

## Strategies for the Implementation of Environmental Protection Regulations towards Sustainable Waste Management in Oyo State

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### Abstract

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*The pursuit of effective strategies for implementing environmental protection regulations towards sustainable waste management in Oyo State is a critical challenge. The state amidst its burgeoning population and economic activities, grapples with the generation of substantial waste, emphasizing the urgency for robust waste management strategies and the absence of comprehensive and well-executed waste management initiatives in the state poses a serious threat to the ecosystem, public health, and overall environmental sustainability. Therefore the study assessed strategies for the implementation of environmental protection regulations towards sustainable waste management in Oyo State, Nigeria. The study unit was drawn from the Oyo State Ministry of Environment and Natural Resources, Oyo State Waste Management Authority, Mottainai Recycling Limited Ibadan, and the Oyo State Local Government Environmentalist. The population for this study was 369, while the sample size was 191 derived using Krejcie and Morgan (1970) sample size determination formula. An in-depth interview was conducted to complement respondents' opinions. Findings from the study showed that Oyo State has approved the establishment of dumpsites, awareness campaigns and educational programs focused on environmental conservation in the state. The study also revealed that there is implementation of penalties and fines for improper waste disposal. The study recommends that the Oyo State Government should establish a recycling plant to facilitate the conversion of waste into valuable resources and enhance robust public awareness and education campaigns, including the strengthening and enforcement of waste management regulations with stiff penalties for violations, to deter illegal dumping and improper waste disposal.*

**Keywords:** Environmental Conservation; Environmental protection, sustainability, waste management, Oyo State

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### 1. Introduction

In the contemporary global landscape, the intricate balance between human activities and environmental health has become a paramount concern (World Bank, 2020). Rapid urbanization, population growth, and industrialization have led to a

surge in waste generation, posing significant challenges to sustainable development and environmental preservation (UNEP, 2019). As the world grapples with the consequences of inadequate waste management, there is an increasing recognition of the urgent need for comprehensive strategies that integrate environmental protection and sustainable waste management practices (Hoornweg, Bhada-Tata, & Kennedy, 2013). The significance of waste management extends beyond the local scale, resonating globally as nations strive to fulfil their commitments to environmental sustainability and climate action.

Safeguarding the environment involves preventing its degradation, a pressing concern exacerbated by factors like population growth, technological advancement, and excessive consumption. These elements have collectively led to detrimental consequences for the environment, posing risks to both human and wildlife well-being. The pursuit of environmental conservation aims to preserve the planet's biodiversity, fostering a symbiotic relationship between nature and humanity. This collaboration allows nature to continue its vital role in sustaining the well-being of humans, animals, and the earth itself. Recognizing the pivotal role, the environment plays in supporting healthy living and life's existence on earth is essential. An in-depth examination of global environmental protection initiatives since 1970 underscores the active participation of the United States Environmental Protection Agency (EPA) in safeguarding both the environment and public health (United Nations Environment Programme, 2021).

The implications of poor waste management stretch far beyond unsightly landfills; they encompass environmental degradation, ecosystem disruption, and potential threats to human health (UNEP, 2021). The pursuit of effective strategies for implementing environmental protection towards sustainable waste management in Nigeria, specifically within Oyo State, is a critical challenge. Nigeria faces environmental degradation issues due to factors like population growth and rapid industrialization, leading to inadequate waste management practices (World Bank, 2020). Oyo State, amidst its burgeoning population and economic activities, grapples with the generation of substantial waste, emphasizing the urgency for robust waste management strategies (Oyo State Ministry of Environment and Water Resources, 2021). The absence of comprehensive and well-executed waste management initiatives in the state poses a serious threat to the ecosystem, public health, and overall environmental sustainability. A thorough examination of existing environmental protection initiatives, waste management practices, and identification of barriers is essential to address this issue effectively (United

Nations Environment Programme, 2021). This approach aims to develop tailored strategies that consider the unique challenges faced by Oyo State in achieving sustainable waste management and environmental protection goals. Therefore, the main objective of the study is to examine the strategies for the implementation of environmental protection regulations towards sustainable waste management in Oyo State. Based on the objective the following research questions are formulated; What are the strategies for the implementation of environmental protection regulations towards sustainable waste management in Oyo State?

