

Green ET Africa

Skills Gap Analysis Validation Workshop

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GreenVETAfrica mission is to offer an innovative capacity building programme on Green Waste Management in Nigeria and Ghana

Waste Management

A terminology used in describing various schemes and programmes for the collection, transportation, processing, management, recycling and safe disposal of waste.

It facilitates improved health and well-being since it reduces the harmful effects of waste on the environment.

It protects our natural resources, biodiversity and human life



WASTE MANAGEMENT

Waste management is important in achieving the Sustainable Development Goals (SDGs), particularly those that connects with:

- SDG3 Improving good health and wellbeing;
- SDG6 Clean water and sanitation;
- SDG8 Decent work and economic growth
- SDG10 Reduced inequalities
- SDG11 Sustainable cities and communities
- SDG12 Responsible consumption and production
- SDG13 Climate action
- SDG14 Life below water
- SDG15 Life on land
- SDG16 Peace, justice and Strong institutions



SKILLS FOR WASTE MANAGEMENT

Technical skills are the foundation for waste management careers.

The effective prevention, mitigation and control of waste on human health and the environment presupposes that the various players in the sector ought to have a minimum level of (technical, digital, behavioral and analytical) skills and competencies required to tackle the increasing challenges of waste management.



SKILLS FOR WASTE MANAGEMENT

The WMS is highly dynamic and based on the heterogeneity of the waste streams; therefore, it requires varying skills, experience and educational qualifications which are highly influenced by the waste types and technology to be used.

The WMS is also perceived as a sector that can help address youth unemployment due to its ability to absorb high numbers of skilled and unskilled workforce.



WASTE MANAGEMENT SKILL GAP ANALYSIS

Indeed, how do we develop the key skill sets required in the youth employment journey in the waste management sector?

How can industry opportunities be exploited to address identified skills shortages by ensuring greater youth employment?

This report is aimed to identify existing skills gaps within the WMS in Nigeria and Ghana and proffer solutions that will address the current and future skill requirements of the sector.



AFRICAN YOUTH UNEMPLOYMENT

- Africa has a young population with an estimated 60% of its population being under the age of 25. The African Development Bank (AfDB) estimates that Africa's youth population is expected to reach about 830 million by 2050.
- This poses more opportunities than challenges. If properly harnessed, Africa would be able to guarantee current and future workforce to support its development.
- The AfDB argues that the majority of Africa's youth do not have stable economic opportunities. It further argues that about 10 – 12 million youths in Africa enter the workforce each year with only about 3.1 million jobs created. This leaves a vast number of youths unemployed

