

**ASSESSING THE ECONOMIC POTENTIAL OF HOUSEHOLD ORGANIC WASTE  
MANAGEMENT AND IT'S ARCHITECTURAL IMPLICATIONS FOR SUSTAINABLE  
ENVIRONMENTAL DESIGN IN EKOSODIN, BENIN CITY**

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**JANUARY, 2026**

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**A RESEARCH DISSERTATION SUBMITTED TO THE  
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**JANUARY, 2026**

## DECLARATION

I, ADONRI GLORIA NEKPEN, hereby declare that this project work titled "**ASSESSING THE ECONOMIC POTENTIAL OF HOUSEHOLD ORGANIC WASTE MANAGEMENT AND IT'S ARCHITECTURAL IMPLICATIONS FOR SUSTAINABLE ENVIRONMENTAL DESIGN IN EKOSODIN, BENIN CITY**" is a record of an original work done by me, as a result of my research effort carried out in the Department of Architecture, Faculty of Environmental Sciences, University of Benin, under the supervision of **ARC. (MRS) G.E.O IFADA**. All academic material used in this work and its sources has been duly acknowledged.

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ADONRI GLORIA NEKPEN

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Date

## **CERTIFICATION**

This is to certify that this study titled **ASSESSING THE ECONOMIC POTENTIAL OF HOUSEHOLD ORGANIC WASTE MANAGEMENT AND IT'S ARCHITECTURAL IMPLICATIONS FOR SUSTAINABLE ENVIRONMENTAL DESIGN IN EKOSODIN, BENIN CITY** was carried out by **ADONRI GLORIA NEKPEN**, with Matric Number **ENV2002712** under my supervision and meets the regulation governing the award of the Bachelor degree in Architecture of the University of Benin, Benin City, Edo State, Nigeria. We certify that it has not been submitted for the Bachelor's degree in this or any other university and is approved for its contribution to knowledge and literary presentation.

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**ARC. (MRS) G.E.O. IFADA**  
**Project Supervisor**

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**DR. (ARC.) OKAFOR IWU**  
**Head of Department**

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**Date**

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**Date**

## **DEDICATION**

This project is dedicated to the Almighty God, the one who has seen me through this academic journey right from the beginning.

Also, I dedicate this project with great love and affection to my parents, friends, and loved ones who have been of great support to me.

## **ACKNOWLEDGEMENTS**

I would like to express my deepest gratitude to God Almighty who led me down this path and enabled me to finish strong.

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## ABSTRACT

This study examines the economic potential of household organic waste management and its architectural implications for sustainable environmental design in Ekosodin Community, Benin City. Household organic waste, including food leftovers, vegetable and fruit peels, and garden waste, constitutes a significant portion of municipal solid waste, yet its economic and environmental value remains largely untapped. The research adopted a mixed-method approach, employing structured questionnaires administered to 100 households, key informant interviews with architects and waste management officials, and field observations. Data were analyzed using descriptive statistics, including frequency distributions and percentages, and interpreted in relation to sustainable design principles. Findings reveal that open dumping and burning are the predominant disposal methods, while composting and waste segregation are minimally practiced. Most households lack designated spaces for organic waste storage and management, indicating a critical gap in residential architectural design that could facilitate sustainable waste handling. Awareness of the economic potential of organic waste was generally low, limiting participation in composting, urban agriculture, and biogas production initiatives. The study concludes that integrating waste-responsive design features into residential architecture, coupled with public awareness campaigns, infrastructural support, and policy enforcement, can transform household organic waste into valuable resources while promoting environmental sustainability. Recommendations include incorporating designated waste management spaces in building designs, establishing community composting centers, and implementing economic incentives for organic waste valorization. This research contributes to the understanding of the intersection between household waste management, architecture, and sustainable environmental design in Nigerian urban.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 BACKGROUND OF THE STUDY

Rapid urbanization and population growth across developing countries have significantly increased the volume of municipal solid waste generated daily, with household organic waste forming the largest proportion of this stream (World Bank, 2018; Hoornweg & Bhada-Tata, 2012). Organic waste, which includes food remnants, vegetable peels, garden trimmings, and other biodegradable materials, constitutes over 50% of household waste in many African cities (UNEP, 2019; Wilson *et al.*, 2015). When improperly managed, this waste contributes to environmental degradation, greenhouse gas emissions, and public health challenges, particularly in densely populated urban communities.

In Nigeria, the challenge of managing household organic waste has become increasingly severe due to inadequate waste management infrastructure, weak policy enforcement, and limited public participation in sustainable waste practices (Ogwueleka, 2009; Adewole, 2009). Studies have shown that most Nigerian households dispose of organic waste through open dumping, roadside disposal, or burning, all of which have detrimental effects on air quality, soil fertility, and water bodies (Afon, 2012; Nabegu, 2010). These practices are especially prevalent in peri-urban communities where municipal services are overstretched.

Benin City, the capital of Edo State, reflects many of these national challenges. As a growing urban center with expanding residential districts, the city generates substantial quantities of organic waste daily, much of which is not systematically collected or processed (Edo State Ministry of Environment, 2020; Aibieyi & Dirisu, 2021). Ekosodin, a residential community within Ovia North-East Local Government Area, typifies this condition, where household waste generation has increased alongside population growth driven by student housing, commercial activities, and residential expansion (Oviasuyi *et al.*, 2018; Aigbavboa & Thwala, 2014).

Beyond its environmental burden, household organic waste possesses significant economic potential when managed through sustainable systems such as composting, biogas production, and urban agriculture support (Zurbrügg *et al.*, 2012; Lohri *et al.*, 2017). Organic waste can be transformed into compost for soil improvement, renewable energy through anaerobic digestion, and income-generating activities for local residents (UNEP, 2019; World Bank,

2018). These opportunities align with circular economy principles, which advocate for waste reduction, reuse, and resource recovery (Geissdoerfer *et al.*, 2017).

From an architectural and environmental design perspective, sustainable waste management is increasingly recognized as a critical component of environmentally responsive built environments (Kibert, 2016; Yeang, 2008). Architectural design can play a transformative role by integrating waste management systems into residential layouts, community spaces, and urban infrastructure, thereby reducing environmental impact while enhancing social and economic sustainability (Vale & Vale, 2013; Edwards, 2014). In communities like Ekosodin, architectural interventions can facilitate decentralized composting centers, waste-responsive landscaping, and spatial planning strategies that encourage waste segregation and reuse.

This study therefore situates itself at the intersection of economic development, environmental sustainability, and architectural design, assessing how household organic waste in Ekosodin can be repositioned from a liability into a resource. By examining the economic potential of organic waste and its architectural implications, the research contributes to sustainable environmental design strategies that are contextually appropriate for Benin City and similar urban communities in Nigeria.

## 1.2 DEFINITION OF TERMS

For conceptual clarity and consistency, key terms used in this study are defined as follows:

1. **Household Organic Waste** refers to biodegradable waste materials generated from domestic activities, including food waste, kitchen scraps, fruit and vegetable remains, and garden trimmings (UNEP, 2019; Wilson *et al.*, 2015). These materials decompose naturally and can be converted into useful by-products such as compost or biogas.
2. **Waste Management** is defined as the systematic process of waste generation control, collection, storage, transportation, processing, recycling, and final disposal in a manner that minimizes environmental and health risks (Tchobanoglous & Kreith, 2002; Ogwueleka, 2009).
3. **Economic Potential** denotes the capacity of household organic waste to generate financial value, employment opportunities, or cost savings through recycling, composting, energy recovery, and related activities (World Bank, 2018; Lohri *et al.*, 2017).