The paper is structured as follows; introduction, literature review, methodology, results and discussions, lastly conclusion and recommendations

## **2. Literature Review**

### **2.1 Conceptual Discourse**

#### **Strategy**

Strategy can be defined as a systematic plan or methodology crafted to achieve particular objectives or goals. It involves making purposeful decisions and allocating resources efficiently to tackle challenges, leverage opportunities, and realize desired results (Thompson, Peteraf, Gamble, & Strickland (2020). Strategies can be developed at different levels, including organizational, business, or individual levels, and may encompass various domains such as marketing, operations, finance, or broader business expansion. A well-executed strategy typically entails thorough analysis, strategic planning, implementation, and ongoing monitoring to adapt to evolving circumstances and optimize outcomes over time. Strategies serve as guiding frameworks to align actions with long-term objectives and increase the likelihood of success (Thompson et al., 2020).

#### **Implementation**

Implementation is the act of translating plans, decisions, or strategies into practical actions or practices (Bryson, 2018). It involves the execution of initiatives, allocation of resources, assignment of responsibilities, establishment of timelines, and monitoring of progress towards achieving set objectives. Successful implementation requires adaptability to changing conditions, overcoming obstacles, and addressing unexpected challenges to ensure the desired outcomes are realized (Bryson, 2018).

#### **Regulation**

Regulation encompasses the rules, statutes, and mandates formulated by governmental or authoritative entities to oversee, manage, or influence diverse facets of society, industry, or conduct. These regulations are crafted to uphold public welfare, safeguard consumer interests, preserve order, foster equitable competition, or attain particular societal objectives. They span various domains such as finance, healthcare, environmental protection, transportation, and labour, among others. Regulatory frameworks typically comprise legislative enactments, administrative guidelines, standards, and enforcement measures to ensure adherence and advance the desired aims (Nolan, 2019).

### **Environmental protection**

Environmental protection is the concerted effort to conserve and safeguard natural resources, ecosystems, and biodiversity for the benefit of current and future generations, ensuring ecological equilibrium. It encompasses strategies aimed at pollution mitigation, waste reduction, energy conservation, and the promotion of sustainable practices to address environmental threats such as climate change, habitat loss, deforestation, and biodiversity decline (UNEP, 20210).

### **Waste management**

Waste management encompasses the organized handling, collection, transportation, processing, recycling, and disposal of waste materials generated by human activities. It entails a range of strategies and practices aimed at minimizing the adverse environmental and health effects of waste, promoting resource efficiency, and decreasing the volume of waste destined for landfills or incineration. Waste management involves activities such as waste segregation, composting, recycling, landfill management, waste-to-energy conversion, and hazardous waste treatment. Its overarching objective is to sustainably manage waste, conserve resources, safeguard public health and the environment, and contribute to the transition towards a circular economy (EPA, 2023).

## **2.2 Theoretical Review**

Theory of Planned Behaviour (TPB) by Icek Ajzen (1985) is a well-suited theory to examine the implementation of environmental protection regulations for sustainable waste management in Oyo State. TPB suggests that people's intentions to perform behaviour are influenced by three key factors:

- i. **Attitude:** The individual's perception of the behavior's favorability. In this case, this would be the resident's or relevant actor's (e.g., waste collector) view on

- how beneficial following the regulations is for the environment and their community.
- ii. Subjective Norm: The perceived social pressure to perform the behaviour. This would be the resident's or actor's perception of how important following the regulations is to their community and how others view compliance.

- iii. Perceived Behavioral Control: The individual's belief in their capability to perform the behaviour. It's the resident's or actor's perception of having the knowledge, resources, and infrastructure to comply with the regulations (e.g., accessible recycling bins, and clear guidelines).

The present study can use TPB to analyze: Residents' attitudes towards waste segregation, composting, and proper disposal methods as outlined in the regulations. The influence of community leaders, religious figures, and environmental groups on residents' behaviour (subjective norm). The effectiveness of government initiatives in providing infrastructure and education to support compliance (perceived behavioural control). By examining these factors, the study can identify areas where regulations need to be better communicated or where additional support is needed to improve waste management practices in Oyo State. By applying TPB and considering these additional aspects, the study provides valuable insights for policymakers in Oyo State to develop effective strategies for implementing environmental protection regulations and achieving sustainable waste management.

