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Inclusive Circularity: Empowering Local Communities Through Waste-Based Eco-Enterprises in Kano State, Nigeria

Muhammad Umar [a] Hassan Nuhu Wali [b]

[a] Department of Business Management, Sule Lamido University Kafin Hausa, Jigawa State, Nigeria

[b] Mittal School of Business, Lovely Professional University, India

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*Corresponding Author: m.umar@slu.edu.ng

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Abstract

The shift toward a circular economy (CE) offers a significant opportunity to enhance environmental sustainability (ES) while promoting inclusive socioeconomic development (IED). This study investigates the role of waste-based eco-enterprises (WBEEs) as catalysts for environmental transformation (ET) and community development (CD) in Kano, Nigeria, one of West Africa's largest and most industrialised urban centres. Employing the Inclusive Circularity (IC) framework, it examines how local entrepreneurs and informal waste workers engage in circular business models (CBMs) that transform waste into value-added products (VAPs). Using a qualitative methodology that combines case studies of three successful eco-enterprises with documentary analysis, the study identifies key enablers, challenges, and social impacts, emphasising the contributions of youth, women, and informal actors. It also assesses policy and financing barriers that limit sectoral growth. The findings suggest that with targeted interventions, such as regulatory recognition, capacity-building, and enhanced market access, WBEEs can effectively address urban waste challenges, reduce poverty, and drive grassroots innovation. The paper concludes by proposing a framework for scaling inclusive CE models in similar urban contexts.

Introduction

In the 21st century, entrepreneurship is no longer viewed solely through the lens of profit-making but is increasingly valued for its ability to address complex social, economic, and environmental challenges. This shift reflects the vital role entrepreneurship plays in driving the global movement toward circularity (UNDP, 2023). Through the development of new business models (NBMs), enterprises can reduce waste, create value, and maximise resource utilisation (Adesua Lincoln, 2022). As global markets grapple with resource scarcity, youth unemployment, and climate change, the need for NBMs that prioritise inclusion, and sustainability is gaining momentum (De Oliveira, 2018). Among these, the circular economy (CE) emerges as a transformative paradigm, redefining how value is created, maintained, and distributed across value chains (Kala & Bolia, 2022). This is justifiable, as the CE integrates adaptable, innovative and sustainable approaches that promote the efficient use of natural resources and encourage recycling (Sohal and de Vass, 2022). It presents an innovative model that facilitates job creation, fosters economic progress, and supports environmental sustainability (Ellen MacArthur Foundation, 2019).

Inclusive Circularity (IC) refers to a concept that integrates the principles of the circular economy with social inclusion (OECD, 2024). IC serves as a people-cantered strategy for the circular economy, ensuring the inclusion of informal, low-income, and marginalised communities in the process of transforming waste materials into resources and products (Kala & Bolia, 2022). It focuses on economic and social inclusion, environmental sustainability, resource recovery, and equitable participation (Gall et al., 2020). Waste-based eco-enterprises (WBEEs), on the other hand, are small businesses and cooperatives that convert waste, such as recycled plastics, organic materials, and artisan crafts into marketable and useful products (Rios et al., 2021). These enterprises are managed by local entrepreneurs, women and youth groups, as well as informal waste pickers, and typically operate at the community level. The circular economy (CE), also known as circularity, represents a shift from the traditional linear economy, which focuses on extracting resources, transforming them into products, and eventually discarding them as waste, towards a model that emphasises the reuse and extended lifespan of products (Adesua Lincoln & Diamond, 2024). This contemporary model not only advocates for environmental sustainability but also emphasizes equity, fairness, and usefulness for all members of society, regardless of their social or economic status (Sohal & de Vass, 2022).