4. **Sustainable Environmental Design** refers to an architectural and planning approach that minimizes negative environmental impacts while promoting efficient use of resources, ecological balance, and long-term environmental quality within the built environment (Kibert, 2016; Edwards, 2014).
5. **Architectural Implications** describe the influence of waste management strategies on spatial organization, building design, community infrastructure, and environmental aesthetics within residential and urban settings (Vale & Vale, 2013; Yeang, 2008).

### 1.3 STATEMENT OF THE PROBLEM

Despite the high proportion of organic waste generated by households in Ekosodin, the community lacks effective systems for waste segregation, collection, and resource recovery (Aibieyi & Dirisu, 2021; Oviasuyi *et al.*, 2018). Organic waste is commonly mixed with non-biodegradable materials and disposed of through open dumping or burning, practices that contribute to environmental pollution and pose serious health risks to residents (Afon, 2012; Nabegu, 2010). The absence of structured organic waste management results in the loss of significant economic opportunities. Compostable waste that could support urban agriculture or landscaping is discarded, while potential energy generation through biogas remains untapped (Zurbrügg *et al.*, 2012; Lohri *et al.*, 2017). This inefficiency perpetuates poverty, increases municipal waste management costs, and exacerbates environmental degradation within the community. From an architectural standpoint, residential layouts and community planning in Ekosodin do not adequately accommodate sustainable waste management systems. Most buildings lack designated spaces for waste segregation or composting, and community infrastructure does not support decentralized waste processing (Kibert, 2016; Yeang, 2008). This disconnect between architectural design and environmental sustainability undermines efforts to promote responsible waste practices at the household level.

The core problem addressed by this study is therefore the underutilization of household organic waste as an economic and environmental resource, compounded by the lack of architectural frameworks that support sustainable waste management in Ekosodin, Benin City.

### 1.4 RESEARCH QUESTIONS

This study is guided by the following research questions:

1. What are the prevailing household organic waste generation and management practices in Ekosodin, Benin City?
2. What economic opportunities can be derived from effective household organic waste management in the study area?
3. How can architectural design principles support sustainable organic waste management in Ekosodin?
4. What challenges hinder the integration of organic waste management into sustainable environmental design within the community?

These questions provide a structured basis for examining environmental, economic, and architectural dimensions of the study.

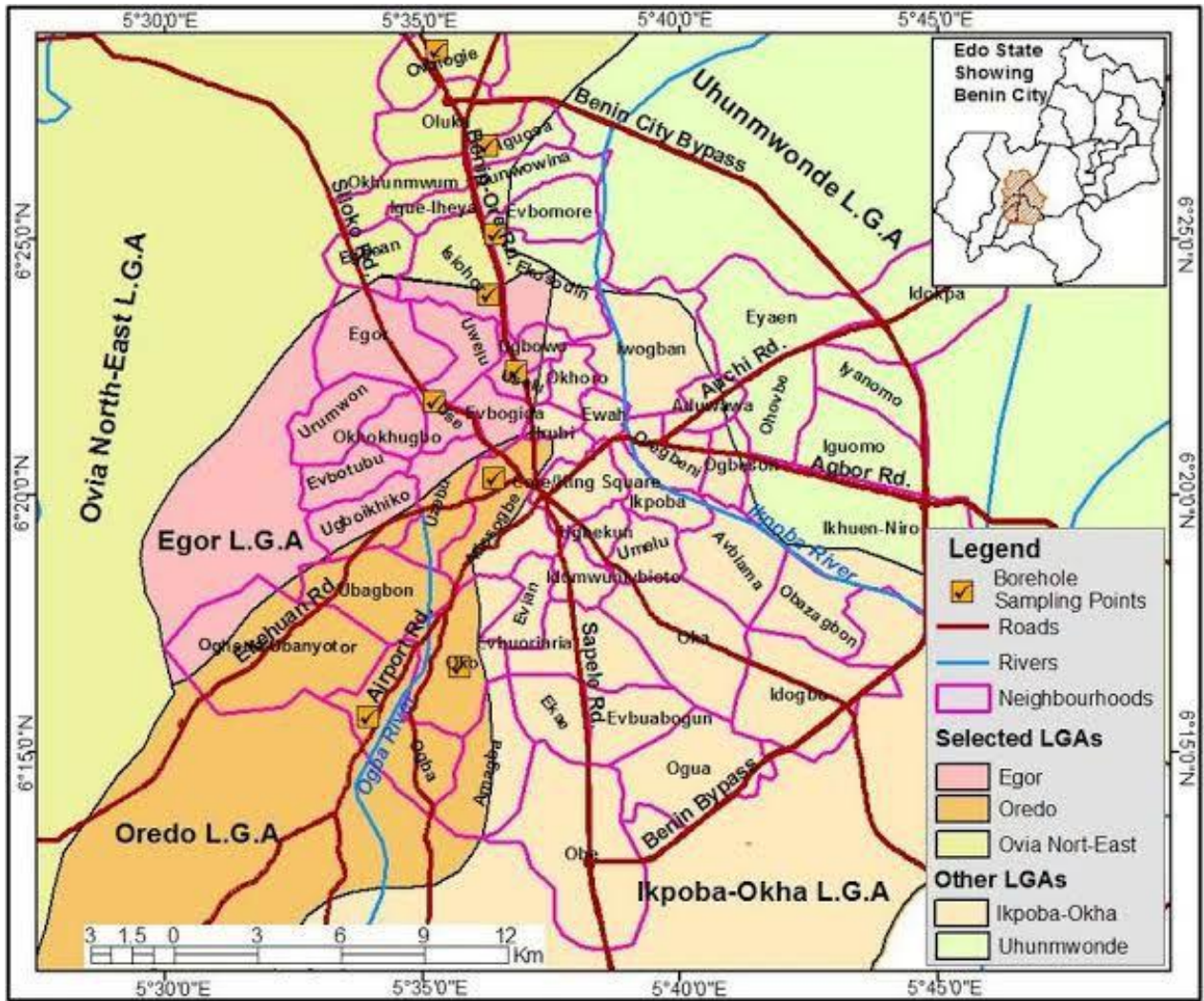
### **1.5 AIM AND OBJECTIVES OF THE STUDY**

The aim of this study is to assess the economic potential of household organic waste management and examine its architectural implications for sustainable environmental design in Ekosodin, Benin City. The specific objectives are to:

1. examine the nature and volume of household organic waste generated in Ekosodin.
2. assess existing methods of organic waste management and associated challenges.
3. evaluate the economic potential of household organic waste through composting, recycling, and resource recovery.
4. explore architectural strategies that support sustainable organic waste management at household and community levels.
5. propose environmentally responsive design recommendations for Ekosodin based on study findings.

### **1.6 STUDY AREA**

Ekosodin is located in Ovia North-East Local Government Area of Benin City, Edo State, Nigeria. The community is predominantly residential and characterized by mixed housing types, including student accommodation due to its proximity to tertiary institutions (Oviasuyi *et al.*, 2018; Aigbavboa & Thwala, 2014). Rapid population growth and limited waste infrastructure make Ekosodin a suitable case study for examining household organic waste management challenges.