### **2.3 Empirical Review**

Okoji, Adeyemi, and Olawuni (2023) evaluated community perceptions regarding waste management practices in the Ilorin metropolis, Kwara State, Nigeria. The improper collection and disposal of municipal wastes have resulted in various environmental challenges, including the obstruction of sewers, and drain networks, and the pollution of water bodies. The results indicated a statistically significant difference in residents' perceptions of waste management practices based on gender. However, there was no statistically significant difference based on marital status, education, and religion. The study recommends public enlightenment campaigns among residents and urban dwellers to promote proper solid waste practices, management, and disposal. However, the study fails to discuss environmental protection policies.

Amin, Raji and Salawu (2023) investigated the effects and obstacles associated with public policy in waste management for environmental security in Kwara State. The findings indicated that public policies on waste management contribute to the efforts of officials to deter fraudulent activities. The study revealed that most respondents expressed that waste management regulations streamline staff operations. Financial constraints and security concerns emerged as significant

challenges hindering the effective implementation of waste management in Kwara State. The paper recommended that the State Ministry of Environment and Forestry increase the deployment of environmental personnel to the State Environmental Protection Agency and allocate more capital to enhance its capabilities. Providing security for environmentalists is crucial for enabling them to carry out their duties effectively. Strengthening environmental laws across the state is advised to enforce sanctions against those violating environmental sanitation practices.

Salawu and Amin (2023) scrutinized Kwara State's environmental protection policies and strategies aimed at establishing sustainable waste management systems, adopting the theory of sustainable development. The findings indicated a notable public awareness regarding the significance of environmental protection and waste management in Kwara. The study unveiled the presence of a single approved dumpsite in the state and highlighted concerning low compliance with environmental and sanitation laws. The study recommended the establishment of recycling and treatment plants by the Kwara State government. Additionally, there was a suggestion to augment the allocated funds for environmental conservation.

Samuel and Olamide (2016) evaluated environmental sanitation and solid waste management in Ibadan North Local Government, Oyo State, Nigeria. The findings revealed that effective management of environmental sanitation and solid waste necessitates collaboration among agencies at the state and local government levels, alongside the involvement of private entities. Furthermore, the research illustrated that residents in Ibadan North local government area exhibited positive attitudes toward certain elements of environmental sanitation, while concurrently expressing negative perceptions regarding particular aspects of solid waste management. It is noteworthy that the scope of the article was confined to Ibadan North local government area.

Lishan, Bo, Tong, Liang, and Ouwen (2023) focused on the promotion and sustenance of public participation in waste separation policies within Shanghai, China. The research disclosed that the implementation of these policies resulted in a 5.3% increase in residents' satisfaction with waste management, accompanied by a notable 6.1% rise in willingness to participate. It emphasized that waste generation can stem from environmentally inefficient resource utilization, with potential adverse consequences, underscoring the imperative to establish and advocate for a close alignment between environmental policies and waste

management. It is noteworthy that the referenced article, although valuable, but neglected to address environmental protection policies, unlike the current research, which specifically explores the strategies of environmental protection policies in the context of waste management in Oyo State, Nigeria.

Armijo, Ojeda and Ramírez (2018) conducted a study centered on characterizing solid waste and assessing the recycling potential within a university campus. The research disclosed that Campus Mexicali I produces one ton of solid waste daily, with more than 65% of this waste being recyclable or possessing the potential for recycling. These findings suggest the practicality of instituting a segregating and recycling program within the university campus. Furthermore, the study highlighted that, considering existing conditions such as the number of recycling companies and their capacities, the local market can absorb all recyclable wastes generated.

Ijaiya and Joseph (2014) explored the reevaluation of environmental law enforcement in Nigeria. The study revealed significant challenges, including limited constitutional provisions for environmental protection, conflicts, and overlapping roles in environmental management, an overly legalistic approach by the courts, and a deficiency in mandatory disclosure of information. The research advocated for the advancement of private and public interest litigation, the introduction of procedures to enhance public participation in Nigerian environmental protection, the establishment of mechanisms to address environmental emergencies, and the creation of dedicated environmental courts.

Fagbohun (2012) provided insights into Nigeria's pursuit of environmental governance through interviews. The study underscored the tangible political, economic, and social costs associated with corruption. Specifically, the research highlighted that environmental damage stemming from practices like bribery, extortion, unfair policies, and other corrupt activities constitutes a significant and expensive consequence. Recognizing the profound impact of corruption on the environment, there is a widely accepted belief that heightened transparency and increased public participation play pivotal roles in enhancing the quality of decisions related to environmental issues. These revelations offer an avenue for intervention, emphasizing the importance of transparency as a powerful tool for promoting conservation, preservation, and environmental justice.



