Nigeria Climate Innovation Centre

The D.I.C.E Africa Project

Identifying Impact Areas for Digital Solutions

in scaling circular economy SME clusters in Africa

ENTERPRISE DEVELOPMENT CENTRE
PAN-ATLANTIC UNIVERSITY

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Nigeria   Ghana   Senegal   Cote d' Ivoire

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Foreword

It is with great pride and optimism that I present this groundbreaking research document, **"Identifying Areas for Digital Solutions in Scaling Circular Economy SME Clusters in Africa"**, a culmination of the DICE Africa Project. Our initial findings on this study, spanning Nigeria, Senegal, Ghana, and Côte d'Ivoire, reflect our commitment at the Nigeria Climate Innovation Center (NCIC) to driving sustainable economic development, inclusive growth and climate resilience across Africa.

The circular economy presents an unprecedented opportunity for Africa not only to tackle environmental challenges but also to catalyse innovation, create jobs and drive economic transformation. By integrating digital solutions into circular-focused SME clusters, we open pathways to scale up businesses, strengthen value chains and improve access to climate finance.

A distinguishing feature of this research is its application of gender-sensitive approach, ensuring that women, who are key drivers in the African circular economy, are not only included but are empowered as leaders, innovators and decision-makers. This inclusivity is vital to building a future where sustainability and equality go hand in hand.

This work would not have been possible without the support and partnership of the International Development Research Center (IDRC), whose vision and investment have made this research a reality. Their unwavering commitment to advancing knowledge, innovation and inclusivity in Africa has been instrumental in shaping the outcomes we present here.

I extend my deepest gratitude to the NCIC Board chaired by Dr. Peter Bamkole, the dedicated teams, partners, collaborators and stakeholders across the four project countries, whose expertise and insights have enriched this research essentially through our partnership with the Enterprise Development Center (EDC) of the Pan Atlantic University, Lagos, Nigeria. The findings and recommendations in this document do not just provide a blueprint for scaling circular economy clusters, but serve as a call to action for policymakers, innovators, investors and development actors to collectively harness the transformative power of digital solutions for Africa's sustainable future.

Bankole Oloruntoba

Chief Executive Officer
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Executive Summary

Context

The global economy is facing a critical need to transition from a linear "take-make-dispose" model to a circular one. For emerging economies in West Africa, this shift is both a necessity to address pressing environmental challenges and a significant opportunity for sustainable economic development. The Digital Innovation for Circular Economy (DICE) project was initiated to explore how digital technologies can serve as a catalyst for this transformation, with a specific focus on helping SMEs scale their operations and access the growing pool of green financing. This report synthesises key findings from a mixed-methods study conducted in several West African countries, providing a strategic overview of the current landscape, key challenges, gender-sensitive oversights and actionable recommendations to foster a more inclusive and technologically enabled circular economy.

Methodology

The research employed a mixed-methods approach to gather and analyse data. The quantitative approach was driven by a survey to assess the perceptions of SME owners and operators on the impact of digital tools. This was complemented by a qualitative approach, using Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). The combined data was analysed to provide a more nuanced view of the challenges and opportunities within the region's digital circular economy ecosystem.

Key Findings

1. **Limited Awareness:** There was limited awareness among SME operators about the existence and benefits of digital tools in circular business processes. Many entrepreneurs in the CE space, especially those operating informally, were unaware of how digital technologies can improve their processes.

2. **Significant Funding Gap:** Most organisations reported not receiving climate or green funding. This indicates a major unmet need for climate finance in the region.

3. **Digital Tools as a Critical Enabler:** For the percentage of organisations that did receive funding, digital tools were overwhelmingly instrumental in their success, enabling access to key resources (grants, loans and training).

4. **Skills Gaps:** Findings revealed a significant knowledge gap on how to use digital technologies to help businesses grow. This was especially so for women, who are often in lower positions within the value chain. This widespread issue must be addressed with targeted, accessible training to help everyone – especially women – benefit from digital tools.