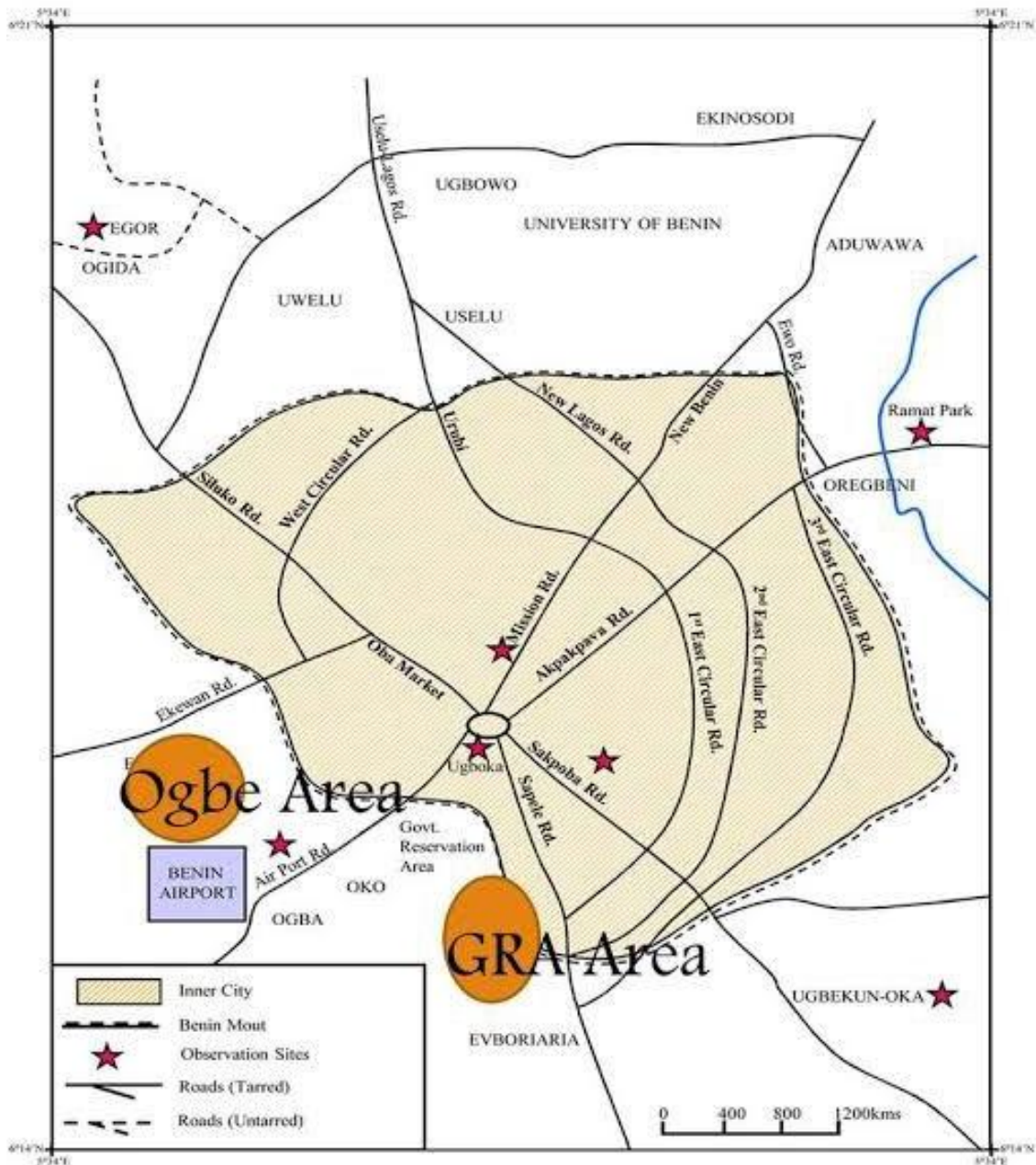
**Figure 1.1a:** Map of Benin City.  
Source: Wikipedia.

## 1.7 SCOPE OF THE STUDY

The study focuses on household organic waste generated within Ekosodin Community, Benin City. It examines waste generation patterns, management practices, economic opportunities, and architectural implications related to sustainable environmental design. While other waste categories are acknowledged, the primary emphasis remains on organic waste due to its environmental and economic relevance.

## 1.8 SIGNIFICANCE OF THE STUDY

This study is significant as it contributes to sustainable development discourse by emphasizing the economic value of household organic waste in urban communities (World Bank, 2018; UNEP, 2019). It provides empirical insights that can inform waste management policies and community-based environmental initiatives in Ekosodin and similar Nigerian



**Figure 1.1b:** Map of Benin City.  
Source: Wikipedia.

settlements. Architecturally, the research highlights the role of design in facilitating sustainable waste practices, expanding the scope of architectural responsibility beyond aesthetics to environmental stewardship (Kibert, 2016; Edwards, 2014). The findings may guide architects, planners, and policymakers in integrating waste-responsive design solutions into residential developments. Additionally, the study benefits local communities by promoting cleaner environments, income generation, and improved public health outcomes through sustainable waste management practices (Zurbrügg *et al.*, 2012; Lohri *et al.*, 2017).

## **1.9 LIMITATIONS OF THE STUDY**

The study is limited by constraints related to data availability, time, and access to comprehensive waste generation records. Financial limitations may also restrict extensive field measurements. Furthermore, findings are context-specific to Ekosodin and may not be directly generalizable to all urban communities in Nigeria without adaptation.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 THEORETICAL FRAMEWORK

The theoretical grounding of the study is rooted in the Circular Economy Theory and Sustainable Architectural Practice Theory.

##### 2.1.1 Circular Economy Theory

Circular Economy Theory advocates for closing material loops by minimizing waste and maximizing reuse, recycling, and resource recovery (Geissdoerfer *et al.*, 2017). In the household waste context, circularity involves converting organic waste into environmental and economic resources through composting and clean energy production rather than defaulting to landfill disposal.

##### 2.1.2 Sustainable Architectural Practice Theory

Sustainable Architectural Practice Theory emphasizes that buildings and urban environments must be designed to support ecological systems, enhance resource efficiency, and promote occupant behavior that aligns with environmental goals (Ezinwakolam & Igwe, 2025; MDPI, 2025). This theory suggests that architectural design should not merely mitigate environmental harm but proactively enable waste valorization and ecological integration.

#### 2.2 CONCEPTUAL FRAMEWORK

The conceptual framework integrates relationships among household organic waste generation, management practices, economic potential, and architectural design interventions.

- **Input:** Household organic waste generation is influenced by urban lifestyles, population density, and consumption patterns.
- **Mediators:** Waste segregation, collection systems, community awareness, and policy support.
- **Moderators:** Architectural design features that enable composting, waste storage, and spatial logic for sustainability.
- **Outcomes:** Economic outputs (compost, energy), improved environmental quality, and sustainable community design.

This framework visually maps how socio-architectural interventions can transform organic waste streams into sustainable ecological and economic systems that improve urban livability and resilience.

