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BRIDGING THE GAP IN WASTE MANAGEMENT

An Analysis by Taka Taka Ni Mali Foundation

Innovating Waste Management Solutions for a sustainable circular economy

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FOREWORD

In the pursuit of a cleaner and more sustainable future, Taka Taka ni Mali Foundation is proud to present this comprehensive report on the gap analysis on waste management in Kenya. As stewards of environmental responsibility, we have embarked on a journey to analyze the current state of waste management in key counties, shedding light on the challenges and opportunities that shape Kenya's efforts in this critical domain.

Within the pages of this report lies more than just statistical figures; it encapsulates the very essence of our commitment to tackling the daily challenges faced by communities in the realm of waste management. It delves into the heart of the matter, shedding light on the intricate tapestry of realities that define the waste landscape in Kenya. As we navigate through these narratives, we unveil not only the struggles but also the collective endeavors required to bridge the existing gaps. This report stands as a testament to our unwavering dedication to transparency, accountability, and the shared aspiration of instigating positive change.

Beyond the numbers, it underscores how waste management intricately aligns with the Sustainable Development Goals, becoming an integral part of our national pursuit of a sustainable economy. Offering insights into Kenya's waste management policy and legislative landscape, this report serves as a guide for key stakeholders in both the public and private sectors. It illuminates the avenues through which existing opportunities can be harnessed to propel proper sector management. Furthermore, the report unveils a spectrum of waste management technologies, presenting a roadmap for nationwide implementation, steering us toward a more promising future.

Our mission at Taka Taka ni Mali Foundation goes beyond waste management; it encompasses a vision of a circular economy where waste transforms into a valuable resource. Through strategic partnerships, regulatory advocacy, and community engagement, we aim to contribute to a paradigm shift in how waste is perceived, managed, and utilized.

As you delve into the pages of this report, we invite you to join us in understanding the complexities and intricacies of waste management in Kenya. Let this document serve as a catalyst for informed discussions, innovative solutions, and collective action towards a cleaner, greener, and more sustainable tomorrow.

Together, let us embark on this transformative journey towards responsible waste management, for our environment, our communities, and the generations yet to come.

MARY NGECHU

Founder & Patron Taka Taka ni Mali

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ACKNOWLEDGEMENTS

We extend heartfelt thanks to our partners for their pivotal roles in shaping this report:

KEPSA
KENYA PRIVATE SECTOR ALLIANCE

KAM
KENYA ASSOCIATION OF MANUFACTURERS
60 Years

TRANSFORM

ALLIANCE FOR SCIENCE

Packaging Producer Responsibility Organisation
PAKPRO

EY
Building a better working world

ProtosCapital
LLP

ACRONYMS AND ABBREVIATIONS

EIA	– Environmental Impact Assessment
EMCA 1999	- Environmental Management and Coordination Act 1999.
NEMA	– National Environment Management Authority
PPP	– Public Private Partnership
SDGs	- Sustainable Development Goals
EPR	– Extended Producer Responsibility
TTNM	– Taka Taka ni Mali Foundation
GDP	- Gross Domestic Product
ICT	-Information Communication Strategy
SMEs	- Small &Medium Enterprises
CSO	-Civil Society Organizations
CBO's	-Community Based Organizations
UNEP	- United Nations Environment Program
ESG	– Environment Social Governance
GIS	– Geographic Information System
NORM	– Naturally Occurring Radioactive Materials
MRF	– Material Recovery Facility
GRI	– Global Reporting Initiative
VAT	– Value Added Tax

DEFINITION OF KEY TERMS

Waste:
Any material that is no longer considered useful or required after the completion of a process and is thus discarded or eliminated.

Domestic Waste:
Waste generated from households, typically consisting of everyday items like food scraps, packaging materials, and household items.

Municipal Waste:
Refers to waste generated from communities and public places, including both residential and commercial sources within a municipality.

Industrial Waste:
Waste produced as a byproduct of industrial processes, encompassing materials like chemicals, manufacturing byproducts, and other industrial residues.

Hazardous Waste:
Waste materials that pose a threat to human health or the environment due to their inherent toxicity, flammability, corrosiveness, or other hazardous characteristics.

Non-Hazardous Waste:
Waste that isn't dangerous to people or the environment. It includes regular stuff like household waste and construction materials.

E-waste (Electronic Waste):
Discarded electronic devices and equipment, including computers, smartphones, and appliances, which may contain hazardous materials and require specialized disposal methods.

Waste Management:
The systematic handling, collection, transportation, recycling, and disposal of waste materials to minimize environmental impact and public health risks.

Sustainable Waste Management:
A waste management approach that relies on the waste management hierarchy, a system that focuses on avoidance, reduction, reuse, recycling, energy recovery, and finally, treatment or disposal.

Extended Producer Responsibility (EPR):
A policy approach where manufacturers and producers are held responsible for the entire life cycle of their products, including the management of post-consumer waste.

Manufacturer:
In the context of EPR, manufacturers are considered producers, but the term "producer" encompasses a broader range of entities involved in the product life cycle, including those responsible for designing, marketing, and distributing the product.

Producer:
In the context of EPR, a producer refers to any individual or entity that is responsible for placing a product on the market. This includes manufacturers, importers, brand owners, and sometimes retailers.

Waste Infrastructure:
Physical facilities and structures designed for waste management, including landfills, recycling centers, and treatment plants.

Landfill Gas:
Gases produced by the decomposition of organic waste in landfills, often composed of methane and carbon dioxide.

Waste-to-Energy (WTE):
Technologies that convert waste materials into energy, such as electricity or heat, through processes like incineration or anaerobic digestion.

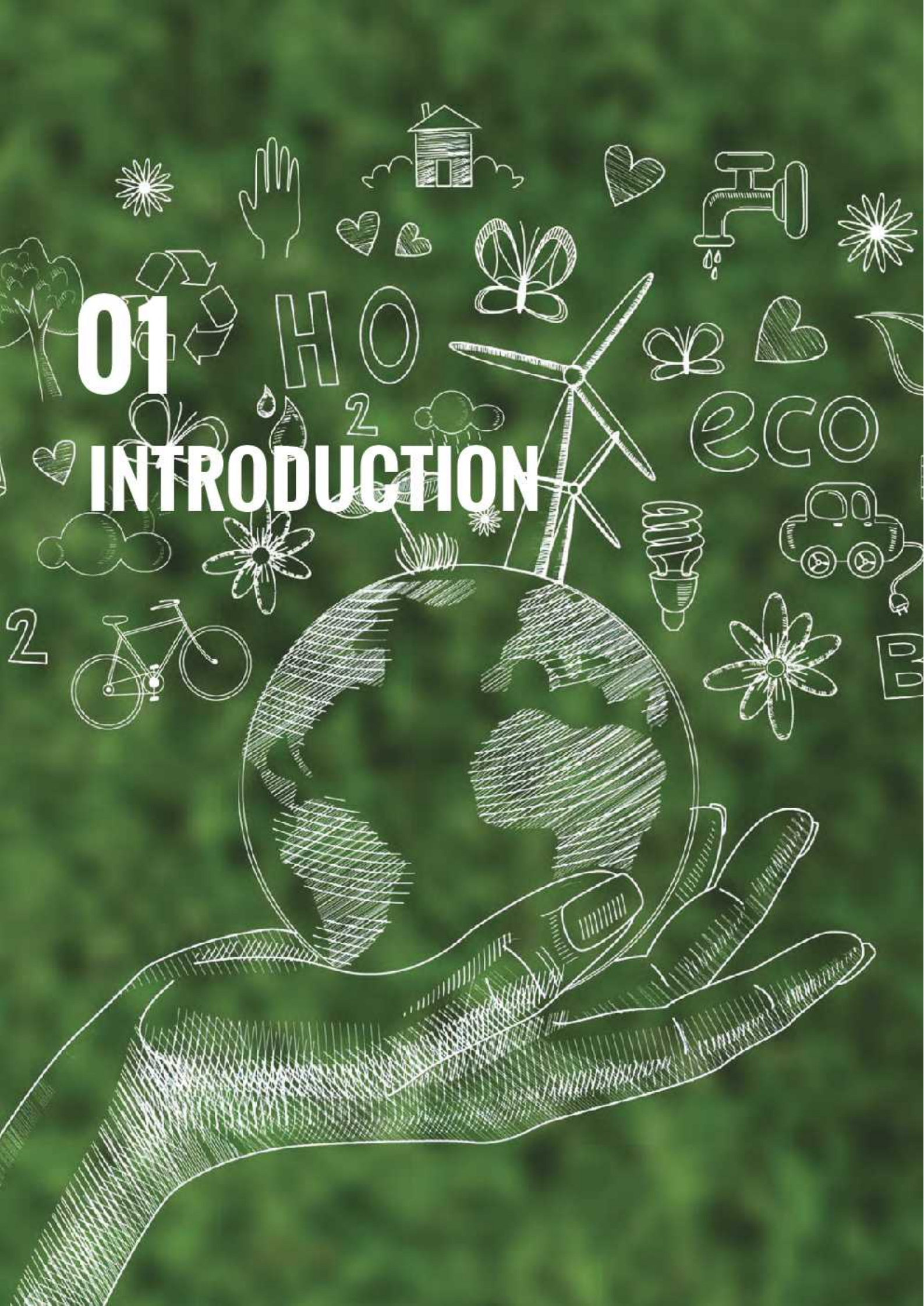
Circular Economy:
An economic model that promotes the continuous use and regeneration of products and materials, emphasizing reduce, reuse, and recycle principles.