5. **Policy and Regulatory Challenges:** Findings revealed a significant lack of policy harmonisation, with conflicting state and national policies creating operational difficulties for businesses. The lack of enforcement for existing regulations, such as Extended Producer Responsibility (EPR), also discouraged compliance.

6. **Major Barriers to Digital Adoption:** The primary barriers hindering the adoption of digital tools were high cost and insufficient capital. Other significant challenges included lack of government support, limited infrastructure and skills gap.

Recommendations

To unlock the full potential of digital innovations in scaling circular economy SMEs across West Africa, the following interventions are recommended:

- **Awareness:** There should be targeted digital literacy and circular economy awareness campaigns for SME owners and operators, with a focus on practical applications of digital tools.

- **Capacity Building:** There is a critical need to bridge the skills gap. This can be achieved through targeted training hubs and mobile learning platforms that focus on practical digital literacy and data analytics. Any training must be flexible and family-friendly to ensure the inclusive participation of women, who are currently hindered due to family obligations.

- **Infrastructure and Ecosystem:** Public-private partnerships should invest in essential digital infrastructure, including reliable internet and off-grid power, in key CE clusters. The ecosystem should also be strengthened by creating and supporting cooperatives and innovation hubs that facilitate shared resources, digital credit and peer learning.

- **Policy and Support:** Policies must shift from unenforceable mandates to a system of tangible incentives, such as tax breaks and waivers, for compliant businesses and consumers. Policies should also facilitate the formalisation of the informal sector and actively incorporate digital solutions, such as a uniform digital platform for waste pickup, into their design.

- **Market Access:** SMEs should receive deliberate support to leverage e-commerce platforms and digital marketing tools. This will help them scale their businesses by accessing broader markets, including international buyers, without the burden of physical expansion.

1.0 Introduction

Circular Economy in Africa

African economies are facing the growing challenges of environmental degradation, increased waste generation, and resource scarcity. This has made it essential to rethink traditional production and consumption models. In response, the circular economy has emerged as a crucial strategy for sustainable development, reducing environmental pressure, and fostering innovation (UNEP, 2022).

The traditional linear economy, or the "take-use-dump" model, has dominated global commerce. This approach relies on extracting finite resources, mass production, and then disposing of waste, which leads to environmental damage, resource depletion, and inefficiency (Geiss Doerfer, et al., 2017).

In contrast, the circular economy (CE) offers a regenerative system where resources are continuously reused, recycled, and recovered. This approach minimizes waste and maximizes resource efficiency (Kirchherr, et al., 2017), aligning with sustainability principles and paving the way for a greener, more viable economy.

Contextually, the circular economy (CE) is the application of digital technology and innovation to transform used or discarded goods—whether solid, liquid, or gas—into new assets. The goal is to benefit the environment and society rather than pose a threat. Essentially, it's about using technology and creative principles to give new life to "dead" materials and reduce their negative impact on ecosystems, human health, and the economy (Ofori, 2023).

Global and African Adoption

For over three decades, global leaders have recognized the need for a circular economy. To achieve Sustainable Development Goal (SDG) 12 (responsible consumption and production), countries in the Global North, such as China and those in the European Union, have developed robust policies to advance circular initiatives (Dunmade, 2018; Ofori, 2023).

However, in Africa, the adoption of the circular economy is still in its early stages. According to Dunmade (2018), there is a lack of sufficient policies and structures to address the challenges hindering its widespread adoption. Even with support from organizations like the European Union, IMF, and World Bank, challenges remain in policy coherence, implementation, and collaboration (Gebrezgabher et al., 2024).

African Efforts

It wasn't until November 16, 2017, that a concerted effort was made by three African governments—Nigeria, South Africa, and Rwanda to form the African Circular Economy Alliance (ACEA) during a UN Climate Change conference. The alliance's goal was to accelerate the adoption of sustainable development models across Africa. At the time, no African Union (AU) policy existed for CE adoption, though there were expressions of aspirations, such as in the African Union Agenda 2036.