## **2.3 LITERATURE REVIEW**

This chapter critically reviews existing scholarship and empirical studies on household organic waste management, economic valorization, and the architectural implications for sustainable environmental design. It situates the study within both global and Nigerian contexts, with emphasis on how different states in Nigeria approach organic waste as an environmental challenge and potential resource. The review draws on studies of waste governance, urban waste composition, and sustainable architecture practice to demonstrate patterns, gaps, and interventions that inform this research. Solid waste management in Nigeria, particularly the organic fraction from households, remains deeply challenging despite its potential for economic and environmental benefit. Scholars attribute systemic weaknesses to weak policy enforcement, fragmented institutional frameworks, limited technical capacities, and low environmental awareness among citizens (Isife & Ugwuanyi, 2025; Akintububo, 2025). Meanwhile, sustainable design discourses emphasize that physical environments influence behavior and waste outcomes, suggesting that architectural strategies can help bridge the gap between waste generation and sustainable reuse (Ezinwakolam & Igwe, 2025; MDPI, 2025).

This chapter is structured into key thematic areas: (1) Literature on household organic waste; (2) Economic potential of organic waste streams; (3) Literature Reviews on *Sustainable Waste Management in Nigeria* (4) Sustainable Waste Management in Ekosodin (5) Architecture and sustainable environmental design; (5) Theoretical framework; and (6) Conceptual framework. Together, these sections provide a foundation for understanding how literature informs the present investigation in Ekosodin, Benin City.

### **2.3.1 Household Organic Waste Management in Nigeria**

Household organic waste refers to biodegradable refuse generated from domestic activities - food scraps, kitchen leftovers, garden trimmings, and other waste that decomposes naturally under appropriate conditions. In developing urban contexts, organic waste frequently represents the largest proportion of municipal solid waste streams (UNEP, 2019; World Bank, 2018). In Nigeria, studies indicate that over 50% of municipal waste from households is

organic, though collection and processing remain dysfunctional (Isife & Ugwuanyi, 2025; Sustainable Review, 2025).

Researchers examining urban solid waste in Nigeria consistently highlight the inadequacy of waste management systems. For instance, Isife and Ugwuanyi (2025) underscore that rapid urbanization and population growth exacerbate solid waste generation, yet infrastructural and operational constraints, including poor planning, budgetary limitations, and lack of public education, stymie effective collection, segregation, and disposal. Their review emphasizes that urbanization without proportional institutional capacity leads to persistent waste accumulation and environmental degradation. Another systematic assessment of municipal solid waste points to gaps in circular economy implementation, where waste generated by households is rarely reintegrated into productive cycles (Sustainable Review, 2025). This mirrors national observations that waste systems prioritize collection and disposal over reuse and valorization, resulting in huge quantities of waste ending up in dumpsites or being burned openly, contributing to pollution and health risks.

Across Nigerian cities, waste governance structures differ, but common trends emerge: weak enforcement of sanitation laws; low public awareness of sustainable disposal practices; and inadequate technical skills within waste management agencies (Akintububo, 2025; Isife & Ugwuanyi, 2025). Furthermore, scholarly reviews of solid waste in Nigeria indicate that although policy frameworks exist, there is a significant implementation gap; legislation is often not translated into effective practice at the state and local levels (Akintububo, 2025; BJES, 2017). In practical terms, household organic waste in many Nigerian contexts is mixed with non-biodegradable materials, undermining opportunities for composting or energy recovery. When disposed of on roadsides, open dumps, or drainage channels, this waste exacerbates flooding, vector diseases, and soil contamination, reducing urban livability and health outcomes (Isife & Ugwuanyi, 2025; BJES, 2017). These systemic conditions underscore why localized studies such as the one undertaken in Ekosodin are essential for understanding community-specific dynamics and interventions.

### **2.3.2 Sustainable Waste Management in Nigeria**

#### **➤ Lagos State**

Lagos State, Nigeria's largest city and economic hub, faces considerable waste management challenges due to its high population density and rapid urban growth. The Lagos State Government has implemented various initiatives to promote sustainable waste management,

including the establishment of the Lagos Waste Management Authority (LAWMA) (Ogunleye *et al.*, 2018). LAWMA has introduced a waste segregation program aimed at increasing recycling rates and reducing the amount of waste sent to landfills. A study by Ogunleye *et al.* (2018) emphasized the importance of public awareness and community engagement in achieving sustainable waste management in Lagos. The researchers found that effective communication and education programs significantly influenced residents' willingness to participate in recycling initiatives. Additionally, the study highlighted the potential for integrating waste management with other urban services, such as transportation and housing, to create a more holistic approach to urban planning.

➤ **Kano State**

In Kano State, challenges in waste management are compounded by inadequate infrastructure and limited financial resources. A study by Adebayo *et al.* (2016) revealed that the majority of waste in Kano is disposed of through open dumping, which poses serious health and environmental risks. The study highlighted the need for improved waste collection services and the establishment of recycling facilities to promote sustainable practices. The Kano State Government has recognized the importance of addressing waste management challenges and has begun to implement policies aimed at improving waste collection and disposal (Adebayo *et al.*, 2016). However, the success of these initiatives depends on community involvement and the establishment of a culture of recycling. The study recommended the development of educational programs to raise awareness about the benefits of recycling and waste reduction among residents.

➤ **Rivers State**

Rivers State, located in the Niger Delta region, faces unique challenges in waste management due to its geographical and socio-economic context. A study conducted by Nwankwoala *et al.* (2016) found that inadequate waste disposal practices contribute to environmental degradation and health hazards in the state. The researchers emphasized the urgent need for sustainable waste management strategies that consider the local context and engage community members in the decision-making process. The Rivers State Government has initiated several waste management programs, including the establishment of waste collection services and recycling initiatives. However, the effectiveness of these programs has been limited by inadequate funding and a lack of public participation (Nwankwoala *et al.*, 2016). The study recommended the implementation of community-based waste management approaches that empower

residents to take an active role in waste management and promote sustainability.

➤ **Abia State**

Abia State has also faced significant waste management challenges, with studies indicating that improper waste disposal practices are prevalent (Ibe *et al.*, 2018). The Abia State government has made efforts to improve waste management through the establishment of the Abia State Environmental Protection Agency (ASEPA), which aims to enhance waste collection and promote recycling initiatives. Ibe *et al.* (2018) conducted a study that assessed the effectiveness of ASEPA's programs in promoting sustainable waste management practices in Abia State. The researchers found that public awareness and education were critical factors influencing the success of these initiatives. The study highlighted the need for community engagement and the development of partnerships between government agencies and local organizations to enhance waste management efforts.

➤ **Ekiti State**

In Ekiti State, sustainable waste management practices have been integrated into the state's development plans. A study by Alabi *et al.* (2017) examined the impact of the Ekiti State Waste Management Policy on waste collection and disposal practices. The researchers found that the policy has led to improvements in waste management services, including the establishment of waste recycling centers and increased public awareness about sustainable waste practices. The study emphasized the importance of continuous monitoring and evaluation of waste management programs to ensure their effectiveness and sustainability (Alabi *et al.*, 2017). Moreover, the researchers stressed the need for collaboration between government agencies, private sector stakeholders, and community members to create a comprehensive waste management framework that addresses the unique challenges faced by Ekiti State.