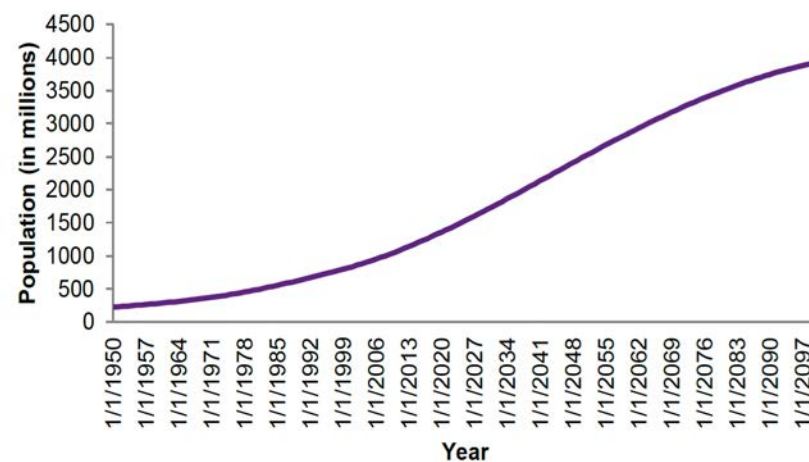


Figure 1: Africa's historical and projected population growth (2010-2100)²



THE CHALLENGE OF QUALITY FORMAL EDUCATION

- Although formal education is important, we have noticed the emergence of an educated but **under-skilled workforce** in some of the leading countries in Africa.
- There is a need for education that focuses on **the integral development of the person**, including the skills and competencies required for employment and enterprise.
- The education system in some African countries guarantees the acquisition of qualifications but **not necessarily the underpinning requisite skills**.
- In Nigeria and Ghana, the manufacturing and industrial services sector has so far complained about the **decline in the skill component of the training obtained in many tertiary education institutions**.
- Most TVET schools have now been reduced to senior secondary schools for specific acquisition of some mono-trades such as leather work, plumbing, etc. This poses some challenges and also presents some opportunities to relaunch the TVET system and position them as centres for the acquisition of industry-relevant skills and qualifications at the post-secondary level

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THE CHALLENGE OF QUALITY FORMAL EDUCATION

According to the 2021 Ghana TVET Report, **Ghana needs a skilled and competent workforce such as artisans and technicians to fill the skills gaps in the various sectors of the economy.**

This is one of the reasons why the Commission for TVET is mandated as set out in the Education Regulatory Bodies Act, 2020 (ACT 1023)⁴ to administer, promote and regulate technical and vocational education and training activities in Ghana including the development of an industry-led curriculum for effective delivery.



SKILL GAPS ANALYSIS METHODOLOGY

In this research, we collected data and other relevant information from two main sources:

Desk-based research on skill need requirements for waste management and the existing skills gap in the waste management sector;

10 Focused group (key informant) interviews comprising participants representing the key stakeholders in the waste management value chain, in Nigeria and Ghana, made up of waste producers, collectors and aggregators, processors and recyclers, and other stakeholders in the waste regulation and policy space.

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SKILL GAPS ANALYSIS METHODOLOGY

For the **desk research**, the analysis focused on obtaining publicly available reports from relevant government, private and multilateral organizations on industry skills shortages in relevant sectors. Some relevant sources included

- African Development Bank
- World Bank
- Nigeria's Federal Ministry of Trade and Investment
- Nigeria's Federal Ministry of Environment
- Lagos Waste Management Authority
(Partner of the project)



SKILL GAPS ANALYSIS METHODOLOGY



The selection of participants for the **focus group interviews** (from Nigeria and Ghana) was based on the following criteria:

- People with subject matter expertise on waste and environmental management issues;
- Those who are currently active participants in the waste management value chain;
- Practitioners and policy workers in the waste management sector;
- Academics and researchers in the waste management industry.



This Figure shows the various players of the waste management value chain in Nigeria and Ghana that were represented in the focus group interviews.

SKILL GAPS ANALYSIS FINDINGS



The salient findings of our research are presented around three main themes:

- Skill requirements for youth employment in the waste management sector;
- Machinery, technologies and tools used by stakeholders in the waste management sector;
- Technical skills **requirements for green waste management**

ANALYTICAL SKILLS



Skill Requirements for youth employment in the waste management sector

- This refers to the **ability to understand complex ideas**, adapt effectively to one's environment, and learn from experience and reason.
- It includes skill sets such as **writing, critical thinking, numeracy, problem-solving**, reading and decision-making.
- Analytical skills are very important in waste management because the ability to collect, **process and interpret data from different sources** (such as surveys, laboratory, environmental and waste audit assessments) are crucial in their operations and management.
- Key players that are hands-on in the waste management sector require basic skills for the collection, sorting, costing, **bookkeeping, conversion, processing and reporting** of their operations.
- Analytical skills are related to the ability to apply critical thinking and problem-solving to identify and proffer **solutions to environmental issues, as well as producing reports in appropriate formats** that can help decision-makers and other stakeholders in the sector to take the most appropriate action.

BEHAVIOURAL SKILLS



Skill Requirements for youth employment in the waste management sector

- This refers to the ability to **navigate interpersonal and social situations** effectively. It includes skill sets such as communication, leadership, creativity and entrepreneurial skills.
- Interpersonal skills which are closely related to behavioral skills are valuable since many stakeholders in the waste management sector need to work collaboratively to address environmental issues associated with waste management.
- **Communication among stakeholders** (using the right means, language and tone), listening and obtaining feedback, and responding professionally and constructively are critical aspects of this skill-set.