From this perspective, inclusive circularity, in the context of empowering local communities through waste-based eco-enterprises, explores how grassroots entrepreneurship, rooted in circular economy principles, is emerging as a viable pathway for economic empowerment and sustainable development (Odeyingbo et al., 2025). Kano, one of Nigeria's most populous and industrious states, faces mounting environmental pressure from unmanaged waste streams, including plastics, electronic waste (e-waste), and organic refuse (World Bank, 2020). Yet, amid these challenges, a growing number of community-driven enterprises are converting waste into opportunity, giving rise to a new generation of eco-entrepreneurs who are redefining what it means to innovate in low-resource settings (Odeyingbo et al., 2025). From youth-led startups transforming plastic into reusable household goods to women's cooperatives engaged in composting and recycling, these eco-enterprises represent more than just environmental interventions, they are engines of job creation, skills development, and inclusive growth.

Recent initiatives, such as the Kano Circular Economy Hub (CEH), launched in 2025 by the state government, and NGO-led programs like Centre for Information Technology and Development's (CITAD) e-waste recovery training for youth, have provided technical support and visibility to these ventures (Jatau et al., 2024). However, despite this momentum, most of these enterprises operate in informal markets with limited access to capital, business development services, or scaling mechanisms. Inclusive circularity is crucial due to its potential for economic opportunity, social justice, resilience, and environmental impact (UNDP, 2023). Kano State, one of West Africa's largest and most industrialized urban centres, faces mounting waste challenges driven by rapid urban growth, population increase, inadequate infrastructure, accelerated urbanisation, and an influx of e-waste (European Commission, 2020). At the same time, circular economy principles are gaining traction both globally and locally, emphasising reuse, resource recovery, and social inclusion (Nawaz et al., 2021). There is a need to investigate inclusive circularity as cantered on Kano State's waste-based eco-enterprises to better understand how community-level sustainability, entrepreneurship, and social inclusion intersect in Kano, Nigeria's largest northern city and a major centre of commerce. This would fill notable gaps in both practice and theory and provide actionable insights for policymakers, NGOs, and social innovators aiming to scale inclusive circular solutions.

By utilising a qualitative approach, including case studies of three eco-enterprises and document analysis, this paper investigates the intersection of inclusive circularity and waste-based eco-enterprises in Kano State, Nigeria. It focuses on how community-led eco-enterprises are leveraging indigenous innovation, low-cost technologies, and social networks to create circular solutions that are both economically viable and socially embedded. Contributing to the broader entrepreneurial discourse, this paper argues that inclusive circular entrepreneurship, where marginalised actors are empowered as creators, not just consumers, holds significant promise for frontier markets like Kano,

Nigeria. It also calls for intentional investment in entrepreneurial ecosystems that prioritise access, sustainability, and impact. Finally, this research positions Kano's eco-enterprises as case studies in resilience and ingenuity, offering practical lessons for entrepreneurs, investors, development agencies, and policymakers seeking to localise the circular economy while broadening participation in green innovation.

Literature Review and Theoretical framework

Inclusive circularity

Inclusive circularity is a concept that integrates two fundamental pillars of sustainability: the circular economy and social inclusion. The circular economy is an economic model aimed at minimising waste, reusing resources, and regenerating natural systems (Nurrohman et al., 2025). Social inclusion, on the other hand, emphasises ensuring that all individuals, particularly marginalised and underrepresented groups, have equitable access to opportunities, benefits, and active participation (UNDP, 2020). Together, inclusive circularity promotes not only environmental sustainability but also broad-based economic and social development.

Inclusive Circularity and waste-based eco-enterprises

There is a growing global movement advocating for investment and policies aligned with achieving the 2030 Sustainable Development Goals (SDGs) (European Commission, 2020). The integration of social, economic, and environmental practices is essential to building a sustainable, equitable, and empowered society (Nawaz et al., 2021). The Inclusive Circularity and Waste-Based Eco-Enterprises (ICWDEEs) model combines concepts from social inclusion, sustainability, the circular economy, and entrepreneurship in the context of waste management (UNDP, 2023). It focuses on integrating workers from the informal waste sector into the recognised modern circular economy by funding and supporting waste-based eco-enterprises and establishing a policy framework that promotes inclusive circularity. Supporting these enterprises can foster innovation and local economic development, enhance environmental sustainability and social equity, reduce waste generation, empower local communities, and improve the working conditions of informal waste workers (World Bank, 2020).