Troschinetz and Mihelcic (2009) delved into the subject of sustainable recycling of municipal solid waste (MSW) within developing countries. The study unveiled that the average rate of MSW generation was 0.77 kg/person/day, with recovery rates spanning from 5% to 40%. The findings highlighted a significant correlation between stakeholder involvement and the three dimensions of sustainability—environment, society, and economy. The factors driven by all three dimensions, such as waste collection and segregation, the MSWM plan, and the local recycled-material market were particularly emphasized, indicating the need for high levels of collaboration with other factors.

Donnini, Rodrigues, Saide, and de Mattos (2007) conducted a study centred on the recycling potential of urban solid waste designated for sanitary landfills in Brazil. The research uncovered that approximately 90% of the waste held the potential for recycling, while only 10% required landfilling. A socioeconomic analysis of waste generation indicated that low-income neighbourhoods tended to dispose of relatively less packaging and more food waste, shoes, and construction debris compared to middle and high-income areas, potentially linked to lower purchasing power and education levels. The study also observed that more aluminium and uncoloured polythene terephthalate were discarded during warmer months, likely due to increased consumption of canned and bottled beverages.

### **3. Methodology**

The study unit of the population of this study was drawn from the Oyo State Ministry of Environment and Natural Resources, Oyo State Waste Management Authority, Mottainai Recycling Limited Ibadan, Oyo State Local Government Environmentalist. According to Krejcie and Morgan's (1970) sample size determination table, in a population of three hundred and eighty (360-379), the appropriate sample size is one hundred and one (191) respondents. The population for this study was 369, while the sample size was 191. Out of the 191 questionnaires, one hundred and eighty-eight (188) were retrieved and analyzed, using the Statistical Package for the Social Sciences (SPSS) version 21. Data were analyzed, using a 5-point Likert scale with “1 = Strongly Disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, and 5 = Strongly Agreed”. An interview was also conducted to complement respondents' opinions. The key informant interview was conducted among the staff of the Oyo State Ministry of Environment and Natural Resources, staff of Oyo State Waste Management Authority, MD/ CEO Mottainai Recycling Limited Ibadan, the Oyo State Environmentalist and residents.

#### 4. Data Presentation and Analysis

**Table 1: Strategies for the implementation of environmental protection policy in Oyo State**

S/ N	STATEMENT S	SD	D	U	A	SA	Total	Aggregat e Response
1	Oyo state is implementing initiatives such as awareness campaigns and educational programs focused on environmental conservation.	5 (2.7%)	8 (4.3%)	7 (3.7%)	<b>101</b> <b>(53.7%)</b>	67 (35.6%)	188 (100%)	Agreed
2	The state has approved the establishment of dumpsite.	2 (1.1)	4 (2.1%)	2 (1.1%)	68 (36.2%)	<b>112</b> <b>(59.6%)</b>	188 (100%)	Strongly Agreed
3	The state government and NGOs are collaborating on joint initiatives.	1 (.5%)	10 (5.3%)	13 (6.9%)	<b>100</b> <b>(53.2%)</b>	64 (34%)	188 (100%)	Agreed
4	There is implementation of penalties and fines for improper waste disposal.	4 (2.1)	10 (5.3%)	1 (.5%)	50 (26.6%)	<b>123</b> <b>(65.4%)</b>	188 (100%)	Strongly Agreed
5	There is an establishment of recycling programs and waste separation initiatives.	13 (6.9%)	15 (8%)	16 (8.5%)	<b>112</b> <b>(59.6%)</b>	32 (17%)	188 (100%)	Agreed
6	Engaging local communities and stakeholders in the decision-	7 (3.7%)	23 (12.2%)	7 (3.7%)	<b>125</b> <b>(66.5%)</b>	26 (13.8%)	188 (100%)	Agreed

	making processes.							
7	Introduction of waste-to-energy technologies including Anaerobic Digestion, Incineration, etc.	20 (10.6%)	41 (21.8%)	9 (4.8%)	<b>90</b> <b>(47.9%)</b>	28 (14.9%)	188 (100%)	Agreed
8	Enforcement of source-based waste segregation such as Household, Commercial and Industrial.	23 (12.2%)	25 (13.3%)	8 (4.3%)	<b>68</b> <b>(36.2%)</b>	64 (34%)	188 (100%)	Agreed
9	Encouragement and promotion of the reduce, reuse, recycle (3Rs) approach	49 (26.1%)	23 (12.2%)	12 (6.4%)	<b>74</b> <b>(39.4%)</b>	30 (16%)	188 (100%)	Agreed
10	The state employs information and communication technology (ICT) to create a database on construction waste.	1 (.5%)	24 (12.8%)	1 (.5%)	<b>141</b> <b>(75%)</b>	21 (11.2%)	188 (100%)	Agreed