> "
>
> Africa will participate in global efforts for climate change mitigation that support and broaden the policy space for sustainable development on the continent. Africa shall continue to speak with one voice and unity of purpose in advancing its position and interests on climate change
>
> AU Agenda 2036, Item 17

Despite aspirations for a circular economy, waste generation remains a significant issue. Between 1950 and 2017, approximately 7 billion of the 9.2 billion tons of plastic produced became waste, according to Oyinlola and Kolade (2023). This mismanagement of waste has led to serious environmental and health problems, a challenge that is projected to worsen with the anticipated rise in global waste production.

In Africa, this problem is particularly acute due to inadequate infrastructure and waste management systems. The United Nations Environment Programme (UNEP, 2018) reports that less than 5% of plastic waste on the continent is recycled. The majority is either dumped into waterways, openly burned, or sent to unmanaged landfills.

E-waste in Africa

E-waste is a growing problem across the continent.

- **Nigeria:** The port of Lagos receives about 100,000 tons of used computers every month, contributing to an estimated 400,000 tons of e-waste generated annually.

- **Ghana:** Over 600 shipping containers of electronics arrive monthly at the Tema port, feeding a complex e-waste market. An estimated 13,000 tons of this e-waste are processed each year.

- **South Africa:** The country generates around 64,000 tons of e-waste annually, but only about 11% is formally recycled (Maphosa and Maphosa, 2020).

A lack of policy and limited recycling infrastructure has made effective e-waste management a major concern. This often leads to unsafe practices like dismantling, burning, and using acid to leach out precious metals. E-waste is frequently dumped in landfills, such as Agbogbloshie, Alaba, and Elukwatini, where it releases high volumes of toxic chemicals. This problem is made worse by the illegal export of e-waste from developed to developing countries, with 80% of e-waste from developed nations being shipped as commercial goods. Although e-waste contains toxic substances like barium and mercury, it also holds valuable materials such as gold, copper, and aluminium. Recycling these materials could generate over 55 billion euros in income (Baldé et al., 2017; Peluola, 2016).

The African continent is projected to generate over 200% more waste by 2050, with plastics and e-waste making up a large portion of this increase (Kaza et al., 2018). Waste production in Sub-Saharan Africa alone increased by 55 million tonnes between 2012 and 2019 (Akanji et al., 2023).

While some countries in the region including Nigeria, Ghana, South Africa, Ethiopia, Kenya, Namibia, and Ivory Coast have started to embrace circular economy practices, others like Somalia, Congo, Sudan, and Zimbabwe largely still follow the traditional "take-make-dispose" model.

Adopting circular economy principles can help address economic issues like waste disposal, energy needs, poverty, and unemployment (Gower et al., 2016). At the forefront of these efforts is the integration of innovative digital solutions, which are essential for driving the adoption of a circular economy.

1.2 Circular Economy in West Africa

NIGERIA

As a founding member of the Africa Circular Economy Alliance (ACEA), and with the assistance of the United Nations Industrial Development Organisation (UNIDO), Nigeria developed policies like the Solid Waste Management (2020) and Plastics Lifecycle Management (2020), aiming to improve the environment, encourage private investment in waste management and produce economic benefits from trash. Conversely, the expected aim is hindered owing to poor alignment with national budgets, lack of collaboration across federal, state and municipal government. To worsen this, the Nigerian policy environment is characterised by inefficiencies.

However, the African Development Bank and UNIDO have supported the government in developing a Nigerian CE roadmap through feasibility studies and green growth strategies (Gebrezgabher et al., 2024). CE adoption in Nigeria is most visible in Lagos and Abuja, where waste recycling startups and informal sector upcycling initiatives thrive due to necessity rather than policy support. Moreover, many businesses just claim to be sustainable in their reports, while their actual activities remain "business as usual." (Dunmade, 2018).