DIGITAL SKILLS



Skill Requirements for youth employment in the waste management sector

- This refers to particular types of technical skills entails the ability to find, evaluate, use, **share and create contents using digital devices such as computers and other smart devices.**
- This skill-set may range from basic level (sending emails) to advanced level (providing digital remote technical support).
- Digital skills are becoming increasingly important in WMS due to the increased **need for interdependence and collaboration to tackle environmental issues across geographies**



TECHNICAL SKILLS

Skill Requirements for youth employment in the waste management sector

- This refers to knowledge, expertise and interactions required to perform a specific job, including **mastery of the materials, tools and technologies.**
- This skill set ranges from understanding **Basic Science, Technology, Engineering and Mathematics** (STEM) to technical, vocational, and financial/accounting skills.
- This report will focus more on addressing the technical need requirements for green waste management.

WASTE GENERATORS



Machinery, technologies & tools used by Stakeholders in the waste management sector

Waste generators, including households, commercial establishments and industries, contribute to the initial stage of waste generation.

- **Waste Segregation Bins:** waste generators can use separate bins or containers to facilitate the segregation of different waste streams, such as recyclables, organic waste, and non-recyclables.
- **Composting Equipment:** This may include compost bins, compost tumblers, or composting machines that aid in the decomposition and transformation of organic matter into nutrient-rich compost;
- **Biogas Digesters:** some waste generators (particularly agricultural or industrial facilities) can utilize biogas digesters to convert organic waste into biogas through anaerobic digestion. Biogas can be used for energy generation, reducing dependency on traditional fossil fuels;
- **On-site Waste Treatment Systems:** certain waste generators, such as large institutions or industrial facilities, may implement on-site waste treatment systems to manage specific types of waste.

Examples include: On-site wastewater treatment plants for treating and recycling wastewater generated within the premises; Mechanical or biological treatment systems for managing organic or hazardous waste produced on-site

WASTE COLLECTORS



Machinery, technologies & tools used by Stakeholders in the waste management sector

Waste collectors are responsible for collecting and transporting waste from various sources to disposal or treatment facilities. They rely on specific technologies and machinery, including:

- **Waste Collection Trucks:** Waste collectors employ various types of trucks to collect and transport waste from different sources. These include:
 - a. Rear-loading trucks
 - b. Front-loading trucks
 - c. Side-loading trucks
- **Collection Bins and Containers:** Waste collectors use bins and containers to collect and temporarily store waste during collection rounds.

These may include large roll-off containers, wheeled bins, or specialized containers for different waste streams (recyclables, organic waste, hazardous waste).

WASTE COLLECTORS



Machinery, technologies & tools used by Stakeholders in the waste management sector

- **Waste Sorting Equipment:** waste collectors employ various tools and equipment to facilitate waste sorting and separation at collection points. These may include:
 - ✓ Grippers and grabbers: Used to handle and separate bulky or oversized items;
 - ✓ Sorting conveyors: Helps in the manual sorting of recyclable materials from the waste stream;
 - ✓ Magnetic separators: Used to extract ferrous metals from mixed waste;
- **Safety Equipment:** Waste collectors require personal protective equipment (PPE) to ensure their safety while handling waste. This includes gloves, masks, safety boots, high-visibility vests, and other protective gear to minimize health hazards and potential injuries.
- **Weighing Systems:** waste collectors require weighing systems or scales to accurately measure and record the weight of waste collected especially the recyclable collectors. This information is valuable for incentives, billing, reporting, and waste management analysis.