### **2.3.3 Sustainable Waste Management in Ekosodin**

Sustainable waste management in Ekosodin is not only necessary but also critical for the health and well-being of its residents, the preservation of the surrounding environment, and the promotion of sustainable urban development. Situated near the University of Benin, Ekosodin is characterized by a diverse population consisting of students, faculty, and local residents, all contributing to the generation of solid waste. The current waste management practices in Ekosodin predominantly involve informal collection and open dumping, which

exacerbate environmental pollution and public health risks (Adeleke *et al.*, 2019). Thus, there is an urgent need for a structured and sustainable waste management system that aligns with best practices while addressing local challenges.

➤ **Environmental Necessity**

The environmental implications of improper waste management in Ekosodin cannot be overstated. Open dumping and burning of waste lead to soil and water contamination, air pollution, and the proliferation of pests and vectors that can cause diseases (Ogunleye *et al.*, 2018). With the rapid growth of the community, the volume of waste generated continues to rise, placing additional strain on the already inadequate waste management system. Implementing sustainable waste management practices, such as recycling, composting, and waste-to-energy technologies, can significantly mitigate these environmental impacts (Kaza *et al.*, 2018).

By adopting sustainable practices, Ekosodin can reduce the amount of waste that ends up in landfills and minimize greenhouse gas emissions associated with waste decomposition (Chalmin & Gaillochet, 2009). For instance, composting organic waste can not only divert waste from landfills but also produce valuable soil amendments that can benefit local agriculture and gardening initiatives. Furthermore, recycling programs can recover valuable materials, reducing the demand for virgin resources and supporting the circular economy (Ellen MacArthur Foundation, 2013).

➤ **Public Health Considerations**

The health implications of poor waste management in Ekosodin are particularly concerning. Improper disposal of waste can lead to the spread of communicable diseases, respiratory ailments, and other health issues related to pollution (WHO, 2018). Studies have shown that communities with inadequate waste management systems experience higher rates of illnesses, particularly among vulnerable populations, such as children and the elderly (Adeleke *et al.*, 2019). By transitioning to a sustainable waste management system, Ekosodin can enhance public health outcomes. Effective waste segregation and proper disposal methods can limit exposure to hazardous materials and reduce the incidence of vector-borne diseases such as malaria and dengue fever (Adebayo *et al.*, 2016). Furthermore, community education and engagement initiatives can raise awareness about the importance of proper waste management practices, empowering residents to take an active role in protecting their health and the environment.

### ➤ **Economic Benefits**

Implementing sustainable waste management practices in Ekosodin also presents significant economic opportunities. A well-structured waste management system can create jobs in various sectors, including waste collection, recycling, and composting (Zhang *et al.*, 2010). This not only provides employment opportunities for residents but also stimulates local economic growth and enhances community resilience. Moreover, by promoting recycling and resource recovery, Ekosodin can reduce the financial burden associated with waste disposal. Landfilling and incineration are often costly, and by diverting waste from these processes, the community can allocate resources more effectively toward other essential services (Nwankwoala *et al.*, 2016). The establishment of a community recycling center can serve as a focal point for these initiatives, fostering local entrepreneurship and innovation in waste management.

### **2.3.4 Community Engagement and Education**

For sustainable waste management to be effective in Ekosodin, active community engagement and education are imperative. The success of any waste management initiative hinges on the participation and cooperation of residents. Studies have shown that communities that are well-informed about waste management practices are more likely to engage in recycling and waste reduction efforts (Ogunleye *et al.*, 2018).

Educational programs can help raise awareness about the importance of sustainable waste management and provide residents with the knowledge and skills needed to implement best practices. Workshops, community clean-up events, and informational campaigns can foster a sense of ownership and responsibility among residents, encouraging them to take an active role in waste management efforts (Adebayo *et al.*, 2016). By fostering a culture of sustainability within the community, Ekosodin can develop a more resilient and engaged population, ultimately leading to improved waste management outcomes.

The necessity for sustainable waste management in Ekosodin is underscored by the pressing environmental, public health, and economic challenges associated with current waste practices. By implementing a comprehensive and integrated waste management plan that incorporates recycling, composting, and community engagement, Ekosodin can enhance the quality of life for its residents while promoting environmental sustainability. The transition to a sustainable waste management system will require collaboration among various stakeholders, including local authorities, community organizations, and residents. By

working together, the community can develop innovative solutions that address waste management challenges and contribute to a healthier, more sustainable environment for current and future generations.

### **2.3.5 Economic Potential of Household Organic Waste**

Emerging from the waste-as-resource paradigm and circular economy literature is the notion that household organic waste can be a valuable economic resource when managed through appropriate technologies and socio-economic systems (Geissdoerfer *et al.*, 2017; UNEP, 2019). Organic waste valorization creates pathways for producing compost, renewable energy (e.g., biogas), and employment opportunities, thereby linking environmental sustainability with economic development.

#### ➤ **Composting and Agricultural Linkages**

Composting, the biological decomposition of organic matter into nutrient-rich soil amendments, is widely recognized as one of the most practical and accessible forms of organic waste valorization, particularly in contexts where agricultural activity and urban farming are important livelihoods (UNEP, 2019; World Bank, 2018). Compost improves soil structure, water retention, and fertility, reducing dependence on synthetic fertilizers and lowering production costs for urban gardens and peri-urban farms. For example, studies in peri-urban Ghana and other West African contexts have shown that composting household organic waste can enhance urban food production while providing income for waste cooperatives (UNEP, 2019). Although similar systematic studies are limited in Nigerian states, analogous initiatives are emerging in parts of Nigeria where community gardens and informal composting clusters have begun to surface.

#### ➤ **Biogas and Renewable Energy**

Anaerobic digestion of organic waste produces biogas, a renewable energy source comprising primarily methane and carbon dioxide, which can be used for cooking, electricity generation, or heating (Bond & Templeton, 2011; Sustainable Review, 2025). Biogas systems can be scaled from small household units to community-level digesters, offering decentralized renewable energy solutions that reduce reliance on fossil fuels or costly grid electricity. Pilot projects in parts of Nigeria's Niger Delta have experimented with small-scale biodigesters linked to market organic waste, showcasing the potential for turning waste into clean energy and refined biofertilizers, though detailed empirical data remains scarce. These interventions

highlight how household organic waste can contribute to energy resilience and economic diversification.

➤ **Informal Economy and Livelihoods**

In Nigerian megacities such as Lagos, research highlights a thriving informal waste economy where waste pickers, recyclers, and secondary material traders derive income from waste streams that would otherwise be unmanaged (Olusosun documentation; Reddit reports on Lagos informal sector, 2021). These activities, though often precarious and lacking formal recognition, reveal how waste systems intersect with urban livelihoods. Collective evidence suggests that leveraging organic waste for economic benefit requires supportive policy frameworks, technical capacity, and community participation (Sustainable Review, 2025). Without these enabling conditions, organic waste continues to be undervalued and underutilized despite its substantial economic potential.

### 2.3.6 Sustainable Environmental Design and Architecture

Sustainable environmental design in architecture integrates ecological principles into the built environment to improve resource efficiency, enhance ecological performance, and reduce environmental impact. In the context of household organic waste, sustainable design considers how buildings and communities can physically accommodate waste segregation, reuse, and resource recovery systems (Kibert, 2016; Ezinwakolam & Igwe, 2025).