Long before CE became an official word in Nigeria, waste pickers, scavengers and other informal actors practised the concept of CE as a means of subsistence. However, in recent years, CE has grown in popularity as an innovative method to reducing poverty and achieving the country's SDGs. Most of these initiatives aim to fight plastic proliferation and manage biodegradable garbage (Akanji et al., 2023). As an example, Lagos, Africa's most populated city, is estimated to produce 20,000 tonnes of waste per day. Generally, waste is currently managed by taking it to dump sites where scavengers pick recyclable items for local factories and sell them to vendors who visit the dump sites to pick the items.

Most of the items recovered by the scavengers are metals and plastics, and the only glass materials recovered from the dump sites are whole bottles. The remaining solid wastes, which are mostly made up of biodegradable materials and other items that evade the scavengers' scrutiny, are left to decompose in the dump sites as land fill. Other classes of solid wastes, such as hazardous chemicals, medical wastes and e-waste, are recovered from their points of generation and processed specifically for recycling or disposal (Adenaike and Omotosho, 2020).

Efforts by the state government have largely been on waste management rather than resource recovery. In 1997, the state government gave the right of way for local operators to champion waste collection initiatives to both reduce the level of waste accumulation across the state and relieve the burden of a state-run waste management system.

In 2001, the government partnered with private actors through the Private Sector Participation (PSP) programme in a bid to further reduce waste management (Adenaike and Omotosho, 2020). The result of this was decentralised waste management system, allowing

local, private and grass-root actors to fully participate in the CE efforts, while the Lagos State Waste Management Authority provided oversight, policies and enabling environment for waste management to thrive.

One of such public–private partnerships happened in 2016, when the Lagos State government initiated the cleaner Lagos project, with a clear objective – turning waste into energy, thereby enabling job creation. This was implemented by Visionscape Sanitation Solutions (a private waste management organisation) and supervised by LAWMA. One of their significant achievements was mechanisation of waste collection process by replacing PSP's equipment with more advanced and technologically sound equipment. However, the project was disrupted in 2019 due to public outcry on the concerns of accumulated wastes and the outcome of PSPs (Adenaike and Omotosho, 2020).

Akanji et al. (2023) defined notable firms, programmes and initiatives geared towards a greener economy as micro-actors. One example of a micro actor is "Circular Lagos," an initiative supported by the Lagos State government and the circular exchange innovation platform. In November 2022, this programme was launched with the goal of promoting the expansion of circular business and investment activities in Lagos State. Circular Lagos Business Platforms and LOOP Lab innovators are other two micro players that are part of the Circular Lagos Project.

The LOOP Lab is an incubator created to foster enduring technological and business collaborations between start-ups and more seasoned industry players. For both domestic and foreign businesses that provide circular goods and services, the Circular Lagos Business Platform promotes business interests and makes it easier for them to grow and invest.
In summary, Nigeria runs a decentralised CE system, encouraging grassroots, micro and macro level participation in the quest towards a more circular economy.

GHANA

In Ghana, long before the term 'Circular Economy' was formalised, communities engaged in sustainable practices driven by necessity and tradition. These included repairing goods, recycling organic waste and reusing materials in agriculture. Such practices have built the foundation for contemporary circular economy concepts. Factors such as rapid urbanisation and increased consumption led to a very significant rise in solid waste, particularly plastics.

Poor waste management infrastructure led to a massive increase in informal recycling hubs in areas like Agbogbloshie in Accra. As these became prominent, health and environmental concerns also increased, necessitating the need for sustainable waste management solutions.

Ofori (2023) studied circular economy practices and their implication for environmental sustainability and revealed that there was no clear-cut waste disposal method in practice in Ghana and people disposed of their waste within their convenience without following any

legal medium. This situation is a detriment to CE and environmental sustainability. There is also a lack of social corporate responsibility on the side of the producers as they do not take any serious action toward financing the collection and management of their waste products.

The study revealed that many stakeholders in the production industry lacked technical knowledge of CE, leading to a lack of mechanisms in place to promote it. There is also a lack of education and awareness efforts on CE, and the public is uninformed of what is required to make CE possible. However, Ghana has also made significant progress in policy formulation efforts to support CE adoption, launching its National Plastic Waste Management Policy (NPMP, 2019) to formalise plastic recycling and reduce pollution.