WASTE TREATMENT FACILITIES



Machinery, technologies & tools used by Stakeholders in the waste management sector

- ✓ Landfill Equipment: Bulldozers, Excavators, Compactors, Rollers, Landfill Liners, Payloader
- ✓ Incineration Equipment: Incinerators, Waste Heat Recovery Systems
- ✓ Composting equipment: Shredders, Mixers and turners, Screening equipment
- ✓ Anaerobic Digesters: Pumps and agitators, Biogas Utilization Systems, Digestate handling equipment
- ✓ Hazardous Waste Treatment Equipment: Chemical Treatment Systems, Encapsulation Systems
- ✓ Leachate Treatment Systems: Leachate Collection and Storage Tanks, Leachate Treatment Equipment
- ✓ Waste Water Treatment Systems: Pre-treatment Equipment, Biological Units, Disinfection Systems
- ✓ Monitoring and Control Systems: Environmental Monitoring Equipment, Control Systems

RECYCLING FACILITIES



Machinery, technologies & tools used by Stakeholders in the waste management sector

- ✓ Sorting Equipment: Trommel Screens, Magnetic Separators, Optical Sorting Machines, Air Separation Systems
- ✓ Balers and compactors: Vertical Balers, Horizontal Balers, Compactors
- ✓ Shredders and Granulators: Shredders, Granulators
- ✓ Optical Sorting Systems: Near-Infrared (NIR) Sorters, Colour Sorting Machines
- ✓ Washing and Cleaning Equipment: Plastic Washing Lines, Glass Washing Machines
- ✓ Pelletizing Equipment: Plastic Pelletizers, Wood Pelletizers
- ✓ Material Recovery Facilities (MRFs): Conveyor Systems, Hoppers and Bins, Control Systems, and Sorting Lines.
- ✓ Quality Testing and Monitoring Equipment: Density Separators, Moisture Sensors, Spectrometers and Analyzers

WASTE MANAGEMENT CONSULTANTS AND PLANNERS



Machinery, technologies & tools used by Stakeholders in the waste management sector

- **Waste Auditing Tools:** Waste characterization equipment, sampling methods, and data analysis software helps assess waste composition and volume, aiding in waste management planning and resource allocation.
- **Modelling and Simulation Software:** specialised software allows consultants to simulate waste management processes, evaluate system performance, and develop strategies for waste reduction and resource recovery specific to each geographical/country context.

TECHNICAL SKILLS FOR WASTE COLLECTION AND TRANSPORTATION



Technical Skills Requirements for Green Waste Management

1. Equipment Operation
2. Maintenance and Repairs
3. Electrical Skills
4. Mechanical Skills
5. Hydraulic Skills
6. Diagnostic and Troubleshooting Skills
7. Safety and awareness compliance
8. Communication and documentation
9. Waste Collection and Transportation

TECHNICAL SKILLS FOR WASTE SORTING AND SEGRAGATION FACILITIES



Technical Skills Requirements for Green Waste Management

1. Equipment Operation and Maintenance
2. Electrical Skills
3. Mechanical Skills
4. Hydraulic Skills
5. Instrumentation and Control Systems
6. Safety and Compliance
7. Problem Solving and Troubleshooting
8. Waste Sorting