Solid Waste Segregation:
The practice of sorting and separating different types of solid waste at the source to facilitate recycling and proper disposal.

Geographic Information Systems (GIS):
Technology for spatial analysis and mapping, used in waste management for optimizing routes and planning.

Integrated Solid Waste Management (ISWM) Plan:
Comprehensive plans that outline strategies for managing solid waste, often addressing collection, disposal, and recycling efforts in a coordinated manner.

ESG (Environmental, Social, and Governance):
ESG refers to a set of criteria used by investors, businesses, and other stakeholders to assess a company's performance and impact in three key areas: how it treats the planet (Environmental), how it treats people, including its employees and communities (Social), and how it's managed, including its values and ethics (Governance).



01 INTRODUCTION

1.1 BACKGROUND INFORMATION

Kenya being a developing nation and with a keen focus to becoming the economic hub for the African continent has established vast industrial sectors. A significant part of this industrial development is happening in urban centers. Agriculture remains the backbone of Kenya's economy accounting for 21.17% of the country's GDP, with exports of tea, coffee and horticulture complementing the sector. Industry makes up 17.66 % of Kenya's GDP and a crucial strategy for economic growth. The services sector is the largest economic driver for growth in Kenya accounting for 55.06 % in GDP as of 2022.[1]

With nearly 53.8 million inhabitants, Kenya ranks among the 10 most populated nations in Africa. By 2050, [2]this number is forecast to almost double, and the country will be home to some 92.6 million people. This increased urbanization, rural-urban migration, rising standards of living and rapid economic growth have contributed to increased solid waste generation by industrialization and other domestic activities. It is important to note the substantial variation in the size and distribution of populations in the counties.

INDUSTRY

Industry makes up 17.66 % of Kenya's GDP and a crucial strategy for economic growth.

AGRICULTURE

Agriculture remains the backbone of Kenya's economy accounting for 21.17% of the country's GDP.

THE SERVICES SECTOR

The services sector is the largest economic driver for growth in Kenya accounting for 55.06 % in GDP as of 2022.

[1]Kenya: Share of economic sectors in the gross domestic product (GDP) from 2012 to 2022
https://www.statista.com/statistics/451143/share-of-economic-sectors-in-the-gdp-in-kenya/

[2]Demographics of Kenya - statistics & facts
https://www.statista.com/topics/7750/demographics-of-kenya/#topicOverview

[3](Battling Kenya's Plastic Waste: Young Kenyan Woman is Transforming Waste into Sustainable and Affordable Building Materials 2021)
https://www.worldbank.org/en/news/feature/2021/03/11/battling-kenya-plastic-waste-young-kenyan-woman-transforming-waste-into-sustainable-and-affordable-building-materials

It is estimated by the World Bank that Kenya generates between 3,000 to 4,000 tons of waste per day, majorly from urban areas. Nairobi alone generates 2,000 to 2,500 tons of waste per day.[3] Nairobi, as the capital and a densely populated city, contributes significantly to this waste stream, generating approximately 2,000 to 2,500 tons of waste per day. The high waste output from Nairobi is attributed to both its dense population and rapid population growth rate.

This information underscores a crucial interconnection between population density and the demands of waste generation and management. The higher population density in urban centers, especially in Nairobi, correlates with increased waste production. This correlation emphasizes the need for effective waste management strategies, particularly in densely populated areas, to address the environmental and logistical challenges associated with such substantial waste volumes. The figures serve as a stark reminder of the importance of implementing sustainable waste management practices to mitigate the environmental impact and ensure the well-being of urban communities in Kenya.

In Kenya, diverse waste streams, including domestic, municipal, industrial, and hazardous wastes, are generated, reflecting the country's multifaceted waste landscape. The rise of industrialization and the growth of information and communication technology (ICT) have given rise to emerging waste streams like e-waste and waste tires.

The composition of general waste exhibits significant variations among households, businesses, and industries, highlighting the complexity of waste management in the country. The evolving nature of waste streams necessitates a nuanced and adaptable approach to address the distinct challenges posed by each category of waste. Solid waste ideally includes refuse from households, non-hazardous solid waste from industrial, commercial, and institutional establishments, market waste, yard waste and street sweepings. This definition excludes medical waste, hazardous waste, and sewage waste. In the context of most low- middle-income countries such as Kenya, municipal waste is often mixed.

This waste is often dumped in open dumpsites or informal landfills which lack proper management and infrastructure. Dandora dumpsite in Nairobi is the most used in the country and largely unregulated. It receives about 850 tons of waste generated daily by Nairobi and covers approximately 30 acres of land.[4]

[3] NAMA - A CIRCULAR ECONOMY SOLID WASTE MANAGEMENT APPROACH FOR URBAN AREAS IN KENYA (Dr. Alexandra Soezer 2017) https://www.undp.org/publications/nama-circular-economy-solid-waste-management-approach-urban-areas-kenya#:~:text=The%20NAMA%20promotes%20an%20alternative,and%20towards%20various%20recycling%20practices.

The waste management sector in Kenya faces significant challenges and gaps that necessitate urgent attention and strategic interventions. This report presents an analysis conducted by Taka Taka Ni Mali (TTNM) Foundation, with the goal of understanding the current state of waste management amongst businesses, evaluating the regulatory landscape, and exploring opportunities for technological innovations that would aid the end-to-end management of waste, tracking of data and complete reporting by businesses of their sustainability efforts.

1.2 PURPOSE

This report demonstrates a comprehensive gap analysis of the waste management sector in Kenya, focusing on key areas critical for sustainable improvement.

The primary purpose is to unveil the current state of waste management in the country, analyze existing policy framework, and explore opportunities for technological and innovative advancements.

By doing so, the report seeks to identify gaps and inefficiencies in the current waste management ecosystem and provide actionable recommendations for a robust, long-term, and sustainable plan that will serve as a road map for elevating the waste management sector in Kenya and support sustainability reporting by businesses that meets stakeholder expectations.

1.3 SCOPE

The scope of the gap analysis in this report covers the following areas of focus:

a) Current State of Waste Management

The analysis delves into statistical data on waste generation, collection, and disposal. Understanding the present landscape, aids to pinpoint specific challenges and areas requiring immediate attention. This insight forms the foundation for developing effective and targeted solutions.
The analysis elaborates the environmental, social, and economic aspects of waste management and highlights findings on job creation, community involvement, public awareness, and on the importance of alignment with Sustainable Development Goals (SDGs) and eco-friendly approaches.

b) Technology and Innovation

The analysis in this report evaluates the current technologies and trends employed in waste management. This report aims to uncover opportunities for improvement, efficiencies, and sustainable practices and recommend innovative solutions that align with global best practices.
Specifically, the report introduces ECOLOOP, an innovation that empowers businesses to seamlessly collect data, measure and report on material metrics relating to Environmental, Social and Governance (ESG) material topics.

c) Regulatory Landscape

The examination of existing waste management regulations is pivotal. This report assesses the current legal and policy framework and identifies gaps in legislation, regulation, and enforcement. This process is essential for ensuring that regulatory measures align with the dynamic needs of an evolving waste management landscape.

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1.4 OUR APPROACH

To conduct a comprehensive analysis of the waste management sector in Kenya, our methodology centered on obtaining valuable insights from key stakeholders. Recognizing the diverse perspectives integral to this assessment, we employed a structured questionnaire as a primary data collection tool.

The questionnaire was designed to capture a wide range of perspectives on the current state of waste management in Kenya. A strategic sampling approach was adopted to ensure representation from various stakeholder groups, including waste management authorities, businesses, industry experts, regulatory bodies, and local communities.

The questionnaires were distributed electronically and in hard copy to facilitate participation across different demographics and locations. This mixed-method approach allowed for a comprehensive collection of both qualitative and quantitative data.

02
AN OVERVIEW OF THE CURRENT STATUS

2.1 CURRENT STATE OF WASTE MANAGEMENT

It is estimated that Kenya generates between 3,000 to 4,000 tons of waste per day and a large proportion of it comes from urban areas. The current state of waste management in the country warrants a need to visualize this descriptively in our minds.

Soda Bottles Comparison: If each ton of waste were represented by standard 500ml soda bottles, the daily waste would fill approximately 6 to 8 million bottles. Laid end to end, these bottles would stretch over 3,500 to 4,667 kilometers, roughly the distance from Nairobi to Cairo.

A review of waste collected from main urban areas in Kenya by The Earth & I as of 2021 shows that:

KISUMU COUNTY

Kisumu County which is home to over 1.1 million generates approximately 551 tons of waste daily. A total of 20% of this is collected and transported, while the remaining 80% accumulates in the open.

There are several dumpsites in the county such as Kachok dumpsite. Due to lack of a formal system of waste separation, locals have engaged in the informal economy of waste recovery.