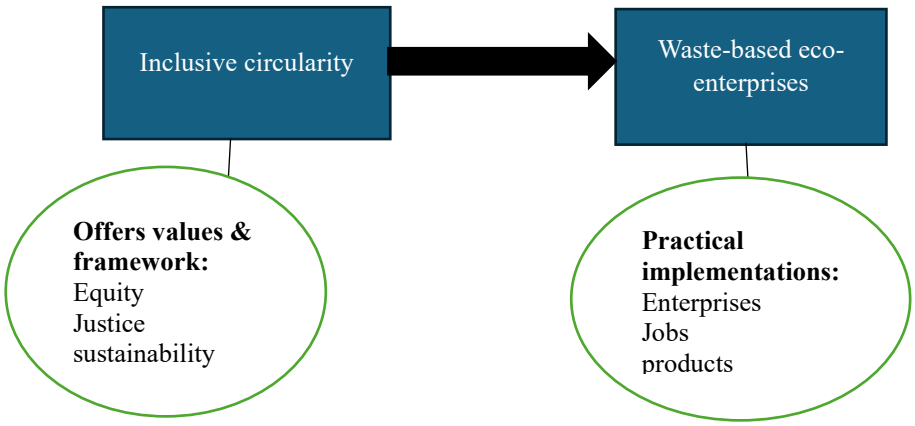

Figure 1: Intersection of inclusive circularity & waste based eco-enterprises framework
Source: Adapted from literature and developed by the author

Figure 1 illustrates the connection between Inclusive Circularity (IC) and Waste-Based Eco-Enterprises (WBEEs). In this framework, IC provides the values and principles related to equity, justice, and sustainability. WBEEs, on the other hand, represent the practical implementation, creating jobs, businesses, and valuable products by utilising waste as a resource. Together, they contribute to shaping a reformative and just economy that addresses both environmental sustainability and social welfare.

Circular economy and inclusive development

Circular economy is a sustainable economic model that focuses on reducing waste, maximizing resource efficiency, and regenerating natural systems. It moves away from the traditional "take-make-dispose" model, promoting reuse, recycling, and sustainable product design (Nurrohman et al., 2025). Inclusive development ensures that the benefits of economic growth and sustainability are shared equitably among all segments of society, especially marginalized and vulnerable groups (Edeh & Onu, 2025). It aims to reduce inequality, enhance social equity, and provide fair access to opportunities. According to Nurrohman et.al. (2025), when combined, circular economy and inclusive development form a powerful framework for achieving sustainable and equitable growth. This integration ensures that the transition to a greener economy does not exclude those most affected by climate change, unemployment, or economic restructuring (Adesua Lincoln, 2025). Thus, it empowers communities, creates green jobs, and supports social innovation while addressing environmental challenges.

Waste and circularity in Kano State

Kano state, Nigeria is one of West Africa's largest industrial cities regarded as centre of commerce, generating significant municipal and industrial waste. The Waste-Free Kano initiative (led by Kano State Ministry of Environment) targets a 40 % reduction in total waste by 2026 and an increase in recycled waste share from 5 % in 2020 to 18 % by 2024 (Kano State Ministry of Environment, 2022). In January 2025, the state launched a major public bin infrastructure initiative for tricycles, buses, and public spaces, alongside reinstating street-sweepers, generating employment and waste-capture opportunities (CITAD, 2024). Kano's government is actively courting investment in circular “waste-to-wealth” models, partnering with agencies like Kan-Invest to mobilise capital and entrepreneurial activity (Kano State Ministry of Environment, 2022).

Integrated Waste to Wealth Empowerment Model for Empowering Local Communities Through Waste-Based Eco-Enterprises

Empowering local communities through waste management by waste-based eco-enterprises is crucial in this era of increasing global policy support and investment, driven by the persistent challenges of climate change, the call for an eco-economy, and the pursuit of the 2030 global goals. This approach requires an integrated model that transforms waste into social and economic opportunities by combining waste management with community development. West to wealth empowerment model (W2WEM), as an integrative model, it focuses on converting waste materials into valuable products, promoting eco-enterprises for sustainability, and fostering circular economy principles. By emphasizing local empowerment, it enables communities, particularly those in informal settlements or low-income areas, to develop waste-to-wealth enterprises, reduce ecological threats, create jobs, and encourage entrepreneurship.