**Source:** Researcher's Field Survey, 2023

On whether or not Oyo State is implementing initiatives such as awareness campaigns and educational programs focused on environmental conservation, data from the table show that  $53.7\% + 35.6\% = 89.3\%$  agreed that Oyo State is implementing initiatives such as awareness campaigns and educational programs focused on environmental conservation. The finding aligns with the input from 2 respondents at the Oyo State Waste Management Authority. According to them, in addressing market sanitation issues, meetings are organized with key figures such

as the market, the Babaloja, Iya loja, and various stakeholders. During these meetings, the purpose is clearly communicated – emphasizing the urgent need for improved cleanliness in the market. The authority's express concerns about the market's current state and stress the importance of implementing measures such as registering with a waste consultant. Although, waste consultants are assigned to them, compliance has been an issue, leading to efforts in convincing and engaging with the Babaloja and Iya loja. However, the authorities express a sense of urgency, emphasizing that certain commodities in the market cannot be properly cleaned or cooked if hygiene measures are not enforced. Respondent 2 from the Oyo State Waste Management Authority further details a strategy introduced by the state government – the use of jingles. These jingles play a vital role in creating awareness among the public about the significance and risks associated with improper waste disposal. Notable examples include; the Baba Sabiko jingle and *Imo Toto* on BCS TV, which have significantly expanded the reach of the awareness campaign. Additionally, the authority conducts house-to-house campaigns and collaborates with the environmental tax force for security reasons. Market sanitation initiatives are implemented every Thursday, involving meetings with the Babaloja, Iya loja, and other stakeholders. Residents are encouraged to register with the waste consultant (Mottainai) to facilitate the efficient removal of their waste twice a month.

Equally, respondent 3 from Mottainai Recycling Limited Ibadan says that: The Oyo State Government conducts radio advocacy and awareness campaigns facilitated by Iya and Babaloja Bodija. Additionally, there is active community engagement involving meetings with community leaders and landlord associations. During these engagements, discussions center on promoting cleanliness and safety in the environment. Positive outcomes are observed, particularly within the Hausa community at Sabo and Ojo, where effective sensitization efforts have taken place. Furthermore, awareness initiatives extend to Okada and Micra riders, as well as transporters, with the reception of the ideas being well-received.

This discovery aligns with Mu's (2020) assertion that environmental awareness and education serve as effective tools in mitigating environmental issues and fostering public engagement in environmental governance. This correlation is also consistent with the findings of Bjorkland and Pringle (2001), who emphasize that environmentally aware and empowered youths can be pivotal agents of change for the enduring protection and stewardship of the environment. Furthermore, the result echoes the conclusions drawn by Simmons and Martin (2002), indicating that

environmental education plays a role in enhancing residents' awareness of green consumption and encouraging enterprises to adopt green production practices. In a prior investigation conducted by Jazat, Akande, and Ogunbode (2023), it was asserted that environmental education plays a pivotal role in fostering responsible behavior by equipping individuals with the essential knowledge, attitudes, values, commitments, and skills necessary for effective problem-solving. The beneficiaries of environmental education not only develop a caring attitude, but also exhibit curiosity and concern for the environment, reflecting in their acquired skills, attitudes and behavior.

On whether the state has approved the establishment of the dumpsite, observations from the table also show that  $59.6\% + 36.2\% = 95.8\%$  of the respondents strongly agreed that the state has approved the establishment of the dumpsite. The finding is similar to respondent 1 from the Oyo State Ministry of Environment and Natural Resources who says that: In our beloved state, there are currently four approved dumpsites strategically located in key local governments across Oyo state. These include the Awotan dumpsite in Ido local government area, the Lapite dumpsite in Akinyele local government area, the Ajankanga dumpsite in Oluyole Local government area, and the Abacku dumpsite in Onaara local government area. Among these, the Awotan dumpsite is considered the most optimal in Oyo state. This finding is consistent with the perspective of respondent 3 from Mottainai Recycling Limited Ibadan, who emphasizes that while the Oyo State Government has approved four dumpsites, there is a pressing need for additional sites to enhance effective waste management practices. Similarly, respondent 5 from Oyo State Local Government Environmentalist concurs, stating that all four approved dumpsites, particularly the Awotan dumpsite are nearing full capacity. The respondent suggests that the Oyo State Government should introduce landfills to create more space and provide an opportunity to convert waste into wealth.