In Kisumu County, the Department of Environment oversees solid waste management services, employing Environmental Officers in each of its five sub-counties. These officers report directly to the Chief Officer in Charge of the Environment. To enhance effective solid waste management, the government enacted the Kisumu County (Solid Waste Management) Act in 2015. This legislation established the Kisumu Solid Waste Management Board, tasked with regulating and supervising all aspects of solid waste management.[5]

[5]Dr. Moses Kathuri Njeru, 'Kenya's Growing Pain Sustainable Solid Waste Management' (The Earth & I, April 2021). https://www.theearthandi.org/post/sustainable-solid-waste-management

NAKURU COUNTY

Nakuru is the third most populous county with a population of over 2.1 million. The Nakuru County Government estimates that 2204.62 tons is generated daily from the county. A stipulated 45% of these wastes are collected while 55% is not recovered.

Disposal mainly takes place in dump site, the main dump site in Nakuru being Gioto. Per day, 80 – 100 lorryloads of waste are taken to Gioto. The mandate for waste management is with The Department of Environment, Natural Resource and Energy of the Nakuru County. This mandate captures policy and strategy development, collection charges, cleaning and issuing of permits for waste management. The county government has also contracted Community Based Organizations and private contractors to supplement waste management activities.[6]

MOMBASA COUNTY

Mombasa County is one of the cities in Kenya with a population of over 1.1 million people. The county generates abouts 1100 tons of solid waste daily, and an estimate of 50% of this waste is collected and disposed of while the other half remains uncollected. The county has three garbage disposal sites: Chanda, Mwakirunge, and Kibarani. Historically, Kibarani was favored due to its proximity to the waste source.

Yet, Mombasa County has undertaken efforts to close this dumpsite and transform it into a recreational park as a component of a broader regeneration initiative in Kenya. Mombasa has a large amount of waste collection equipment, including heavy machinery and over 80 trucks for managing solid waste. Despite the significant number of trucks, almost half of the solid waste in Mombasa is not picked up on time. This leads to informal waste recovery and open burning at temporary collection points. The workforce to operate the trucks and equipment may be insufficient, and there is no formal waste separation. However, some community-based organizations and individuals pick up waste either at disposal or collection points.[7]

[6] Water, Energy, Environment, Natural Resources, and Climate Change – County Government of Nakuru (Nakuru County Government, 2021). https://nakuru.go.ke/water-irrigation-environment-and-natural-resources/

[7] Dr. Moses Kathuri Njeru, 'Kenya's Growing Pain: Sustainable Solid Waste Management' (The Earth & I, April 2021). https://www.theearthandi.org/post/sustainable-solid-waste-management

NAIROBI COUNTY

Nairobi County, the capital city of Kenya, is home to over 4.4 million people and generates around 2600 tons of waste daily. However, 660 tons of this waste goes uncollected. Therefore, in terms of waste management in Nairobi County, approximately 74.62% of the generated waste is collected, while about 25.38% remains uncollected. Waste management in the county is governed by two key documents: the Integrated Solid Waste Management Plan (ISWMP), revised in 2010, and the Nairobi City County Solid Waste Management (SWM) Act of 2015[8] The Act highlights that managing solid waste is a shared responsibility among waste generators, property owners, occupiers, contracted service providers, and others. It also emphasizes the significance of public participation in ensuring effective solid waste management.[9]

Despite being the sole designated solid waste disposal site in the county, experts have consistently noted that the Dandora dumpsite is full and contributes to pollution in the surrounding area. To address this issue, various community-based organizations, youth groups, and private waste handling companies collaborate with the county government to manage solid waste. Additionally, the county works in partnership with the Kenya Alliance of Residents Association (KARA) to develop waste regulations, collaborates with the National Environment Management Authority (NEMA) to enhance compliance and enforcement, and engages with the United Nations Environment Program to address carbon emissions related to waste burning. These non-governmental entities actively promote the principles of the "three Rs" (reduce, reuse, recycle) and contribute to environmental education initiatives.

[8]Integrated Solid Waste Management Plan (ISWMP) 2010
https://knowwaste.net/Documents/IS_6_4_Nairobi_ISWMplan_draft1_19Feb.pdf
[9]The Nairobi City County Solid Waste Management (SWM) Act of 2015
https://nairobi.go.ke/nairobi-city-county-acts/

2.2 SAMPLED COUNTIES WASTE GENERATION COMPARATIVE ANALYSIS

Each bar represents the quantity of waste produced in a single day,[10] providing a comparative overview of the population density and waste generation in these sample regions as of 2021.

Figure1: The bar graph illustrates the daily amount of waste generated in five sampled counties in Kenya.

[10]Dr. Moses Kathuri Njeru, 'Kenya's Growing Pain: Sustainable Solid Waste Management' (The Earth & I, April 2021) https://www.theearthandi.org/post/sustainable-solid-waste-management

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2.3 SAMPLED COUNTIES WASTE COLLECTION COMPARATIVE ANALYSIS

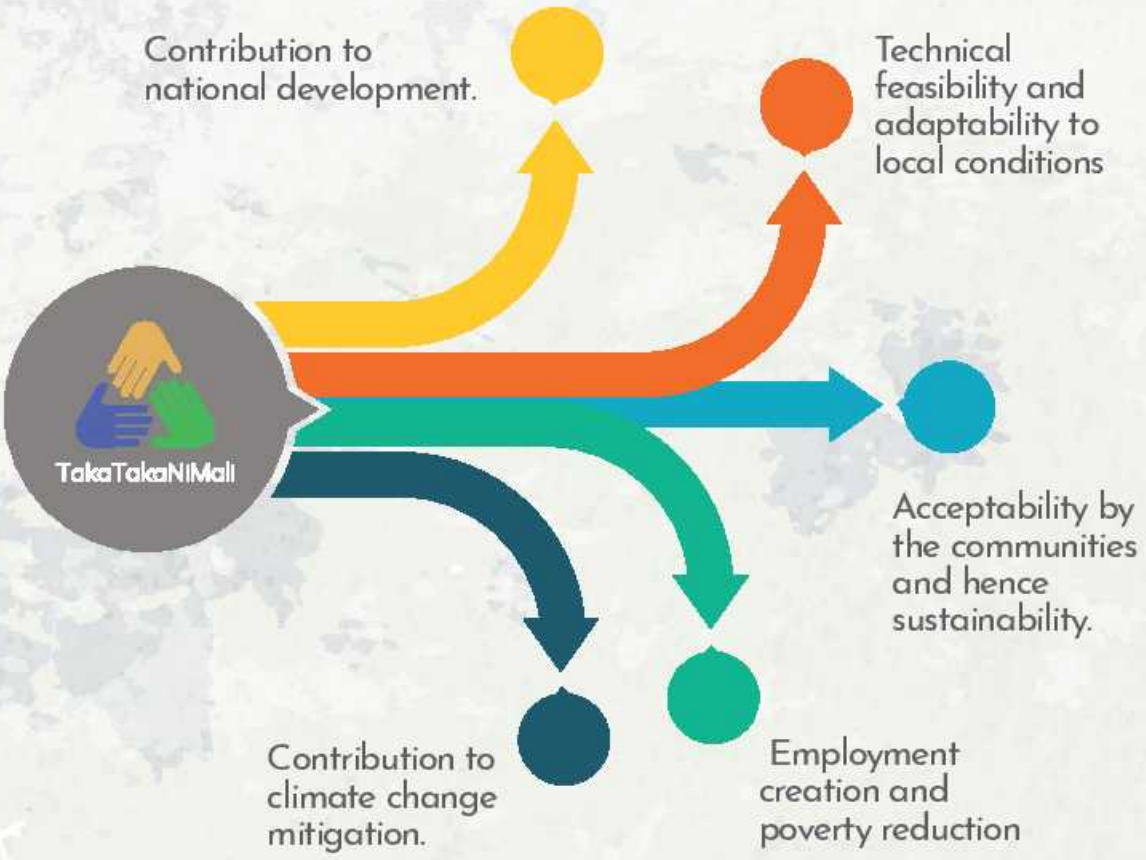
Each bar represents the proportion of daily waste generation, highlighting the varying levels of effectiveness in waste collection across the sampled counties as of 2021.[11]

Figure 2: This bar graph depicts the percentage of waste collected and uncollected in five sampled counties in Kenya.

[11] *'Dr. Moses Kathuri Njeru, 'Kenya's Growing Pain: Sustainable Solid Waste Management' (The Earth & I April 2021). https://www.theearthandi.org/post/sustainable-solid-waste-management*

2.4 TECHNOLOGY AND INNOVATION DEVELOPMENT

Several waste management technologies are currently available that can be used to mitigate climate change and provide socio-economic benefits to the country. According to report titled *Technology Action Plan for Climate Change Technologies, Adaptation* [12]- conducted by UNEP in collaboration with NEMA in 2013, reported the criteria for prioritization of technologies in the waste management sector were as follows:



[12]Technology Action Plan for Climate Change Technologies, Adaptation - NEMA
https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyactionplan-mitigation-kenya-13.pdf

Based on the above criteria the results of prioritization of waste management technologies were as follows:

Methane capture from bio-digesters - this includes anaerobic digestion and incineration processes to generate biogas or electricity.

Waste composting technologies -are used for organic waste management.

Waste plastic recycling community -based organizations and startups have leveraged technology to promote recycling initiatives. This includes the use of online platforms and apps to connect recyclers with waste producers.

Smart Bins with Fill Level Sensors - are being explored to improve waste collection efficiency. (The T-Bin in Kenya)
Methane capture from landfills.