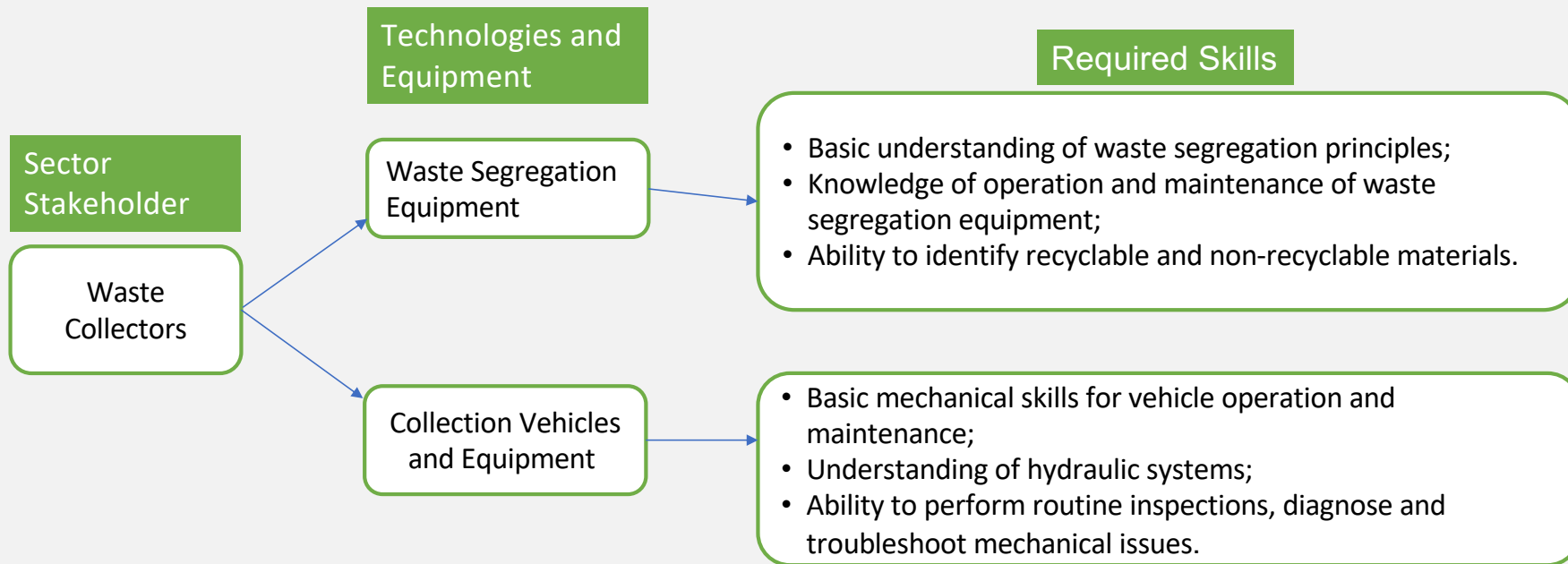
TECHNICAL SKILLS FOR WASTE RECYCLING AND RECOVERY FACILITIES



