that prioritize environmental sustainability, whether through reduced packaging, bioplastic alternatives, or increased use of recycled materials (68).

The study's hypothesis regarding the association between consumer perception of Sustainable Development Goals (SDGs) in waste management and socio-demographic factors reveals nuanced insights. While gender may not significantly influence consumer perception, factors such as education level, marital status, occupation, age, and shopping frequency demonstrate considerable influence. These findings underscore the importance of targeted educational campaigns and awareness initiatives to enhance public understanding of environmental issues, particularly concerning plastic waste (69).

Young people possess the potential to be crucial contributors to a sustainable consumption future. However, the transition to more sustainable consumption patterns depends on their acquisition of complex interdisciplinary understandings that enable them to become informed and responsible consumers. Such understanding encompasses recognizing the symbolic value of commodities, gaining insight into the systems and processes that produce and market these commodities and services, and developing an awareness of the impact consumer lifestyles have on the environment and society.

Moreover, education for sustainable consumption necessitates that young people not only acquire knowledge about sustainability in its broadest sense but also cultivate the ability to link this knowledge to their everyday practices and behaviours. This approach will empower them to view their consumption choices as powerful decisions that shape markets and production patterns, allowing them to recognize and understand the implications of their own and others' consumption behaviours on both the natural and social environment. By addressing these educational needs, we can better prepare younger generations to engage actively in sustainable consumption and contribute meaningfully to waste management efforts aligned with SDGs.

In conclusion, the study highlights the imperative for concerted efforts to enhance waste management practices within Port Harcourt's superstores. By addressing the identified disparities in consumer perceptions, promoting sustainable consumption patterns, and advocating for robust regulatory frameworks, stakeholders can contribute to achieving SDG targets and fostering a sustainable future. The integration of these findings into policy and practice is essential for creating resilient and inclusive communities that prioritize SDGs.

5. Conclusion

This study underscores the critical imperative for enhanced waste management practices within Port Harcourt's superstores to effectively advance Sustainable Development Goals (SDGs) related to waste management, particularly SDG 12 (responsible consumption and production) and SDG 11 (sustainable cities and communities). The findings elucidate the significant impact of consumer perceptions and engagement on waste management outcomes, highlighting the pivotal role of informed consumer behaviour in achieving sustainability targets. The prevalence of poor waste management practices poses substantial environmental and health risks, necessitating urgent action from stakeholders, including superstores, to

adopt and promote environmentally sound practices. It is evident that effective waste management requires a multifaceted approach that integrates education, regulatory measures, and technological innovations to optimize resource utilization and minimize environmental degradation. Environmental awareness emerges as a key driver of consumer participation in waste management activities, underscoring the importance of robust educational campaigns and information dissemination strategies. By fostering a deeper understanding of the environmental consequences of plastic packaging waste and promoting sustainable consumption patterns, stakeholders can empower individuals to make informed choices that contribute to waste reduction efforts.

In conclusion, the integration of sustainable waste management practices into urban planning and development is indispensable for creating resilient and sustainable cities capable of supporting the well-being of present and future generations. By aligning with global sustainability frameworks and implementing proactive measures, Port Harcourt's superstores can lead by example in fostering a culture of environmental responsibility and contributing to the broader goal of achieving a sustainable future.

5.1. Recommendations

Based on the findings of this study, it is recommended that Port Harcourt superstores adopt a proactive approach to waste management by implementing several key strategies. First, superstores should develop targeted awareness campaigns aimed at educating consumers about the Sustainable Development Goals (SDGs) related to waste management. This educational effort is essential to help consumers understand their role in reducing waste and the significant impact of their purchasing decisions. According to recent estimates, supermarkets are directly responsible for just 5% of total food waste, but their position means they are indirectly accountable for waste generated elsewhere, such as rejecting produce from suppliers.

Additionally, it is crucial to reevaluate current promotional strategies. Eliminating "Buy One Get One Free" offers can discourage excessive purchasing, while focusing on promotions that encourage consumers to buy only what they need can further reduce waste. Many supermarkets have already made changes to their promotional strategies and developed innovations in packaging and labelling to help consumers waste less. Collaboration with suppliers is vital; by guaranteeing a high percentage of orders, superstores can improve demand forecasting and minimize surplus, thus preventing the burden of waste from shifting back onto producers. For example, some retailers now work with suppliers to ensure that unexpected changes in demand do not lead to rejected produce.

Establishing systems to find secondary markets for unwanted produce is also essential, as it allows superstores to mitigate waste while positively impacting local communities. Furthermore, offering discounts on food items nearing their expiration dates or perceived as suboptimal should be prioritized. However, it is crucial to study consumer behaviour regarding these offers to understand how price-focused purchasing might relate to increased waste at home.

Additionally, strengthening partnerships with charitable organizations to facilitate the donation of surplus food can effectively reduce in-store waste and contribute to poverty relief. Despite the challenges associated with evaluating donations for efficient waste reduction, such initiatives have been reported to successfully decrease waste in stores. Finally, integrating sustainability into supply chain management practices is imperative. Supply chains should be designed to consider economic, environmental, and social impacts, ensuring a holistic approach from local to global perspectives. Given the new emphasis on sustainable supply chain management, employing concepts like green supply chain management (GrSCM) and sustainable supply chain management (SSCM) will further enhance these efforts.

By implementing these recommendations, Port Harcourt superstores can enhance consumer involvement in waste management, support sustainable practices, and contribute meaningfully to the overarching goals of sustainable development.

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