Mobile Applications and RFID (Radio-Frequency Identification) - has been employed for tracking and managing waste bins. Each bin is equipped with an RFID tag, allowing for real-time tracking and monitoring of collection activities.

Waste reuse.

2.5 POLICY AND LEGISLATION LANDSCAPE

Several waste management technologies are currently available that can be used to mitigate climate change and provide socio-economic benefits to the country. According to report titled Technology Action Plan for Climate Change Technologies, Adaptation - conducted by UNEP in collaboration with NEMA in 2013, reported the criteria for prioritization of technologies in the waste management sector were as follows:

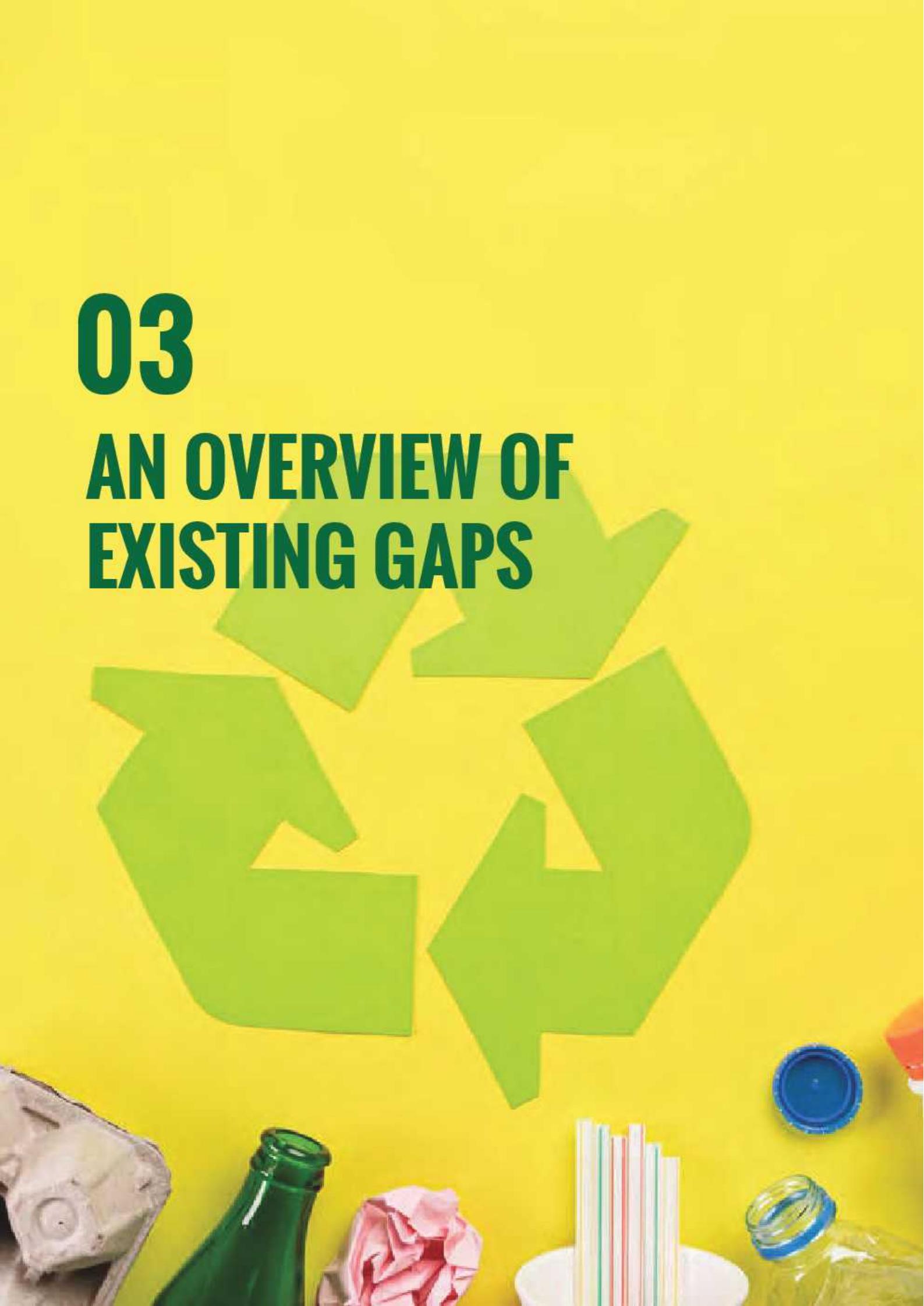
POLICY AND LEGISLATION	OBJECTIVES ALIGNED TO WASTE MANAGEMENT
Kenya Vision 2030	Kenya's Vision 2030 is inspired by the principle of Sustainable Development. The Waste Management Strategy is centered on Youth Groups. It aims to establish a solid waste management system for the City of Nairobi on a Public Private Partnership basis. This will set a trend to be followed by other municipalities.
National Climate Change Action Plan (NCCAP)	This Kenya's first Action Plan on climate change. It highlights improvement of waste management through: a) Creation of a regulatory framework that allows for the rights to landfill gas to be licensed for developers for capture and use. b) Creation of financial incentives for private sector players to install composting and methane capture facilities for energy generation. c) Improve rates of waste collection and disposal
National Climate Change Action Plan (NCCAP)	This Kenya's first Action Plan on climate change. It highlights improvement of waste management through: a) Creation of a regulatory framework that allows for the rights to landfill gas to be licensed for developers for capture and use. b) Creation of financial incentives for private sector players to install composting and methane capture facilities for energy generation. c) Improve rates of waste collection and disposal
Environmental Management and Coordination Act (EMCA) 2015	This law provides for the institutional framework for environmental protection in Kenya and NEMA is implementing body. EMCA includes the following detailed regulation a) Solid Waste Segregation and Reduction at Production and Consumption Levels b) Primary Storage, Collection, Transportation and Transfer Stations c) Treatment and Landfills d) Incineration and Recycling of Solid Waste e) Resource Recovery and Construction and Demolition Waste f) Hazardous Wastes

Sustainable Waste Management Act 2022.	The Act focuses on circularity, extended producer responsibility and waste management. Private sector companies must create three-year waste management plans and submit annual reports to NEMA. They are required to identify and address negative impacts of their products, promote product recovery and reuse, recycle materials, and consider environmental aspects in design and disposal. Additionally, they must collect and separate hazardous waste before disposing of it in facilities provided by the county government or NEMA.
The Solid Waste Management Initiative	It was established under the Kenya Vision 2030 Agenda as one of the flagship projects. This calls for the relocation of the Dandora dump site, and development of solid waste management systems in five leading municipalities and the economic zones planned under Vision 2030.
The Plastic Bags Ban	Enforced since 2017, the ban prohibits the use, manufacture, and importation of plastic bags, aiming to curb environmental pollution.
The National Solid Waste Management Strategy	The strategy seeks to establish a common platform for action between stakeholders to systematically improve waste management in Kenya. The measures set out in the strategy cannot be undertaken without a collective approach to waste challenges, and the involvement of a broad range of stakeholders in their implementation.
The Integrated Solid Waste Management (ISWM) Plan for Nairobi	Launched in March 2009, this plan is designed to help Nairobi to overcome its solid waste management challenges, with a focus on solving the public health issues related to the lack of consistent, efficient, and effective waste collection and disposal, and to reduce waste streams by at least 50 per cent through recycling.
The Nairobi City County Solid Waste Management Act (SWM), 2015	The Act highlights that managing solid waste is a shared responsibility among waste generators, property owners, occupiers, contracted service providers, and others. It also emphasizes the significance of public participation in ensuring effective solid waste management. The Act recognizes the County Government as the sole body with solid waste disposal responsibility and other entities must apply for an operation permit.
Occupational Safety and Health Act of 2007	The Act stipulates on the handling, transportation and disposal of chemicals and other hazardous substances materials.
The Scrap Metal Act (2015)	The Act prohibits anybody from exporting any scrap metal unless the public officer in charge of the police station has been given written notice of the intention to export the scrap metal, specifying in such notice the premises and time at which the scrap metal may be inspected.

Table 1: Waste Management Policy and Legislation Landscape in Kenya

03

AN OVERVIEW OF EXISTING GAPS



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3.1 EXISTING GAPS IN WASTE MANAGEMENT

In Kenya, waste management faces several significant gaps that hinder effective management practices, leading to environmental, social, and economic challenges. Some of the key existing gaps in waste management identified by this gap analysis report include:

01

Inadequate Waste Collection and Transport

A significant portion of generated waste in all counties remains uncollected, ranging from 20% to 55%, leading to accumulation in open areas. [13]

02

Insufficient Formal Waste Separation

The absence of a formal system of waste separation results in reliance on informal waste recovery, affecting recycling efforts.

03

Overloaded Dumpsites and Environmental Pollution

Dumpsites across the country face overload issues, contributing to environmental pollution and health concerns.

04

Challenges in Policy Implementation

Despite legislative frameworks, there are gaps in the effective implementation and enforcement of waste management policies in Kenya.

05

Limited Public Awareness and Education

Counties struggle with creating public awareness and education on sustainable waste management practices, leading to gaps in citizen participation and adherence to guidelines.