The discovery aligns with the observations made by Yusuf, Adewoye, and Sawyer (2022), who noted the existence of an officially approved dumpsite in Kwara State, encompassing the Ilorin metropolis. However, they emphasized the need for improved management of this dumpsite to ensure safe and responsible waste disposal practices. In a study conducted by Udoh and Inyang (2016) waste collection challenges were reported in the study area, including issues such as a singular dumpsite causing routing problems, the use of a single type of waste receptacle for all waste categories, inadequate consideration of bin sizes for overpopulated areas resulting in open receptacles, and waste overflow creating

breeding grounds for rodents, fleas, and vermin. This finding resonates with a prior investigation by Temitope (2017), revealing that Oyo State has four approved dumpsites. The Ajakanga dumpsite, established in 1996 and located at Old Ijebu Road in Oluyole Local Government Area, Ibadan, is an open dumpsite spanning 10.034 hectares, operated by the Oyo State government. Another dumpsite, Lapite, established in 1996 at Moniya, Oyo Road in Akinyele Local Government Area, is still operational and classified as a built-up urban settlement. The Aba-Eku dumpsite, established in 1985 and situated at Olunloyo, Akanrakan Road in Ona-Ara Local Government Area, and the Awotan dumpsite, established in 1987 and located at Apete, Akufo Road in Ido Local Government Area, contribute to the waste disposal infrastructure in Oyo State.

On whether the state government and NGOs are collaborating on joint initiatives, the table reveals that  $53.2\% + 34\% = 87.2\%$  of the respondents agreed that the state government and NGOs are collaborating on joint initiatives. The result is in line with Hushie (2016) and Dholakia (2013), acknowledging the positive impact of NGO-government collaboration on environmental and health improvements. This collaboration has notably contributed to the development of programs aimed at controlling and preventing various diseases, including cholera, communicable diseases, malaria, and tuberculosis across diverse communities. W.H.O (2001) concurred, recognizing the inevitability of NGO collaboration with the public sector in healthcare provision activities, especially for impoverished individuals, specific vulnerable groups, suburban populations, disabled individuals, and the elderly. Ejaz, Shaikh, and Rizvi (2011) assert that NGOs possess heightened capacities to identify societal issues and priorities compared to governments. NGOs establish more effective communication channels with communities to discern their needs and priorities, and solutions proposed by NGOs are readily accepted by society members.

On whether there is implementation of penalties and fines for improper waste disposal, the table reveals that  $65.4\% + 26.6\% = 92\%$  of the respondents strongly agreed that there is implementation of penalties and fines for improper waste disposal. The result is similar to respondent 1 from Oyo State Ministry of Environment and Natural Resources that: The Oyo state established an environmental tax force. The officers are stationed in strategic places to monitor those who are dumping waste illegally because some people are dumping their waste on road media. The violator is charged to court and pays a fine according to the judgment. The violator can be taken to prison if he/she fails to settle the fine.

In addendum, respondent 3 from Mottainai Recycling Limited Ibadan, Oyo State Ministry of Environment and Natural Resources states that: Environmental officers are tasked with removing and apprehending polluters who resist compliance, dealing with violators by taking legal action, including court proceedings. Offenders below the age of eighteen face community service penalties such as cleaning streets, while those eighteen and older undergo legal judgment and fines, with specific penalties for flat tipper offenses that spread waste. The environmental task force, along with health officers, starts their duties before 7:00 a.m. To enhance their effectiveness, the public is provided with contact numbers of officials for reporting environmental issues promptly. Despite these efforts, public commitment to environmental protection and waste management in Oyo (Ibadan) is inadequate, with the city having earned a reputation as "the dirty city" in areas like Eleyele and Challenge. Miranda (2013) notes that the National Environmental Standards and Regulations Enforcement Agency (NESREA) in Nigeria is responsible for enforcing environmental standards and regulations, conducting research for environmental protection, and educating the public on proper waste disposal methods. Hakeem and Joseph (2014) emphasize that the Harmful Waste Act prohibits the illegal disposal of harmful wastes, with offenders facing severe penalties, including life imprisonment and asset forfeiture.