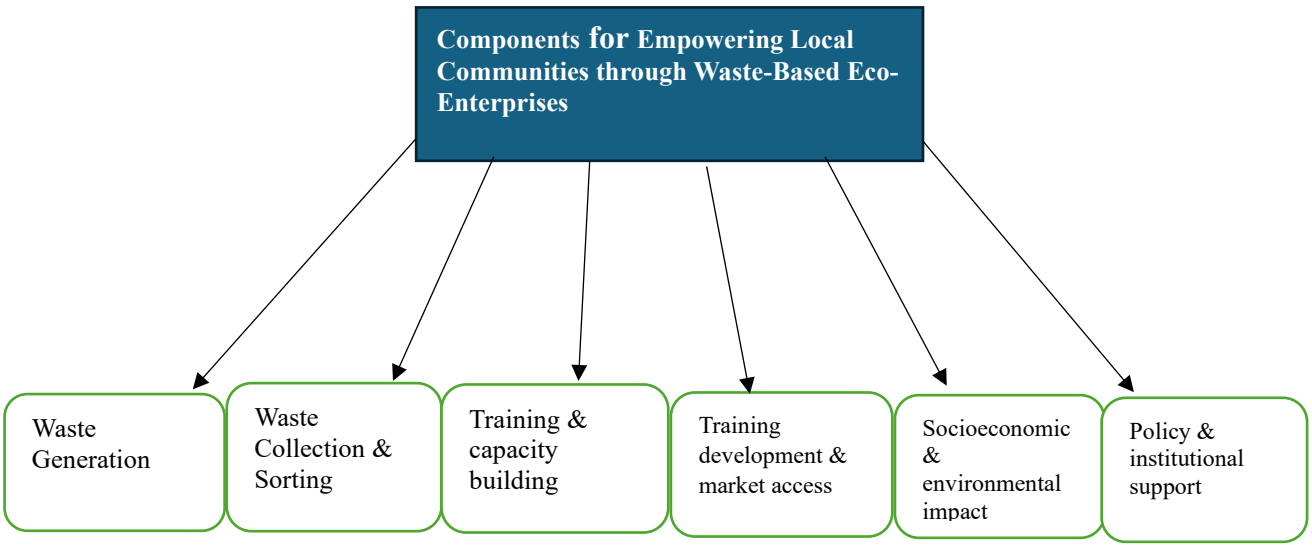

Figure 2: Integrated Waste to Wealth Empowerment Model
Source: Adapted from literature and developed by the author

Figure 2 presents an integrated model illustrating the transformation of waste into wealth through inclusive circularity in Kano State, Nigeria. The Inclusive Waste-to-Wealth Empowerment Model (IW2WEM) provides a comprehensive framework that highlights the interconnection between waste management, social inclusion, and economic empowerment, three core pillars that drive inclusive circularity. This model demonstrates how waste can be transformed into sustainable economic opportunities while simultaneously empowering communities both economically and socially. The key components of the model include:

- Waste Generation: Originating from households, businesses, and industries.
- Waste Collection and Sorting: Focused on identifying and separating recyclable materials.
- Training and Capacity Building: Targeted at informal recyclers and workers to improve skills and safety.
- Training Development and Market Access: Offering vocational training and linking recycled products or services to viable markets.
- Socioeconomic and Environmental Access: Addressing how effective waste management enhances ecosystems, reduces pollution, creates jobs, and promotes public health.
- Policy and Institutional Support: Establishing regulatory frameworks, institutional roles, and policies that guide and support the waste management system.

The IW2WEM model is adaptable for implementation by enterprises in the waste management sector, as well as by government agencies, NGOs, and cooperatives.