[13] Dr. Moses Kathuri Njeru, 'Kenya's Growing Pain: Sustainable Solid Waste Management' (The Earth & I, April 2021) https://www.theearthandi.org/post/sustainable-solid-waste-management

3.2 TECHNOLOGY RELATED GAPS

While there exist several innovations on waste management technologies, most of these systems fall short of enabling businesses to track, monitor and report on their efforts that promote environmental stewardship and social responsibility through waste management. The table below summarizes some of the gaps in these innovations: and innovation for waste collection in Kenya, ultimately fostering a more efficient and sustainable waste management ecosystem.

EXISTING TECHNOLOGIES	ADOPTION GAPS
Advanced Tracking Systems	Many waste management systems in Kenya lack advanced tracking mechanisms, making it challenging to monitor the efficiency of waste collection routes and schedules due to the absence of real-time data.
Smart Bin Technologies	The lack of widespread adoption of these smart bin technologies hampers the optimization of waste collection routes, leading to inefficient resource allocation and increased operational costs.
Integration of Geographic Information Systems (GIS)	GIS applications play a crucial role in optimizing waste collection by providing spatial analysis and optimization of route planning. However, their integration into waste management practices in Kenya is not widespread.
Data-driven Decision-Making	The absence of robust data analytics tools and platforms in waste management operations impedes data-driven decision-making. Data analytics could enhance predictive modelling for waste generation.
Mobile Applications	The utilization of mobile applications is not widespread. Lack of user-friendly interfaces and accessibility diminishes the potential for increased public participation in waste reduction and proper disposal practices.
Automated Sorting Technologies	The low usage of automated sorting technologies result in increased manual sorting efforts and reduces the efficiency of recycling processes, contributing to higher operational costs and lower recycling rates.
Fleet Management Technologies	The use of outdated vehicle tracking, and fleet management systems leads to inefficiencies in waste collection logistics. Upgrading could optimize routes, reduce fuel consumption, and improve overall operational efficiency.
Standardized Communication Protocols	The absence of standardized communication protocols among waste management stakeholders, including municipalities, private waste collectors, and technology providers, hinders seamless integration of innovative solutions.

Table 2: Waste Management Technology related Gaps in Kenya

3.3 POLICY AND LEGISLATION LANDSCAPE GAPS

In the realm of waste management in Kenya, a closer examination reveals certain legislative and policy gaps that impact the efficiency and sustainability of waste practices. While existing policies provide a foundation, critical gaps persist, influencing the effectiveness of waste management initiatives. These gaps range from enforcement challenges and limited incentives for comprehensive recycling practices to insufficient frameworks addressing emerging environmental concerns. [14]

POLICY AND LEGISLATION GAP	GAP ANALYSIS
Enforcement	Despite having policies and laws in place, there has been a historical challenge in enforcing waste management regulations. Inconsistent enforcement has led to non-compliance and hindered the effectiveness of waste management initiatives.
Extended Producer Responsibility (EPR) Implementation	There is an ongoing development of an Extended Producer Responsibility Policy through the Sustainable Waste Management Act 2022. Section 13 obligates all producers that introduce products specified under schedule one of the regulations, to the Kenyan market, to bear mandatory Extended Producer Responsibility for the post-consumer stage and their products' lifecycles. The full implementation and enforcement of EPR, have been limited.
Inadequate Infrastructure Investment	There has been a need for increased investment in waste management infrastructure, including waste collection systems, recycling facilities, and proper disposal sites.
Public Awareness and Education	Public awareness and education on waste management practices have often been insufficient. Active participation from the public is required to fill gaps in awareness that hinder community engagement in waste reduction and recycling initiatives.
Incentives for Recycling	The Kenyan government has provided incentives to businesses for plastic recycling through VAT exemptions for services offered included in plastic recycling plants and the cost of machinery and equipment to build plastic recycling plants. However, the existing gaps are limited duration of incentives, lack of awareness of incentive, a lack of inclusivity for small enterprises and a low market demand for recycled products.
Hazardous Waste Management	The Waste Management Regulations prohibits operators producing non-hazardous waste from discharging or disposing of waste unless it has been treated in a treatment facility and in a manner prescribed by NEMA. [15] There are no approved methods for treatment of non-hazardous waste.

[14] Kenya Waste Management Guidelines (developed for petroleum sector) 2020
https://www.nema.go.ke/images/Docs/Selelah_OilandGas/Waste%20Management%20Guidelines%20for%20O&G%20sector_120320-min.pdf

[15] Kenya Waste Management Guidelines developed for petroleum sector (2020)
https://www.nema.go.ke/images/Docs/Selelah_OilandGas/Waste%20Management%20Guidelines%20for%20O&G%20sector_120320-min.pdf

Harmonization of County-Level Regulations	Waste management responsibilities are devolved to county governments in Kenya. However, there are variations in regulations and enforcement mechanisms among counties, highlighting the need for better harmonization and standardization.
Research and Data Collection	Gaps in comprehensive research and data collection on waste generation patterns, composition, and disposal practices can impede evidence-based decision-making. a) Kenyan law has no provisions on underground disposal. b) Kenyan law fails to regulate produced sand, naturally occurring radioactive materials (NORM) c) Most of Kenya's requirements on waste apply to hazardous – as opposed to non-hazardous waste. d) Kenya's legislation does not address management of sanitary waste, hence it fails to grant authorities the power to review and approve operator's proposed managing options of sanitary waste. Gaps in comprehensive research and data collection on waste generation patterns, composition, and disposal practices are impeding evidence-based decision-making for effective waste management.
Circular Economy Integration	Many of Kenya's policies promoting the circular economy primarily focus on the principle of minimizing waste through thoughtful design and partially replenishing natural resources. However, there are limited measures in place to actively promote the continuous use and retention of materials and products within the circular economy framework. (repair, servicing and maintenance, refurbishment, re-establishment)
Adaptation to Emerging Challenges	The legal and policy frameworks may need continuous adaptation to address emerging challenges, such as the proliferation of single-use plastics, changing consumption patterns, and advancements in waste-to-energy technologies.

Table 3: Waste Management Policy and Legislation Gaps in Kenya

3.4 FINDINGS FROM THE SUSTAINABILITY GAP ANALYSIS SURVEY BY TTNM

The survey findings illuminate a diverse landscape of waste management practices and sustainability engagement among participating organizations. A notable proportion of respondents (50 respondents) indicated outsourcing for waste collection as their predominant waste handling practice within their premises. Challenges in adopting sustainable waste management models were identified, with 60% citing lack of segregation infrastructure as a significant obstacle.

The current office setting of this institutions showcases that 65% of the sampled organizations share their complex with other businesses, 30% are sole occupiers and 5% work exclusively online. Shared complexes may pose challenges in waste segregation, while sole occupiers potentially have more control over sustainable practices. The online-focused segment may generate less physical waste. These insights emphasize the varied contexts of waste management, calling for tailored strategies to enhance sustainability across different office settings in Kenya.

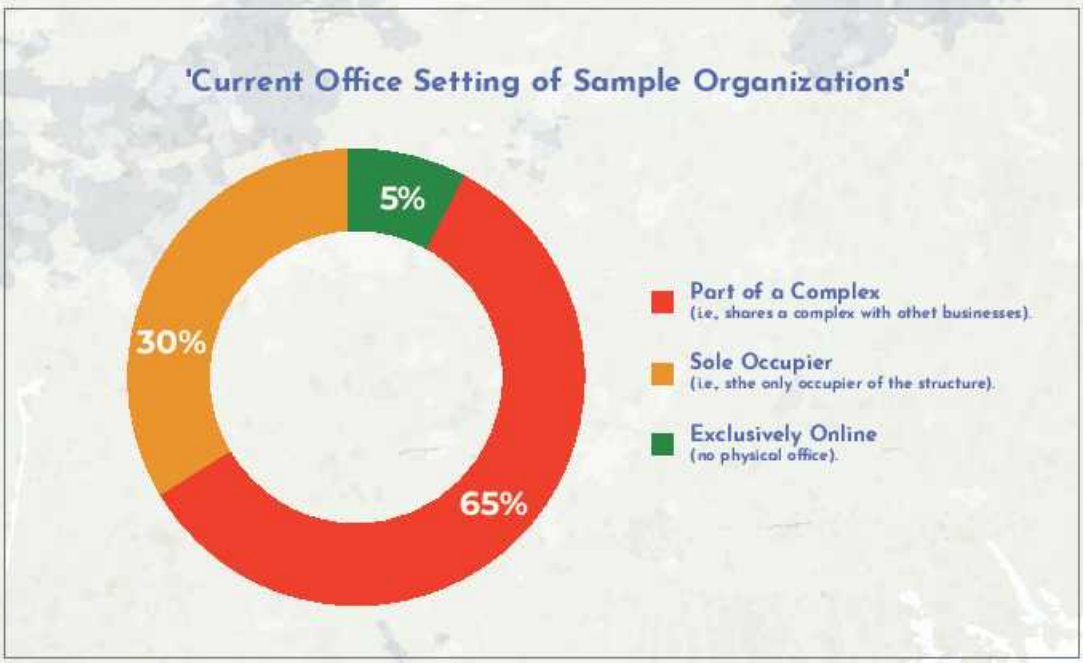


Figure 3: Office Setting for the Sampled Organizations

The survey indicates 50% of the organizations use a waste collector outsourced by their companies and 40% outsourced by the property manager. Only 5% did not know who does their waste management and 5% were being managed by TTNM. These insights suggest a mixed approach to waste management with both internal and external entities being utilized. The 5% who were unaware of their waste management source underscore potential gaps in communication or awareness within organizations. These insights underscore the need for increased awareness and tailored waste management solutions across diverse organizational structures in Kenya.