However, Ijaiya and Joseph (2014) argue that existing punishments for noncompliance are inadequate, and injured parties are not adequately compensated. Some environmental offenses are administratively punished rather than through corrective or criminal measures. The enforcement of environmental laws in Nigeria faces challenges, including a lack of modern technology, according to Fagbohun (2012).

On whether there is an establishment of recycling programs and waste separation initiatives, the table also reveals that  $59.6\% + 17\% = 76.6\%$  of the respondents agreed that there is an establishment of recycling programs and waste separation initiatives. The finding is in line with respondent 3 from Mottainai Recycling Limited Ibadan states that: The Oyo state government has initiated various recycling programs and waste separation initiatives, although the state currently lacks a recycling plant. Despite this, the awareness around turning waste into a valuable resource has grown significantly, becoming a means of survival for many residents. Previously, the prevalent practice involved the activities of Hausa scavengers, commonly known as Bola or Aluminium. These scavengers, permitted to operate, contribute to waste reduction, particularly items like Ankara (lasting 200

years), cloth (lasting 500 years without rust), and nylon, thereby lessening the load on dump sites. While organic waste typically goes to the dump site, the government encourages waste sorting at the source, as a 240-liter waste bin equates to a drum.

However, the absence of a functional recycling or treatment plant in the state remains a challenge. This observation aligns with Jenny and Tim's (2021) acknowledgment that commendable initiatives aimed at mitigating environmental damage, such as recycling plastic packaging into clothing or repurposing unused bread into beer, have gained popularity. Additionally, Pradipta and Harminder's (2018) previous study underscores the priority placed on recycling urban waste for sustainable environmental management in both developed and developing countries. Jacob, Kris, and Mengiseny (2021) further support the importance of waste segregation in the waste management chain, facilitating effective Reuse, Recycling, and Recovery (RRR).

On whether there is engaging local communities and stakeholders in the decision-making processes, the table also reveals that  $66.5\% + 13.8\% = 80.3\%$  of the respondents agreed that there is Engaging local communities and stakeholders in the decision-making processes. The finding is in line with respondent 3 from Mottainai Recycling Limited Ibadan states that: Inclusive stakeholder consultation serves as the linchpin for addressing environmental protection and waste management, fostering a sense of belonging among stakeholders. This approach aligns with the findings of Mekonnen, Amanuel, and Terje (2022), who emphasize that the success of projects, especially those involving environmental decision-making, hinges on the active participation of stakeholders across all levels. The involvement of stakeholders is paramount for ensuring sustainability and environmental security. Richardson and Razzaque (2006) note that stakeholder participation in environmental decision-making enable citizens to exercise their democratic rights through the collective engagement of ordinary people, the media, environmentalists, academics, and scientists. Borghi, Macha, Kamuzora, and Mtei (2020) contended that involving stakeholders across the policy development cycle—encompassing problem identification, agenda setting, policy formulation, adoption, implementation, and evaluation—is crucial. This engagement is essential for understanding the diverse needs of various groups and communities, including civil society organizations and donors with differing priorities. It contributes to promoting equity in policy outcomes. Lavee and Sagie (2007) argue that involving various parties can lead to innovative strategies, including recycling initiatives and circular economy models.



On whether there is the introduction of waste-to-energy technologies, the table also reveals that  $47.9\% + 14.9\% = 62.8\%$  of the respondents also agreed that there is the introduction of waste-to-energy technologies including Anaerobic Digestion, Incineration, etc. The finding is similar to Moshood, Olawale, and Temitope (2022) emphasized that the adoption of a waste-to-energy system holds the potential to mitigate the adverse environmental impact resulting from waste generation. Additionally, it enables the production of renewable and sustainable energy, aligning with the principles of a circular economy. Evangelisti, Lettieri, Borello, and Clif (2017) highlighted the significance of integrating waste-to-energy (WtE) technologies into the energy/waste management system to ensure sustainable waste management and enhance the diversity of the energy generation mix. The utilization of municipal solid waste (MSW) for producing value-added products and energy carriers, such as biogas, syngas, hydrogen gas, and bio-oil, positions it as a promising renewable energy resource. UNEP (2019) reported that a significant portion of waste, ranging from 30% to 90%, is disposed of in landfills or dumpsites in Africa. Notably, plastic waste can be transformed into oil, and wood or woody biomass can yield syngas and char, as indicated by Chen et al. (2014).