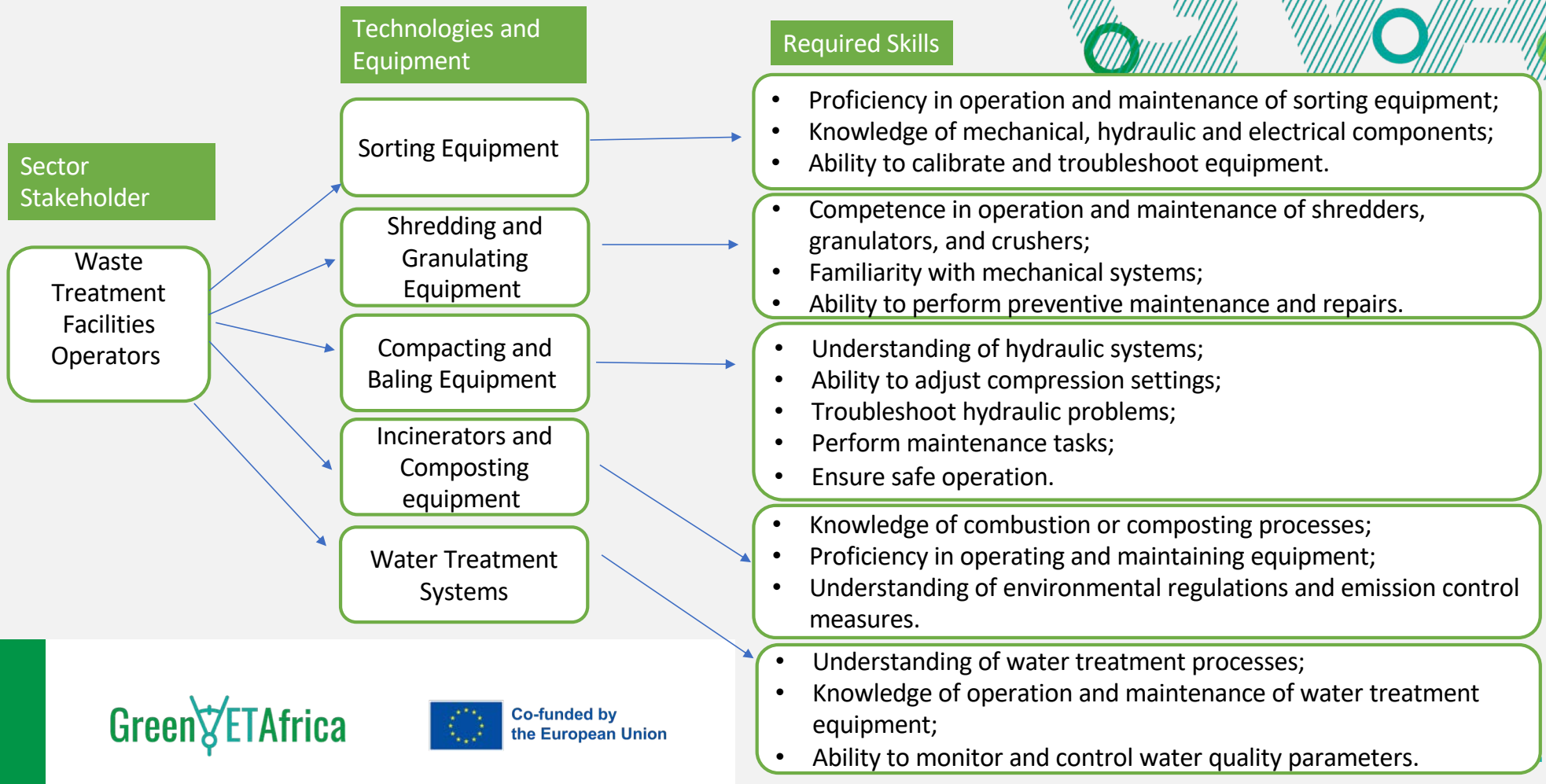
Technical Skills Requirements for Green Waste Management