In terms of policies to support CE, the NPMP (2019) policy was drafted to reduce plastic waste, promote reuse and recycling, and support innovation in sustainable packaging, with key CE elements including support for CE business models and incentives for plastic alternatives and biodegradable materials. This was led by agencies such as the MESTI, EPA and GPAP. Another key policy is the Ghana National Action Partnership (NPAP), launched by the government of Ghana in partnership with the World Economic Forum. The policy focuses on circularity in the plastics value chain, and includes a multi-stakeholder roadmap to eliminate leakage and support closed-loop systems.

The National Climate Change Policy (2013) and Updated Nationally Determined Contribution (NDC) (2021) include elements of waste-to-energy, composting and biogas generation, sustainable production and consumption, and are positioned as a climate adaptation and mitigation strategy. The Green Jobs Strategy (2022), developed by the Ministry of Employment and Labour Relations, aims to create decent jobs in sectors like waste management, renewable energy, and recycling and sustainable agriculture, with major incentives being to support MSMEs and cooperatives in green and circular industries.

Despite these policies, Ghana faces some regulatory challenges including:
- Lack of a Comprehensive National Circular Economy Law
- Fragmented Institutional Mandates and Poor Inter-Agency Coordination
- Weak Enforcement of Existing Environmental and Waste Laws
- Inadequate Implementation of Extended Producer Responsibility (EPR)
- Absence of Circular Product Standards and Certifications
- Limited Integration into Local Government Regulations
- Tax and Incentive Misalignment
- Limited Alignment with Trade and Industrial Policies

In view of these challenges, Ghana has responded at different times with key incentives to drive CE adoption, including tax reliefs and import duty waivers for equipment recycling, renewable energy, and biodegradable packaging materials. Incentives also include access to green financing, such as fidelity bank green loans, GIZ sponsored green SME grants, UNDP challenge funds, as well as public-private partnerships (PPP) whichsupports waste management contracts,material recovery and recycling hubs. (Fidelity Bank, Ghana (2023); Ghana Ministry of Finance (2021)).

CÔTE D'IVOIRE

Côte d'Ivoire is gradually aligning itself with the global movement towards a circular economy, although the concept has not yet been fully institutionalised at the national level. Historically, public policies have emphasised waste management, environmental protection and the integration of sustainable development principles (Ministère de l'Environnement et du Développement Durable [MINEDD], 2018; Government of Côte d'Ivoire, 2021). The National Development Plan (PND 2021–2025) highlights the importance of green growth and sustainable development as pillars of Côte d'Ivoire's economic transformation, promoting the emergence of environmentally responsible industries (Government of Côte d'Ivoire, 2021).

In line with this trajectory, a national framework for the circular economy is currently under development, integrating both concrete actions and a strategic vision driven by actors such as the Abidjan Institute for Circular Economy (Institut de l'ÉconomieCirculaired'Abidjan – IECA), in partnership with sectoral ministries and private stakeholders (Government of Côte d'Ivoire, 2023).

The National Environmental and Sustainable Development Policy (PNEDD, 2018) advocates better management of natural resources and a transition toward sustainable production and consumption patterns, aligned with the Sustainable Development Goals (SDGs). Several initiatives in sustainable waste management and green economy development indicate that solid foundations for a circular economy are already in place (MINEDD, 2022).

Interestingly, Africa is seen as the dumping site or wastebin of the world, where used products are shipped onto the continent almost daily. Given the multifaceted challenges facing the continent, managing internally produced waste is already a given challenging task, to talk less of waste produced by exports. Hence, it is imperative to explore different digital innovations for circular economy (DICE).

SENEGAL

Senegal's circular economy space is emerging as a vital driver for sustainable development, propelled by government commitment, donor engagement and grassroots innovation. The country's economy, while historically reliant on agriculture, fisheries and extractives, has seen a gradual shift towards green and resource-efficient practices. Key opportunities exist in waste management, recycling, renewable energy and sustainable agriculture, where local SMEs are increasingly playing a central role (World Bank, 2021). Urban centres such as Dakar, Thiès, and Saint-Louis, have witnessed a rise in startups and cooperatives innovating in plastics recycling, composting, upcycling, and repair services. The government's Plan Sénégal Émergent (PSE) includes sustainability objectives that align with circular economy principles, creating a favourable policy backdrop for expansion (Government of Senegal, 2014).