➤ **Design for Waste Segregation and Composting**

Sustainable architectural design can include designated spaces for waste segregation and composting within residential buildings and public spaces. Such design elements might include built-in composting bins in kitchens, shared composting hubs in courtyards, and community gardens that consume organic outputs. Empirical architectural studies in Nigeria show that architects are increasingly aware of sustainability principles, though the integration of waste management specifics remains limited in practice (MDPI, 2025). International experiences emphasize that making sustainable waste disposal part of daily life requires architectural and spatial planning that normalizes such practices. Designs that are convenient, safe, and visually integrated into everyday spaces encourage occupant participation and reduce barriers associated with waste handling.

➤ **Landscape and Public Space Design**

Architects and urban planners also have opportunities to weave organic waste systems into

landscape and open space design. Community gardens, green buffers, and ecological parks can function as waste processing sites, absorbing composted material while enhancing aesthetics and community utility. Such integrations align with broader sustainable urban design goals, including stormwater management, biodiversity enhancement, and social cohesion. Research on green architecture in Nigeria indicates increasing interest in sustainable and resource-efficient materials and strategies, though implementation is uneven due to cost constraints, limited policy enforcement, and technical skill gaps (Ezinwakolam & Igwe, 2025; MDPI, 2025). These obstacles suggest that while architectural theory supports sustainable waste integration, practical application requires supportive institutional and economic contexts.

➤ **Policy, Codes, and Built Environment Standards**

Effective integration of waste management into built environments also necessitates policy and regulatory alignment. Nigeria's environmental sanitation laws and decentralized governance mean that local authorities, state governments, and municipalities share responsibility for waste practices (Akintububo, 2025). However, experts note that enforcement is often weak, and design standards rarely mandate waste provisions in residential planning, limiting architectural innovation in this domain. Addressing these gaps requires multi-level coordination between environmental agencies, architectural associations, and local planners to embed waste management provisions within building codes and planning regulations.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter outlines the research methodology employed in the study to develop a sustainable waste management system for Ekosodin. It details the research design, population and sampling techniques, sample size, data collection methods, data analysis, and ethical considerations. The methodology is designed to ensure that the research is systematic, valid, and reliable, providing a comprehensive understanding of the current waste management practices in Ekosodin and the community's attitudes toward sustainability.

#### **3.2 RESEARCH DESIGN/DATA TYPES AND SOURCES**

The research design for this study is predominantly descriptive and exploratory. A descriptive research design allows for the systematic collection and presentation of data regarding the current waste management practices in Ekosodin, while an exploratory approach enables the investigation of new ideas and insights regarding sustainable waste management strategies (Creswell, 2014). This combination is particularly useful in understanding the complexities of waste management systems and the factors influencing community behavior and attitudes toward sustainability.

The study employs a mixed-methods approach, integrating both quantitative and qualitative data collection techniques. Quantitative data will be gathered through structured surveys to quantify waste management practices, while qualitative data will be collected through interviews and focus group discussions to gain deeper insights into community perceptions and attitudes toward sustainable waste management. This triangulation of methods allows for a richer understanding of the research problem and enhances the validity of the findings (Dörnyei, 2007).

#### **3.3 POPULATION AND SAMPLING TECHNIQUES**

The target population for this study comprises residents of Ekosodin, including students, faculty members of the University of Benin, and local community members. This population is chosen because they represent the primary stakeholders affected by waste management practices in the area. A stratified sampling technique will be utilized to ensure representation across different demographic groups within Ekosodin. Stratification will be based on key characteristics such as age, gender, and occupation, allowing for a more comprehensive

understanding of the diverse perspectives within the community (Creswell, 2014). This approach helps to capture the views of various segments of the population, ensuring that the findings are reflective of the community as a whole.

### **3.4 SAMPLE SIZE**

The sample size for this study is set at 100 respondents. This number is deemed adequate for achieving statistical significance while ensuring the feasibility of data collection within the study's time constraints (Cohen *et al.*, 2011). The sample will be proportionally distributed across the identified strata to ensure that different demographic groups are adequately represented. The decision to select 100 respondents is based on previous studies that have successfully employed similar sample sizes in community-based research on waste management (Ogunleye *et al.*, 2018). The sample will be recruited through community engagement initiatives, including outreach programs at the University of Benin and local community centers, to ensure broad participation.

### **3.5 DATA COLLECTION METHODS**

Data collection will involve a combination of surveys, interviews, and focus group discussions.

- 1. Surveys:** A structured questionnaire will be developed to gather quantitative data on the current waste management practices, recycling behaviors, and attitudes toward sustainable waste management among the residents of Ekosodin. The questionnaire will consist of closed-ended questions, Likert scale items, and demographic questions. It will be pre-tested with a small group of residents to ensure clarity and relevance before the main data collection begins (Dörnyei, 2007).
- 2. Interviews:** Semi-structured interviews will be conducted with key stakeholders, including local community leaders, waste management officials, and representatives from relevant NGOs. These interviews will provide qualitative insights into the challenges and opportunities related to waste management in Ekosodin, as well as the perceived effectiveness of current initiatives.
- 3. Focus Group Discussions:** Focus groups will be organized with diverse segments of the community, including students and local residents. These discussions will encourage

participants to share their experiences, perceptions, and suggestions regarding waste management practices and sustainability. The focus groups will be facilitated by trained moderators to ensure open dialogue and to probe deeper into participants' perspectives.

### **3.6 DATA ANALYSIS**

Quantitative data collected from surveys will be analyzed using statistical software, such as SPSS or Excel, to perform descriptive and inferential analyses. Descriptive statistics will be used to summarize the data and identify patterns in waste management practices, while inferential statistics will be applied to test hypotheses and determine correlations between variables (Field, 2013).

Qualitative data obtained from interviews and focus group discussions will be transcribed and subjected to thematic analysis. This involves coding the data, identifying recurring themes, and interpreting the findings in relation to the research questions (Braun & Clarke, 2006). The integration of quantitative and qualitative data analysis will provide a comprehensive understanding of the research topic, allowing for triangulation of findings.

### **3.7 ETHICAL CONSIDERATIONS**

Ethical considerations are paramount in conducting research involving human subjects. Prior to data collection, ethical approval will be sought from the relevant institutional review board or ethics committee. Informed consent will be obtained from all participants, ensuring that they understand the purpose of the study, their rights to confidentiality, and their ability to withdraw from the study at any time without penalty (Creswell, 2014). Participants will be assured that their responses will be treated with confidentiality and used solely for research purposes. Additionally, data will be anonymized to protect the identities of individuals and communities involved in the study. The research will adhere to ethical guidelines and standards to ensure the integrity and credibility of the research process.

## **CHAPTER FOUR**

### **4.0 DATA ANALYSIS, PRESENTATION AND DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter presents, analyzes, and discusses data collected during the field survey conducted in the Ekosodin Community, Benin City. The chapter focuses on household organic waste generation patterns, existing waste management practices, awareness of the economic potential of organic waste, and the architectural implications for sustainable environmental design. Data were obtained through structured questionnaires administered to household residents, interviews with key informants, and direct observation of waste handling practices and residential layouts.

The chapter is organized into thematic sections aligned with the research objectives. Quantitative data are presented using tables, frequencies, and percentages, while qualitative data from interviews and observations are analyzed descriptively. The discussion interprets findings in relation to existing literature reviewed in Chapter Two, highlighting similarities, differences, and implications for sustainable architecture and environmental planning in Ekosodin.