- ✓ Sorting Equipment Operation and Maintenance
- ✓ Shredding and Granulating Equipment and Maintenance
- ✓ Compacting and Baling Equipment Operation and Maintenance
- ✓ Hydraulic Skills
- ✓ Material Handling Equipment Operation and Maintenance
- ✓ Quality Control and Testing
- ✓ Maintenance and Repair Skills
- ✓ Safety and Compliance
- ✓ Electrical skills
- ✓ Mechanical skills
- ✓ 11. Hydraulic Skills
- ✓ Waste Recycling

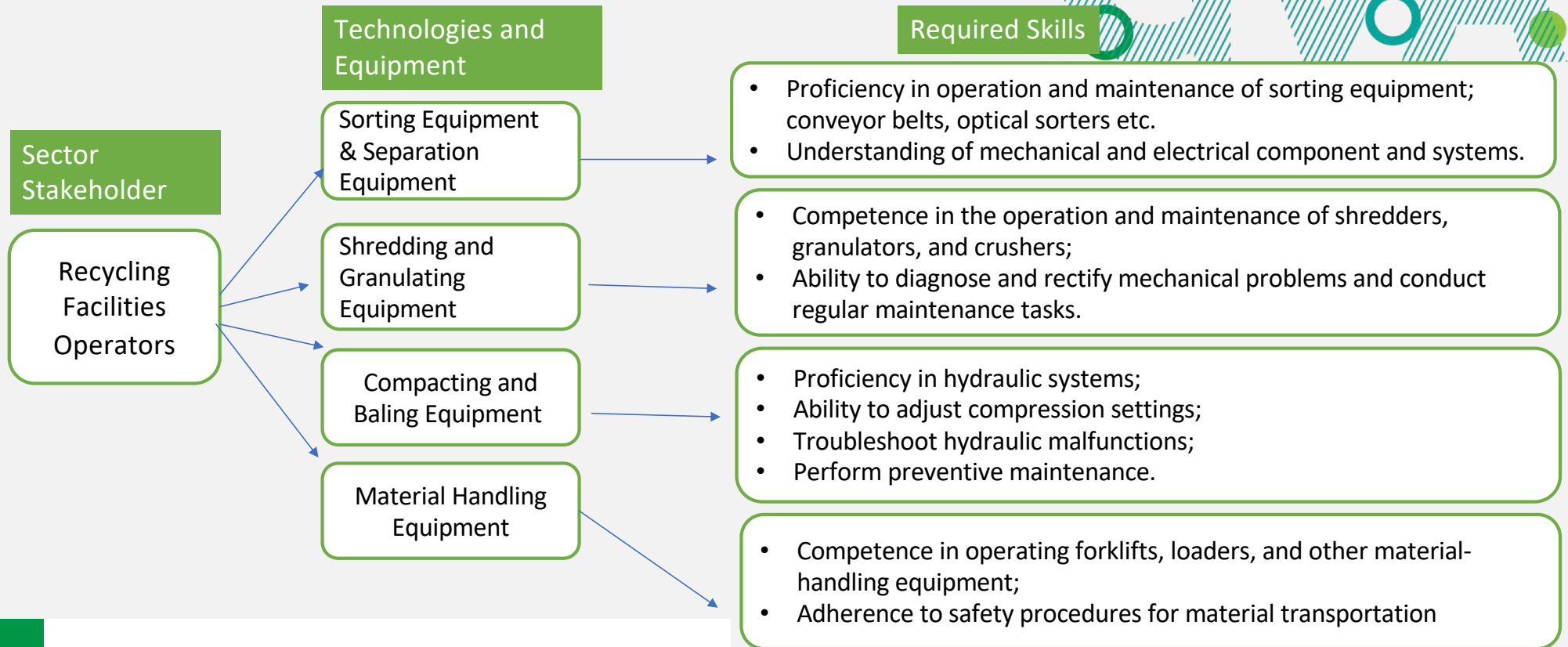
MAPPING TECHNOLOGIES AND SKILLS FOR THE WASTE MANAGEMENT SECTOR



MAPPING TECHNOLOGIES AND SKILLS FOR THE WASTE MANAGEMENT SECTOR



MAPPING TECHNOLOGIES AND SKILLS FOR THE WASTE MANAGEMENT SECTOR



IMPACT OF SKILL GAPS



1. The absence of technical skills in waste collection and handling processes leads to inefficiencies
2. The skills gap in recycling and resource recovery stifles the development and implementation of effective recycling programs.
3. The shortage of specialised skills in handling hazardous waste poses significant risks to public health and the environment.
4. The skills gap hinders the adoption and utilisation of advanced technologies in waste management.
5. The skills gap in waste management policy development, implementation, and enforcement undermines effective waste management practices.
6. The cumulative impacts of the lack of technical skills in waste management are evident in environmental pollution and public health concerns

ADDRESSING THE SKILL GAPS IN THE WASTE MANAGEMENT SECTOR



1. Technical Training and Capacity Building
2. Vocational and Trade Skills Development
3. Continuous Professional Development
4. Knowledge Sharing and Collaboration
5. Industry-Academia Partnerships
6. Technological Adoption and Innovation
7. Policy Support and Regulation
8. Public Awareness and Education

CONCLUSION



1. The waste management sector in Nigeria and Ghana is facing **significant skill gap challenges, particularly in technical expertise**, that impede the effective management of waste
2. To bridge these gaps, a multi-faceted approach is necessary. This includes the implementation of **comprehensive training and capacity-building programs** that focus on developing the technical skills and competencies required in waste management.
3. Indeed, collaborations and **partnerships between educational institutions, industry stakeholders, and government agencies** can play a pivotal role in enhancing technical skills within the sector.
4. Furthermore, leveraging innovative technologies and fostering a culture of **continuous learning** and professional development are essential components of addressing the technical skills gap.
5. By prioritising the development of **technical skills, investing in contemporary training initiatives innovations**, and recurrent capacity building the waste management sector can overcome the current skill gaps, enhance waste management practices, ensure compliance with environmental regulations, and pave the way for a more sustainable and efficient waste management system.

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