Waste management in Senegal is primarily regulated by the Ministry of Urban Planning, Housing, and Public Hygiene (MUHCH), which oversees national sanitation and waste disposal policies. The Senegalese National Waste Management Agency (Unité de Coordination de la Gestion des Déchets Solides – UCG) plays a central operational role, managing urban solid waste collection, transport and landfill operations (UCG, 2023). UCG also supports recycling initiatives, coordinates public–private partnerships in waste management and promotes community awareness programmes on waste segregation and reduction. Local municipalities are tasked with implementing waste management strategies at the city level, often collaborating with informal sector actors who play a significant role in material recovery (UNEP, 2018). Regulatory oversight also includes enforcement of environmental compliance through the Ministry of Environment and Sustainable Development, which ensures that waste treatment and disposal adhere to environmental standards.

Digital inclusion in Senegal's circular economy is growing but remains uneven, particularly between urban and rural areas. Mobile connectivity is relatively strong, with internet penetration reaching about 58% in 2023 (DataReportal, 2023), enabling many SMEs to leverage digital tools for marketing, mobile payments, and supply chain management.
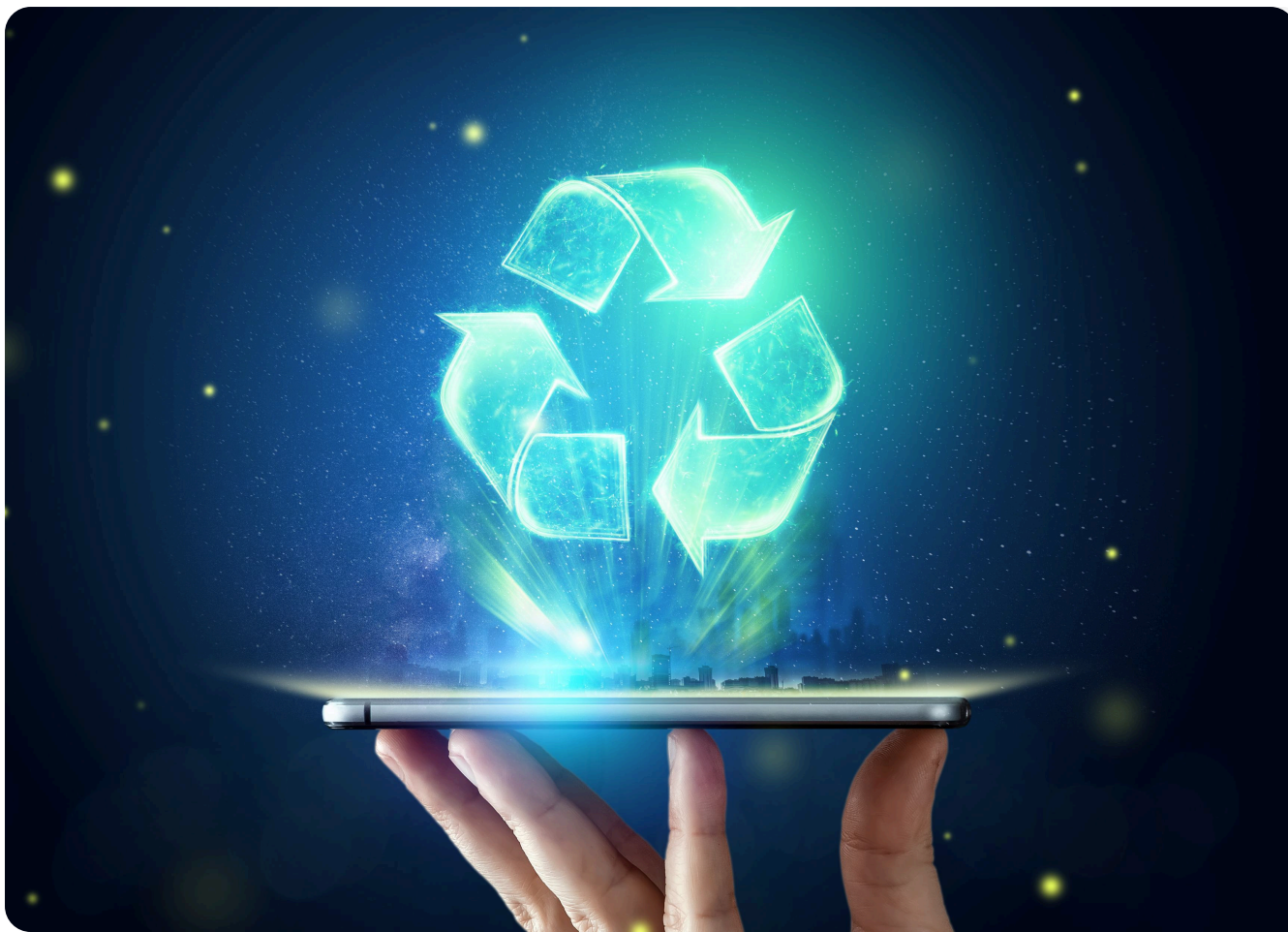
Platforms such as Jumia and local e-commerce channels are being adapted by green businesses to expand market reach, while mobile money services like Orange Money and Wave support financial inclusion (GSMA, 2022). Some recycling and waste management enterprises have adopted geolocation and data tracking systems to optimise collection routes and monitor material recovery rates (GIZ, 2021). However, challenges persist in the form of limited digital literacy, high costs of technology adoption and infrastructural gaps in less connected regions, which restrict the full integration of digital solutions into circular economy activities.