Theoretical Framework

To provide a supportive theory that is pertinent to this paper, the study employed community enterprise based (CBE) theory by Peredo and Chrisman (2006) that elucidates how locally driven enterprises develop in response to community needs, utilizing local resources, local knowledge, and collective action to create social, environmental, and economic value. The CBE theory posits that enterprises are rooted in local participation and resource utilization and can simultaneously generate economic, environmental, and social benefits (Peredo & Chrisman, 2006). In the context of this study, CBE theory helps explain how waste-based eco-enterprises empower underserved groups, foster inclusive circularity, and build resilient, sustainable communities. This theory aptly supported this study because the topic combines inclusive development, community empowerment, and circular economy practices, exactly the principles at the heart of CBE Theory to investigate how inclusive circularity is empowering local communities through waste-based eco-enterprises in Kano State, Nigeria.

Proposed Framework for Scaling Inclusive Circular Economy Models in Kano

Regulatory recognition and formalisation should expand existing policy frameworks to officially register and integrate informal waste workers and small eco-enterprises under the Kano State Environmental Planning and Protection Agency (KASEPPA), with oversight from the Kano Urban Planning Development Authority (KNUPDA) (Ekenam et al., 2024). This includes simplifying licensing processes, providing micro-grants, and designating Sanitation Enterprise Zones to support green entrepreneurship. Capacity building and training programs should offer technical skills in waste sorting, occupational safety, digital tools, entrepreneurship, and gender-inclusive practices. Market access and demand stimulation can be achieved through partnerships between waste-based

environmental enterprises (WBEEs) and local manufacturers or recyclers. Government and large institutions should adopt public procurement policies for recycled materials, and local conversion of waste into consumer goods should be incentivised. Financing mechanisms should include impact investment vehicles tailored to eco-startups, supported by the Kano State Government and development partners. Results-based financing models and incentive systems, such as eTrash2Cash tokens, can reward performance. Monitoring, documentation, and scaling should involve developing community-level indicators such as tons of waste diverted, income generated, and number of marginalized beneficiaries reached. Publishing good practice case studies can attract broader investment and enable replication in other regions.

Methodology

Given the significance of entrepreneurship in wealth creation, innovation, and contributing hugely to addressing multifaceted social and environmental challenges (Umar, Mukhtar & Aziz, 2024), this study utilises qualitative approach using documentary analysis and multiple case study of three eco-enterprises operating in kano, Nigeria. The combination of case study with documentary analysis was conducted for data collection from diverse secondary sources to provide for an in-depth understanding and contextualisation (Service, 2009). This blend, according Armstrong (2021), offers accurate and robust data for triangulation. Furthermore, Patton (1999), highlighted that triangulation improves the investigator's justification over the assertion that a study's results are simply a product of a single approach, a single source, or a single researcher's predisposition. Accordingly, this study systematically reviewed relevant documents, and a comparative case study analysis of three eco-enterprises was equally adopted for data analysis to enhance credibility. The documents were randomly identified from peer-reviewed academic journals, official government policy statements, enterprises and NGO publications, and credible media reports.

Results: Case Studies of Circular Initiatives in Kano Nigeria

This section of the paper presents a case studies of 3 eco-enterprises in Kano, Nigeria that are turning waste into products, such as recycled material, reusable raw materials, plastic bricks, compost, recycled crafts, Impact on livelihoods, especially for women and youth, the challenges faced: financing, policy support, market linkage and Role of traditional knowledge vs. technological innovation.

Case study1: Trash and Eco Solutions Limited

Trash and Eco Solutions Limited was established in 2018 headquarter Kano, Nigeria, to developed from a passionate commitment to combat environmental degradation and promote sustainable waste management practices Trash and Eco Solutions developed from a passionate commitment to combat environmental degradation and promote sustainable waste management practices. Witnessing the adverse effects of unchecked pollution and waste mismanagement, our founders were inspired to act and make a difference in their community. Officially registered in 2021, Trash and Eco Solutions have since been at the forefront of the green movement in Kano, pioneering innovative solutions to tackle waste and preserve the environment for future generations. With a blend of local expertise and global sustainability principles, we've established ourselves as a trusted partner in building a cleaner, greener future for all.