Figure 4: Waste Collectors for the Sample Organizations

The survey highlighted that 40% of the organizations do not track or keep any record of their waste collection. Furthermore, 25% of the organizations indicated that the contracted waste collector provides them with their waste collection data on a regular basis. 10% of the sample indicated to keep the record on notebooks and 5% used a digital platform to store that data. Only 5% keep records of their waste collection and track vendor visits and audit their tracking forms. This showcases a need for greater emphasis on systematic tracking, vendor audits, and data-driven waste management practices in the country. The limited use of digital platforms furthermore indicates potential for enhanced technological solutions.

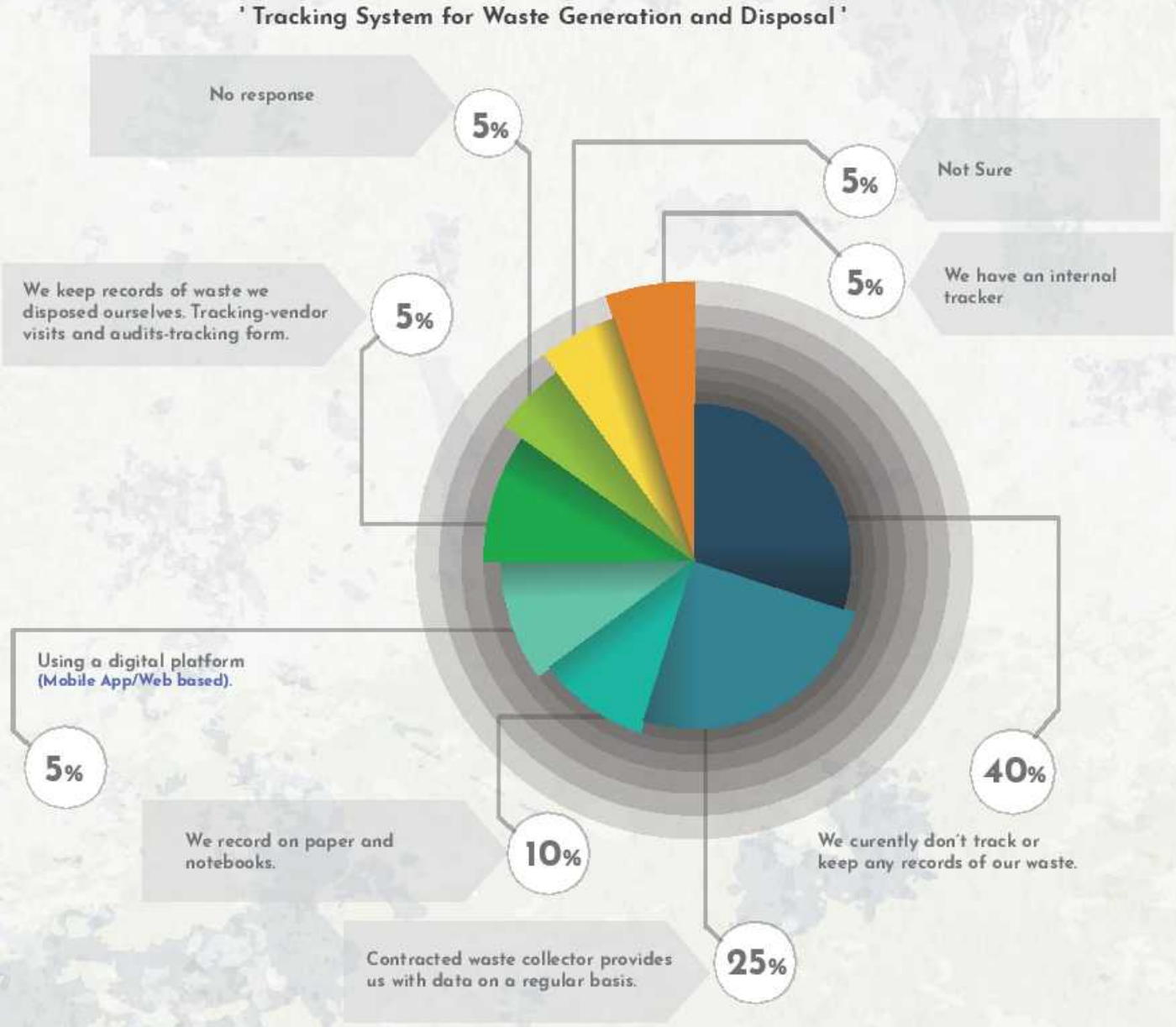


Figure 5: Organizations that track their Waste Collection

Challenges encountered in this waste management sector include lack of finances to shift to a sustainable waste management system and lack of waste management infrastructure. Moreover, 100% of respondents expressed awareness of the Sustainable Waste Management Act, 2022. These findings collectively present insights, providing collaborative initiatives, and an understanding of the current state of waste management and sustainability practices across the surveyed organizations.

04
BRIDGING THE GAPS IN WASTE MANAGEMENT

4.1 A CASE STUDY OF KAJIADO PUBLIC PRIVATE COMMUNITY COLLABORATION (PPCC)

Taka Taka Ni Mali (TTNM), established in 2017, is a woman-led non-profit foundation in Kenya dedicated to transforming the waste management ecosystem. Guided by a multifaceted approach encompassing Environmental, Social, and Governance principles, Partnerships and Stakeholder Engagement, Technology services, and Capacity Building programs, TTNM strives to instigate new industries, innovations, investments, and green job opportunities in Kenya. TTNM) is an organization that is dedicated to organizing and promoting sustainability in the waste management ecosystem through creating a circular economy while minimizing waste through reusing, repairing, repurposing, refurbishing, and recycling existing waste to achieve a common goal of environmental conservation, job creation, and sustainable economic growth.

The PPCC approach is an innovative way of addressing the challenges of waste management by involving the public sector, private sector, and the community in finding sustainable solutions. Taka Taka ni Mali Foundation recognizes that no single entity can solve the waste management problem alone. By collaborating with various stakeholders, the ecosystem can leverage their expertise, resources, and networks to create a more sustainable and effective waste management system.

The public sector, including county governments, has an essential role to play in creating policies and regulations that support sustainable waste management practices. TTNM collaborates with county governments to promote sustainable waste management policies and programs that reduce waste and promote recycling. This collaboration creates an enabling environment for the private sector to invest in sustainable waste management solutions. [16]

TTNM and Kajiado County signed a memorandum of understanding to demonstrate the value of public private community collaboration. The following were the results of the collaboration:

a) Community groups consisting of women and youth were formed to source and sort waste at the dump site. TTNM provided training on waste management and environmental conservation.

b) The collaboration to the formation of a material recovery facility (MRF) which was built by the County government, while TTNM invested in machinery such as balers and shredders to process the waste for recycling.

c) Additionally, TTNM established a buyer to purchase recyclables from the community groups.

[16] *Taka Taka ni Mali Foundation (TTNM) Kajiado Public Private Community Collaboration (PPCC)*

Since the establishment of Taka Taka Ni Mali foundation - (TTNM) in 2017, we have formulated short and valuable training programs that provide the communities in Kenya with the opportunities to actively participate in sustainable waste management. Highlighted below are some of the key achievements from these public private community collaborations.

Figure 6: Key Achievements of TTNM efforts in establishing PPCCs

The Public Private Community Collaboration (PPCC) initiative strategically fills the following crucial gaps identified in Kenya's waste management sector.

a) It actively addresses the longstanding issue of limited community involvement in waste management by establishing community groups, predominantly comprising women and youth, engaged in waste sourcing and sorting at the dump site. This not only empowers local communities but also contributes to more effective waste management practices.

b) The PPCC initiative tackles infrastructure gaps by establishing a Material Recovery Facility (MRF) through collaboration with Kajiado County. Equipped with machinery provided by TTNM, including balers and shredders, this MRF plays a pivotal role in processing waste for recycling.