#### **4.2 DATA RELIABILITY AND RESPONSE RATE OF RESPONDENTS**

A total of 110 questionnaires were distributed to households within the Ekosodin Community. Out of these, 100 questionnaires were correctly filled and returned, representing a response rate of approximately 91%. This high response rate enhances the reliability and representativeness of the data collected. The remaining questionnaires were either incomplete or not returned and were therefore excluded from analysis. Interviews were conducted with selected waste management personnel and built-environment professionals. Observational data were recorded during field visits to households, communal waste points, and surrounding environments. The combination of multiple data sources strengthens the credibility of the findings through triangulation.

#### **4.3 INTERPRETATION OF OPINION-BASED SURVEY RESPONSES**

##### **Socio-Economic Characteristics of Respondents**

The socio-economic characteristics of respondents provide important context for understanding household waste generation and management practices.

### A. Gender Distribution

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Male</b>	48	48.0
<b>Female</b>	52	52.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 4.1:** Table showing gender distribution of respondents

The gender distribution shows a relatively balanced participation of male and female respondents. This balance ensures that household waste management perspectives are captured from both genders, which is important since waste handling is often shared among household members.

### B. Age Distribution

<b>Age Range (Years)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 20	10	10.0
21–30	38	38.0
31–40	30	30.0
41–50	15	15.0
Above 50	7	7.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 4.2:** Table showing age distribution of respondents

Most respondents fall within the 21–40 age range, which represents the economically active population. This suggests that a significant portion of residents possess the capacity to participate in waste management initiatives and economic activities related to the reuse of organic waste.

### C. Household Size

<b>Household Size</b>	<b>Frequency</b>	<b>Percentage (%)</b>
1–3 persons	28	28.0
4–6 persons	46	46.0
7 and above	26	26.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 4.3:** Table showing respondents opinion of household size

The majority of households consist of four to six persons. Larger household sizes typically generate higher volumes of organic waste, which has implications for waste storage space, disposal frequency, and potential for composting.

#### 4.3.1 Research Question One: What are the Household Organic Waste Generation Patterns?

Respondents were asked to identify the major types of organic waste generated in their households.

##### A. Household Organic Waste

Type of Organic Waste	Frequency	Percentage (%)
Food leftovers	42	42.0
Vegetable/fruit peels	35	35.0
Garden waste	15	15.0
Others	8	8.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 4.4:** Table showing respondents opinion of household size

The findings show that food leftovers and vegetable/fruit peels constitute the largest proportion of household organic waste in Ekosodin. This aligns with earlier studies indicating that organic waste is the dominant component of municipal solid waste in Nigerian urban areas. The high volume of biodegradable waste suggests strong potential for composting and other waste valorization practices if appropriate systems are put in place.

#### 4.3.2 Research Question Two: What are the Household Organic Waste Storage and Disposal Methods?

Respondents were asked about how they store and dispose of organic waste.

Disposal Method	Frequency	Percentage (%)
Open dumping	45	45.0
Communal waste bins	30	30.0
Burning	15	15.0
Composting	10	10.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 4.5:** Table showing common methods of waste disposal by respondents

Open dumping is the most common disposal method, followed by the use of communal waste

bins. Burning remains a notable practice, contributing to air pollution and environmental degradation. Only a small proportion of respondents practice composting, indicating limited adoption of sustainable waste management methods. Field observations revealed that open dumps are often located near residential buildings, drains, and vacant plots, posing health and environmental risks. These practices reflect inadequate waste infrastructure and limited enforcement of environmental sanitation regulations.

### 4.3.3 Research Question Three: What is the Awareness of Economic Potential of Household Organic Waste?

To assess awareness levels, respondents were asked whether they believed organic waste could be reused for economic benefit.

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	35	35.0
No	50	50.0
Not sure	15	15.0
<b>Total</b>	<b>100</b>	<b>100</b>

Table 4.6: showing respondents awareness of economic benefits of organic waste

Half of the respondents were unaware of the economic potential of organic waste. This lack of awareness limits participation in composting, urban agriculture, and waste-to-energy initiatives. Those who were aware mentioned uses such as manure for farming and gardening, while very few had knowledge of biogas or organized composting systems.

### 4.3.4 Research Question Four: What are Architectural Features Influencing Waste Management?

Respondents were asked whether their residential buildings provide adequate space for waste segregation and storage.

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Adequate space available	25	25.0
Inadequate space	55	55.0
No designated space	20	20.0
<b>Total</b>	<b>100</b>	<b>100</b>

Table 4.7: showing respondents idea on availability of waste management space in residential buildings

The findings show that most residential buildings lack adequate architectural provisions for waste management. Observation revealed that many houses do not include designated waste storage areas, forcing residents to place waste containers in corridors, kitchens, or outdoor spaces. This discourages proper segregation and increases environmental nuisance.

#### **4.4 CASE STUDIES**

To strengthen the validity of the research and offer practical insights, two distinct case studies were conducted in Ekosodin. Direct observations were carried out to document existing waste management practices and their environmental and architectural implications. Particular attention was given to areas used as informal dump sites and locations where waste recycling activities occur. Photographic evidence was collected during the field survey to support observations and enhance data reliability.

##### **4.4.1 CASE STUDY ONE:**

###### **Ekosodin Community: Market Road Community Dump Site, Ekosodin**

Field observations revealed the existence of open and uncontrolled dump sites within Ekosodin Community. One prominent dump site is located along a steep erosion gully, where large quantities of mixed household waste are disposed indiscriminately.



**Figure 4.1:** Open dump site along an erosion-prone slope in Ekosodin Community  
**Source:** Author's Field Survey, 2025

The dump site consists of a mixture of Household organic waste (food leftovers, vegetable and fruit peels), plastic bottles and sachet water waste, nylon and packaging materials, household debris and discarded items. The choice of erosion valleys as dumping grounds suggests a lack of designated waste disposal facilities within the community. Residents appear to use these areas because they are out of direct sight and perceived as “unused land,” despite their environmental sensitivity.

#### **4.4.2 CASE STUDY TWO:**

### Observation of Plastic Waste Recycling Activities

In contrast to organic waste disposal, field observations revealed informal plastic waste recycling practices within Ekosodin.



**Figure 4:2:** Collected and packaged plastic waste for recycling in Ekosodin

**Source:** Author's Field Survey, 2025

Plastic bottles, especially PET bottles and water packaging, were observed to be manually collected from households and dump sites, sorted and packed into large transparent sacks and stored temporarily in open spaces before being transported to recyclers or waste buyers. This practice indicates the presence of a grassroots circular economy, where waste materials are recognized as having economic values. However, these activities remain unregulated exposing workers and materials to weather conditions and health hazards.

#### 4.5 KEY SUMMARY OF FINDINGS

The findings of this study reveal that household organic waste constitutes a significant portion of waste generated in Ekosodin Community. The dominance of food-related waste aligns with studies conducted in other Nigerian urban areas, confirming that organic waste

remains a major component of municipal solid waste streams. The prevalence of open dumping and burning reflects inadequate waste infrastructure and limited awareness of sustainable waste management practices. These disposal methods contribute to environmental pollution, public health risks, and aesthetic degradation of the built environment. The low level of composting observed indicates that the economic potential of organic waste remains largely untapped. Awareness of the economic value of organic waste is generally low among residents. This lack of knowledge limits household participation in waste reuse initiatives and reinforces the perception of waste as a burden rather than a resource. Public education and community-based programs are therefore essential for promoting sustainable waste practices. Architecturally, the study highlights a critical disconnects between residential design and waste management needs. Most buildings lack designated spaces for waste segregation and storage, discouraging proper waste handling. Integrating waste management considerations into architectural design could significantly improve environmental hygiene, support composting initiatives, and enhance sustainable living conditions.