On whether there is enforcement of source-based waste segregation such as Household, Commercial and Industrial, data from the table also show that  $36.2\% + 34\% = 70.2\%$  of the respondents also agreed that there is Enforcement of source-based waste segregation such as Household, Commercial and Industrial. The result is in line with respondent 3 from Mottainai Recycling Limited Ibadan, which states that: The Oyo state government actively promotes waste sorting at the source, encouraging residents to segregate their waste for subsequent conversion into valuable resources. Initiatives for waste separation are implemented, allowing waste collectors and scavengers to operate and facilitate the segregation of waste into distinct categories, promoting reduction, reuse, and recycling. This approach aligns with the findings of Maletz, Dornack, and Ziyang (2018), who highlight waste segregation as a crucial step in the transition toward a circular economy. Troschinetz and Mihelcic (2009) emphasize the dependency of sustainable recycling programs, among other factors, on effective waste segregation. Johnson *et al.* (2013) affirm that waste segregation substantially contributes to effective waste management. Stoeva and Alriksson (2017) suggest that waste segregation's impact on hospital waste management can enhance energy recovery from waste and improve the recycling process.

On whether there is encouragement and promotion of the reduce, reuse, recycle (3Rs) approach, the table reveals that  $39.4\% + 16\% = 55.4\%$  of the respondents also agreed that there is encouragement and promotion of the reduce, reuse, recycle (3Rs) approach. The result is similar to respondent 3 from Mottainai Recycling Limited Ibadan, which states that: Registered scavengers are permitted to operate at the dumpsite daily from 8:00 am to 5:00 pm, contributing significantly to waste reduction. Their activities specifically target items such as cloth (Ankara), which can endure for up to 200 years, and nylon, with a lifespan of 500 years without decay. By engaging in these activities, scavengers play a crucial role in minimizing the volume of waste directed to the dumpsite. Organic waste, on the other hand, typically finds its way to the dumpsite. As an illustration, a standard waste bin has a capacity of 240 liters. To further encourage responsible waste management, the government advocates for waste sorting at the source, emphasizing the potential financial benefits of such practices. According to Armijo De Vega et al. (2008) and Donnini Mancini et al. (2007), well-planned and managed waste reuse, recycling, and recovery (RRR) initiatives can reduce the volume of waste for disposal by up to 65% of the total generated.

On whether the state employs information and communication technology (ICT) to create a database on construction waste, the table reveals that  $75\% + 11.2\% = 86.7\%$  of the respondents also agreed that the state employs information and communication technology (ICT) to create a database on construction waste. The outcome aligns with the input provided by respondent 3 from Mottainai Recycling Limited Ibadan, highlighting that the Oyo state government has integrated technology, specifically Information and Communication Technology (ICT), to compile databases for waste construction and monitoring purposes. The actions of waste collectors are closely monitored using tracking systems, and Closed-Circuit Television (CCT) cameras are strategically installed to oversee both waste collectors and individuals contributing to pollution.

## **5. Conclusion and Recommendations**

The study investigated the environmental protection policies governing sustainable waste management systems in Oyo state. It found that the Oyo State government treats environmental protection and waste management seriously, addressing them through public awareness campaigns and strict law enforcement against violators. However, the study noted that some members of the public exhibit resistance to compliance. In the present era, global practices demonstrate the conversion of waste

into wealth. Therefore, the Oyo State government has the opportunity to align itself with global standards, utilizing daily waste generation as a means to enhance the economic development of the state. The study recommends further that:

1. Oyo state government should establish recycling plant to facilitate the conversion of waste into valuable resources. Recycling initiatives are essential for a circular economy. Incentives for the establishment of recycling facilities, collaboration with existing businesses, and promoting the use of recycled materials in local industries will drive sustainable practices.
2. The government should invest more in cutting-edge technologies to bolster environmental protection and foster sustainable waste management practices. Investing in modern waste collection vehicles and strategically locating waste collection centres across the state will improve accessibility for residents. A robust public awareness and education campaign should be enhanced.
3. The Oyo state government should intensify on legislation and enforcement of sanitary laws. Strengthening and enforcing waste management laws, along with penalties for violations, will deter illegal dumping and improper waste disposal. Allocating funds for innovation in waste management technologies, fostering partnerships between research institutions and private enterprises, and regularly updating strategies based on emerging technologies will ensure continued progress.

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