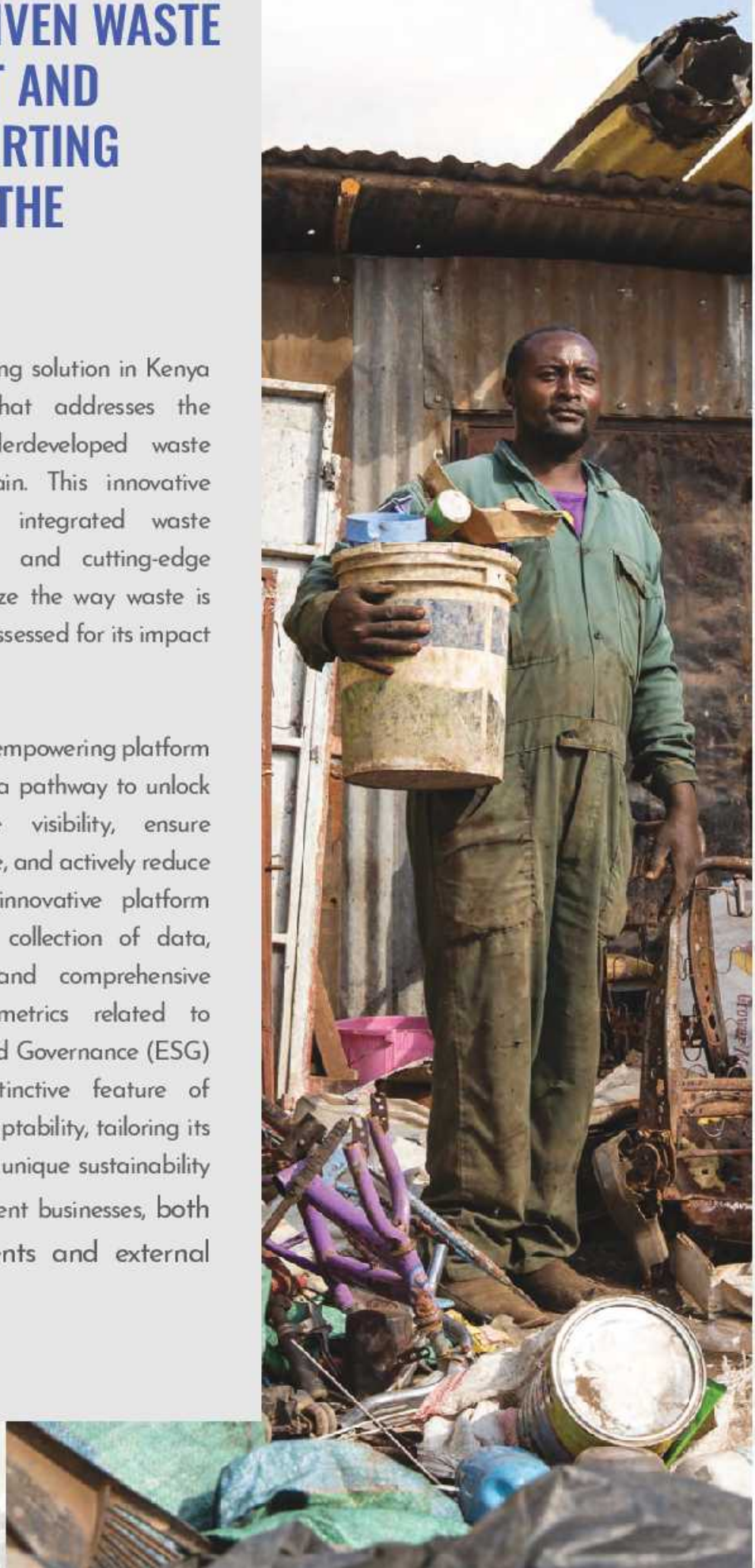
c) The initiative responds to challenges associated with limited buyer networks by establishing a market for recycled materials, thereby creating a sustainable economic model within the waste management ecosystem.

d) Lastly, recognizing the significance of policy and regulatory support, TTNM collaborates with county governments to advocate for and implement sustainable waste management policies and programs. Through these multifaceted interventions, the PPCC approach emerges as a holistic strategy to elevate and address critical gaps in Kenya's waste management landscape.

4.2 DATA DRIVEN WASTE MANAGEMENT AND IMPACT REPORTING PLATFORM – THE ECOLOOP

ECOLOOP, is a pioneering solution in Kenya provided by TTNM that addresses the challenges of an underdeveloped waste management value chain. This innovative product leverages an integrated waste regeneration eco-system and cutting-edge technology to revolutionize the way waste is tracked, converted, and assessed for its impact on the environment.

ECOLOOP serves as an empowering platform for businesses, providing a pathway to unlock brand value, enhance visibility, ensure environmental compliance, and actively reduce carbon footprint. This innovative platform facilitates the seamless collection of data, precise measurement, and comprehensive reporting on crucial metrics related to Environmental, Social, and Governance (ESG) material topics. A distinctive feature of ECOLOOP lies in its adaptability, tailoring its functionality to meet the unique sustainability reporting needs of different businesses, both for internal assessments and external disclosure.



Notably, the platform integrates with key Reporting Standards such as Global Reporting Initiative (GRI) and the UN Global Compact, among others, ensuring alignment with globally recognized benchmarks for sustainability reporting. [17]

In essence, ECOLOOP emerges as a strategic tool for companies aiming to navigate the complexities of sustainability, align with international reporting standards, and showcase their commitment to responsible business practices. ECOLOOP's strategic positioning as a solution goes beyond mere compliance—it serves as a catalyst for businesses looking to distinguish themselves in the realm of sustainability. By leveraging its adaptability and alignment with international reporting standards, ECOLOOP empowers companies to showcase their commitment to responsible business practices authentically. As a result, ECOLOOP becomes more than just a tool; it becomes a strategic partner in helping organizations elevate their sustainability efforts, build credibility, and contribute meaningfully to a more sustainable and responsible business landscape.

Figure 7: ECOLOOP

[17] *Taka Taka ni Mali Foundation - ECOLOOP*

05 WASTE MANAGEMENT IN THE SUSTAINABILITY ECOSYSTEM

Waste management stands at the intersection of environmental stewardship, social responsibility, and economic viability within the broader framework of sustainability. Its significance lies not only in the responsible disposal of waste but also in the broader impact it has on ecological health, community welfare, and economic progress. By effectively managing waste, a holistic and interconnected approach to sustainability emerges, encompassing various facets that contribute to the well-being of society and the planet.

a) Waste Management and Environmental Sustainability

Waste management significantly impacts environmental sustainability by minimizing resource depletion, pollution, and greenhouse gas emissions:

i. **Resource Conservation:** Recycling and reusing materials through proper waste management reduce the demand for raw materials, preserving natural resources and reducing energy consumption associated with extraction and production.

ii. **Pollution Mitigation:** By preventing the release of hazardous substances into the environment, proper waste management mitigates soil, air, and water pollution, safeguarding ecosystems, biodiversity, and human health.

iii. **Climate Change Mitigation:** Effective waste management, including methane capture from landfills and employing sustainable waste treatment methods, helps mitigate climate change by reducing greenhouse gas emissions.

b) Social Dimensions of Waste Management

Effective waste management has profound social implications that extend beyond environmental concerns:

i. **Public Health Improvement:** Responsible waste management practices prevent health hazards such as air and water contamination, reducing disease transmission and improving overall public health.

ii. **Livelihoods and Empowerment:** Waste management activities, especially in the informal sector, create employment opportunities, contributing to poverty reduction and economic empowerment within communities.

c) Economic Aspects of Waste Management

Waste management plays a pivotal role in fostering economic sustainability and resource efficiency:

i. **Circular Economy Promotion:** Embracing recycling and reuse promotes the circular economy model, minimizing waste, maximizing resource utilization, and creating economic opportunities.

ii. **Cost Savings and Resource Efficiency:** Efficient waste management reduces disposal costs, encourages resource efficiency, and potentially generates revenue through the sale of recyclable materials.

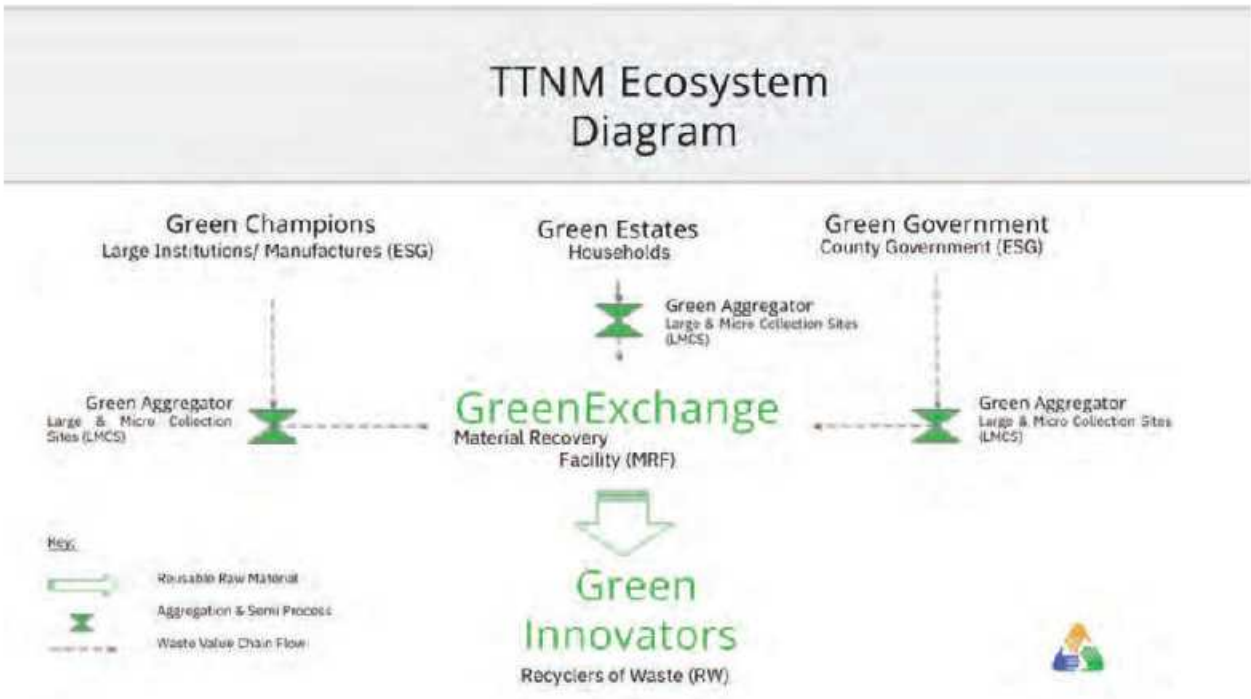
d) Engagement and Collaborative Efforts

Waste management requires collaborative efforts and community engagement to achieve sustainability objectives:

i. **Behavioral Change and Awareness:** Educating communities fosters behavioral changes toward responsible waste disposal, consumption habits, and the importance of sustainability.

ii. **Stakeholder Collaboration:** Governments, businesses, NGOs, and individuals must collaborate to implement comprehensive waste management strategies, ensuring a collective commitment to sustainable practices.