Overall, the findings underscore the importance of combining community awareness, waste infrastructure, and architectural design strategies to achieve sustainable household organic waste management in Ekosodin.

## **CHAPTER FIVE**

### **5.0 CONCLUSION AND RECOMMENDATIONS**

#### **5.1 CONCLUSION**

The study on household organic waste management in Ekosodin Community, Benin City has revealed that organic waste constitutes a substantial portion of household refuse, primarily composed of food leftovers and vegetable or fruit peels. Despite its abundance, the economic potential of this resource remains largely untapped, as most residents lack awareness of composting, biogas production, and other waste-to-resource initiatives. Current disposal methods—such as open dumping and burning pose significant environmental and health risks, highlighting the urgent need for sustainable management strategies. A critical insight from the study is the strong influence of architecture on waste management practices. The absence of designated storage, segregation, and composting spaces in residential buildings constrains proper handling of organic waste and perpetuates environmentally harmful behaviors. Architectural design, when thoughtfully integrated, has the capacity to facilitate sustainable waste practices, encourage household participation, and enhance community-wide environmental quality. Additionally, the study underscores the importance of community awareness, infrastructure, and policy frameworks in transforming household organic waste from an environmental burden into an economic and ecological opportunity. The convergence of these elements education, design, and support systems can enable residents to participate effectively in sustainable waste management, generating both environmental and economic benefits.

In conclusion, household organic waste in Ekosodin represents a latent economic resource and a pivotal factor for sustainable environmental design. Leveraging its potential requires a multi-dimensional approach that integrates architectural design, public awareness, policy enforcement, and infrastructural support. Such an approach not only mitigates environmental hazards but also contributes to sustainable urban development and improved quality of life for residents.

#### **5.2 RECOMMENDATIONS**

Based on the findings and conclusions of this study, the following recommendations are proposed:

- 1. Integration of Waste-Responsive Architectural Design:** Residential buildings should incorporate dedicated spaces for waste segregation, storage, and composting. Architects and urban planners must design homes and communal spaces that facilitate easy handling of organic waste, thus promoting sustainable household practices.
- 2. Community Awareness and Education Programs:** Government agencies, NGOs, and community organizations should implement educational campaigns to sensitize residents about the environmental and economic value of household organic waste. Training programs can provide practical guidance on composting, urban agriculture, and small-scale biogas production.
- 3. Infrastructure and Waste Management Services:** Local authorities should improve waste collection services and establish community composting centers. Provision of bins and regular collection schedules will reduce open dumping and burning, thereby enhancing environmental sanitation.
- 4. Economic Incentives for Waste Valorization:** Residents should be encouraged to participate in waste-to-resource initiatives through incentives such as microcredit schemes, subsidies for composting equipment, or buy-back programs for organic waste products. These measures can transform waste into a source of income while supporting environmental sustainability.
- 5. Policy and Regulatory Framework Enhancement:** Effective implementation of environmental sanitation regulations, alongside enforcement of penalties for illegal dumping, is crucial. Policies should mandate that new residential developments include waste management provisions in building designs.
- 6. Research and Development Initiatives:** Further studies should explore innovative waste-to-energy technologies, large-scale composting models, and community-based organic waste management systems suitable for urban Nigerian contexts.

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## APPENDIX

### SURVEY QUESTIONNAIRE

**Topic: ASSESSING THE ECONOMIC POTENTIAL OF HOUSEHOLD ORGANIC WASTE MANAGEMENT AND ITS ARCHITECTURAL IMPLICATIONS FOR SUSTAINABLE ENVIRONMENTAL DESIGN IN EKOSODIN, BENIN CITY**

By **Adonri Gloria Nekpen**

Mat No: **ENV2002712**

Submitted to the Department of Architecture,  
Faculty of Environmental Science,  
University of Benin Questionnaire

#### **Dear Respondent,**

I am a student conducting a research on household organic waste management and its architectural implications for sustainable environmental design in Ekosodin community, Benin City. The information you provide will be strictly used for academic purposes. Your participation is voluntary, and your honest input is highly valuable to the success of this study. Thank you for taking the time to assist in improving the future of our markets and preserving their cultural identity. Kindly respond honestly to the questions below. Your responses will be treated with confidentiality.

Yours faithfully,

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*Researcher*

**QUESTIONNAIRE FOR ASSESSING THE ECONOMIC POTENTIAL OF HOUSEHOLD ORGANIC WASTE MANAGEMENT AND ITS ARCHITECTURAL IMPLICATIONS FOR SUSTAINABLE ENVIRONMENTAL DESIGN IN EKOSODIN, BENIN CITY**

#### **Section A: Socio- Demographic Information: Respondent Profile**

**Instructions:** please tick (✓) the appropriate answer or fill in where required.

**1. Gender**

Male

 Female

**2. Age (years)**

 Below 20 21–30 31–40 41–50 Above 50

**3. Household size**

 1–3 persons 4–6 persons 7 persons and above

4. **Occupation** \_\_\_\_\_

5. **Educational Level**

- No formal education
- Primary
- Secondary
- Tertiary

**Section B: Household Organic Waste Generation**

1. **What types of organic waste are commonly generated in your household? (You may tick more than one)?**

- Food leftovers
- Vegetable/fruit peels
- Garden/yard waste
- Other (please specify): \_\_\_\_\_

2. **How often is organic waste generated in your household?**

- Daily
- 2–3 times per week
- Weekly
- Occasionally

**Section C: Organic Waste Management Practices**

1. **How do you usually dispose of organic waste?**

- Open dumping
- Communal waste bins
- Burning
- Composting
- Other (please specify): \_\_\_\_\_

2. **Do you segregate organic waste from other household waste?**

- Yes
- No

3. **If yes, how is it segregated?** \_\_\_\_\_

4. **Is there a designated space in your household for storing organic waste before disposal?**

- Yes
- No

5. **If yes, please describe the space:** \_\_\_\_\_

**Section D: Awareness of Economic Potential**

1. **Are you aware that organic waste can be transformed into useful products like compost, manure, or biogas?**

- Yes
- No
- Not sure

2. **Have you ever engaged in any economic activity using organic waste?**  
 Yes  
 No

3. If yes, please describe the activity: \_\_\_\_\_

4. **Would you be willing to participate in composting or biogas production if resources and guidance are provided?**  
 Yes  
 No  
 Maybe

**Section E: ARCHITECTURAL IMPLICATIONS**

1. **Does your house/building have a designated space for organic waste management (storage, segregation, or composting)?**  
 Yes  
 No

2. **Do you think having such spaces in residential buildings would improve waste management in your household?**  
 Strongly agree  
 Agree  
 Neutral  
 Disagree  
 Strongly disagree

3. **Do you face challenges in managing organic waste due to lack of space or building design?**  
 Yes  
 No

4. If yes, please explain: \_\_\_\_\_

**Section F: Additional Comments**

1. **In your opinion, how can household organic waste be better managed in Ekosodin?**

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2. **Any other suggestions regarding architectural design for sustainable waste management:**

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**THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION!**