Case study2: eTrash2Cash Limited

eTrash2Cash is an e-Waste Management service platform in Kano, Nigeria. It manages online the collection of all kinds of wastes from low-income households in Kano, Nigeria and awards them incentives. The startup processes these wastes and makes reusable materials from them, like tissue papers from paper wastes and lumbers from plastic wastes. eTrash2Cash is a mobile waste

management enterprise, it is the first and premier technology-based waste management enterprise in northern Nigeria, providing strong and innovative waste collection and recycling scheme, leveraging on ICT to provide strong environmental, economic and social positive impacts. It registers and collects all varieties of wastes (paper, plastic, glass, electronics, metals, food) from 10,000 low and middle-income earning households and commercial hubs in Kano City online using web technology and gives them incentives, in form of cash rewards through mobile money (eMoney) in exchange for their wastes, depending on its quality and quantity.

Case study 3: Gumsag Recycles Limited

Gumsag Recycles is another eco-enterprise established and operating in Kano State, Nigeria with focus on processing High-Density Polyethylene (HDPE) and PET plastic waste into high-grade feedstock, including sorted and baled PET suitable for food-grade rPET manufacturing Markets Served: Supplies clean PET and HDPE feedstock to both local recyclers/manufacturers and international clients Collection & Sorting: Engages informal collectors and small-scale suppliers across Kano to source plastic waste. PET bottles are meticulously sorted by quality to meet rPET standards. HDPE streams are similarly processed Processing: Waste is baled and packaged for transport. PET is prepared according to industrial specifications; HDPE is prepared as reusable industrial material.

Table 1. Summary of three Selected Waste Base Eco-Enterprises in Kano

Enterprise	Waste Stream	Value-Added Products	Target Beneficiaries	Employment Focus
Trash & Eco Solutions	Mixed municipal waste	Compost, recycled materials	Local communities, women	Collection, outreach, training
eTrash2Cash	Mixed household waste	Reusable raw materials	Low-income households, youth	Digital collection, incentives
Gumsag Recycles	HDPE, PET plastics	Clean rPET feedstock	Informal collectors, youth	Sorting, baling, logistics

Table 1 provides a comparative summary of three waste-based eco-enterprises (WBEEs) operating in Kano, Nigeria. It outlines how each enterprise manages specific types of waste, the value-added products they generate, their target beneficiaries, and their focus areas for employment. Notably, the first case study, Trash & Eco Solutions, stands out with a distinct approach in terms of its waste stream, the products it produces, its beneficiary clusters, and its employment strategy, compared to the other two enterprises, eTrash2Cash and Gumsag Recycles.

Conclusion

Waste-based eco-enterprises in Kano offer a viable pathway to integrate environmental sustainability with inclusive socioeconomic development. With targeted policy support, capacity-building, and market linkages, WBEEs can scale as engines of grassroots innovation, reducing urban waste while empowering marginalized actors. The proposed IC-scaling framework provides a replicable model for similar urban settings across West Africa. The transition to a circular economy in Kano presents a unique convergence of environmental urgency and community development potential. WBEEs like Gumsag Recycles, Trash and Eco Solutions, and eTrash2Cash demonstrate how circular business models can catalyse urban waste management, local livelihoods, and grassroots innovation. With targeted support, judicious policy recognition, capacity-building, financing instruments, and market access, they can elevate inclusive circularity from niche enterprises to a city-wide developmental strategy. The paper employed qualitative methodology that combines case studies of three successful eco-enterprises with documentary analysis, the study identifies key enablers,

challenges, and social impacts, emphasizing the contributions of youth, women, and informal actors. It also assesses policy and financing barriers that limit sectoral growth. The findings suggest that with targeted interventions, such as regulatory recognition, capacity-building, and enhanced market access, WBEEs can effectively address urban waste challenges, reduce poverty, and drive grassroots innovation. The paper concludes by proposing a framework for scaling inclusive CE models in similar urban contexts

Declaration

In this study, the authors declare no conflicts of interest.

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ORCID ID:

Muhammad Umar: https://orcid.org/0009-0009-9163-9419

Hassan Nuhu Wali: https://orcid.org/0009-0005-1433-3687

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