TTNM acknowledges that waste management serves as a cornerstone of sustainability, intertwining environmental preservation, social well-being, and economic prosperity. Its multifaceted impact underscores the interconnectedness of various sustainability elements, demonstrating how responsible waste management is essential for a more sustainable future.



06 WASTE MANAGEMENT AND SUSTAINABLE DEVELOPMENT GOALS (SDGS)

TakaTakaNiMali

Waste management in Kenya stands as a key driver for fulfilling Sustainable Development Goals (SDGs) and achieving corporate responsibility and shared value. Waste management plays a critical role in addressing several Sustainable Development Goals (SDGs) and contributes significantly to sustainable development by promoting environmental, economic, and social well-being. Waste management aligns with and contributes to achieving the following SDGs:

SUSTAINABLE DEVELOPMENT GOALS (SDGS)	EXPLANATION
	**Sustainable Cities and Communities;** Effective waste management is essential for creating sustainable cities and communities. Proper waste collection, recycling, and disposal systems can help reduce the environmental impact of urban areas, prevent pollution, and improve overall living conditions.
	**Responsible Consumption and Production;** Waste management encourages responsible consumption and production by promoting recycling, reuse, and reduction of waste generation. Implementing practices such as waste segregation, composting, and resource recovery minimizes the amount of waste sent to landfills and conserves natural resources.
	**Climate Action:** Inappropriate waste management, particularly landfilling and incineration, contributes to greenhouse gas emissions. However, proper waste management, including recycling and organic waste diversion, reduces these emissions by preventing methane production in landfills and avoiding the release of harmful pollutants from incineration.
 	**Life Below Water & Life on Land** -Inadequate waste management, especially improper disposal of plastics and other non-biodegradable materials, adversely affects marine and terrestrial ecosystems. Proper waste disposal and recycling initiatives help protect biodiversity, reduce habitat destruction, and prevent contamination of oceans, rivers, and soil.
	**Clean Water and Sanitation;** Effective waste management prevents water pollution by ensuring that hazardous substances from waste do not contaminate water sources. Proper waste treatment and disposal systems safeguard water quality, thereby contributing to clean water and sanitation goals.

	Affordable and Clean Energy; Waste management practices such as waste-to-energy technologies, like anaerobic digestion and incineration with energy recovery, can generate renewable energy from organic waste, reducing dependency on fossil fuels and contributing to clean energy production.
	Decent Work and Economic Growth; Waste management creates employment opportunities in various sectors such as recycling, waste collection, sorting facilities, and technology development for waste treatment. Additionally, by promoting the circular economy, waste management can stimulate economic growth through the creation of new markets for recycled materials.
	**Industry, Innovation, and Infrastructure;** Encouraging innovation in waste management technologies and infrastructure development fosters more efficient and sustainable waste treatment methods, supporting industrial and infrastructural growth while reducing environmental impacts.

Table 4: Waste Management and SDGs

Waste management is an indispensable component of sustainable development as it directly addresses several SDGs by promoting responsible consumption, protecting the environment, conserving resources, mitigating climate change, and fostering economic growth and social well-being. Adopting comprehensive waste management strategies is crucial for achieving a more sustainable and resilient future for all.

07 RECOMMENDATIONS

Recommendations for the future of waste management in Kenya include:

Incentives for Licensing of waste recyclers:

The establishment of regulatory measures ensuring that every waste recycler obtains proper licensing, coupled with the introduction of fiscal incentives to encourage participation from registered recyclers.

Collaboration between regulatory bodies and the City Council

to support individuals involved in material recovery by facilitating the acquisition of suitable land for their activities. A forward-looking vision for waste management in the city involves a collaborative and efficient system where the city council and private firms work jointly towards sustainable solutions.

Public awareness and Education

emerge as a pivotal aspect, urging for joint efforts by private and public sector to play an active role in educating the population on best practices in waste management. This includes promoting recycling, segregation, reuse, and recovery, while fostering a culture of waste reduction and proper storage among both producers and consumers.

Enforcement:

To counter rampant illegal disposal, leveraging the powers provided by the Environmental Management and Coordination Act (EMCA) is essential.

Establishment of sorting stations

as effective platforms for resource recovery, minimizing the volume of solid waste reaching final disposal sites.

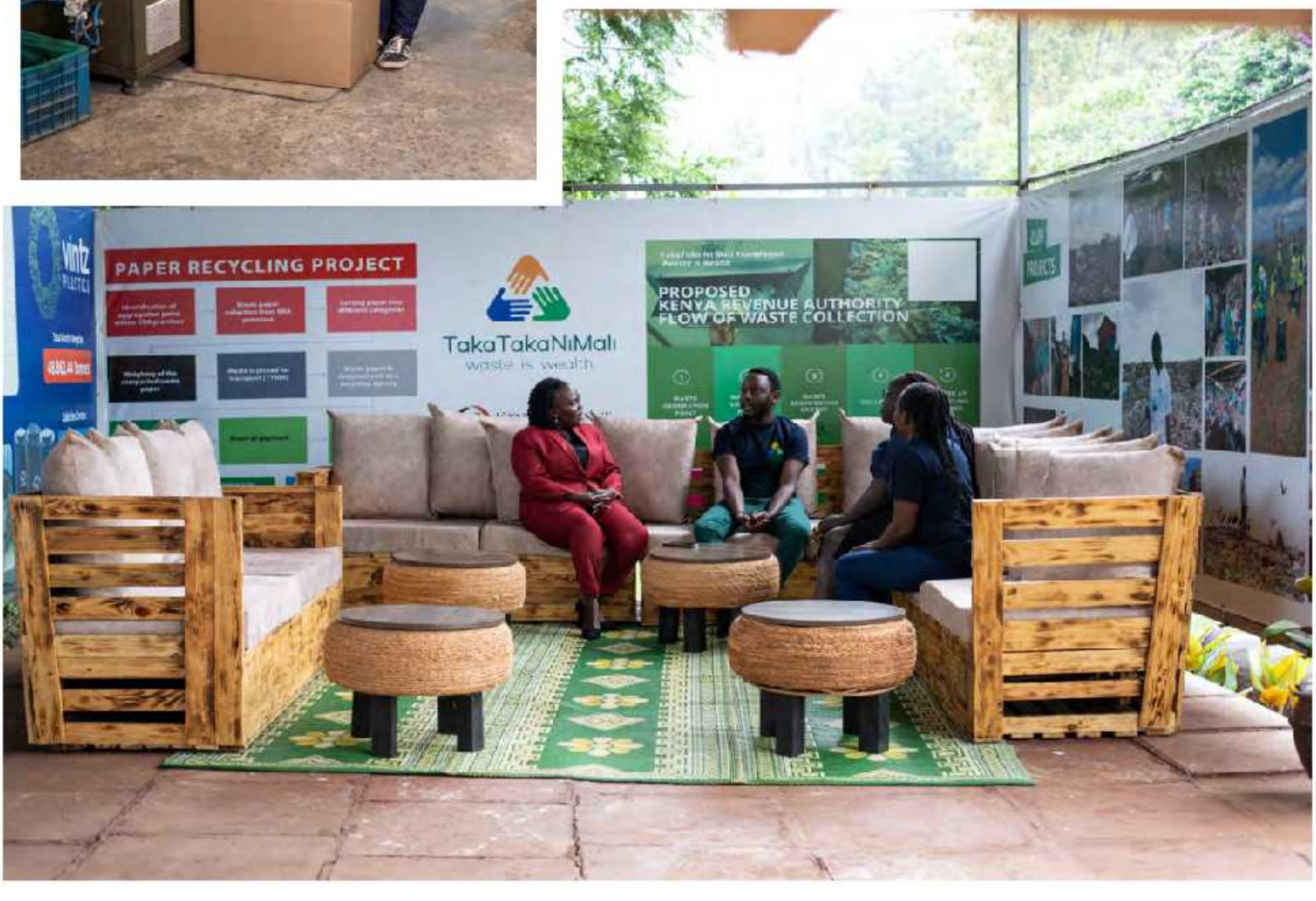
Fostering research and development initiatives

to propel the adoption of these technologies, promoting public-private partnerships to drive investment and expertise, and establishing regulatory frameworks that incentivize the integration of state-of-the-art waste management solutions.

The deployment of smart technologies,

such as Internet of Things (IoT)-enabled waste bins for efficient collection and monitoring, holds the potential to enhance the overall efficiency and effectiveness of waste management practices. By strategically leveraging these technologies, Kenya can not only address current waste challenges but also pave the way for a more sustainable and resilient future in waste management.

OUR ACTIVITIES

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