The gender dimension is also critical. While women are heavily engaged in informal recycling, artisanal production and Agro processing, they face barriers in accessing both capital and digital tools. Programmes led by NGOs and development partners, such as ENDA Énergie and GIZ's initiatives, are working to strengthen women's participation by providing training, access to digital marketplaces and mentorship in circular-focused enterprises (ENDA Énergie, 2021). Bridging the gap in digital skills and infrastructure, while fostering policy support and investment, will be essential to scaling the circular economy in Senegal and ensuring it becomes both inclusive and digitally enabled. With continued collaboration between the public sector, private actors and international development partners, Senegal is well-positioned to leverage digital innovation as a catalyst for a more resilient and sustainable circular economy.

2.0 Methodology

The research for the Digital Innovation for Circular Economy (DICE) project employed a mixed-methods approach to provide a more nuanced understanding of the intersection of digital innovation, circular economy practices and access to climate finance in West Africa. This methodology was designed to triangulate findings from both quantitative and qualitative data sources, ensuring the robustness and validity of the results.

2.1 Quantitative Data Collection

A quantitative survey was administered across the four selected West African countries: Ghana, Nigeria, Senegal, and Côte d'Ivoire. A total of 549 responses were collected from small and medium-sized enterprises (SMEs) and other stakeholders engaging in circular economic activities.

To ensure broad reach and accessibility, the survey instrument was translated and administered in French for the francophone regions of Senegal and Côte d'Ivoire. The responses were subsequently translated back into English for standardised analysis. The survey was structured to capture a range of data, including:

- Demographic information of the respondents and their organisations.
- Perceptions on policy and government support.
- Adoption and usage of digital tools in their operations.
- Barriers and enablers to digital innovation.
- The perceived impact of digital tools on key business outcomes such as revenue, cost savings and access to funding.
- Gender-specific insights on women's participation, decision-making and barriers to digital adoption.

2.2 Qualitative Data Collection

To enrich the quantitative findings with in-depth perspectives and contextual understanding, two primary qualitative data collection methods were utilised:

- **Focus Group Discussions (FGDs):** A total of five FGDs were conducted, with one held in each of the country of Ghana, Senegal, and Côte d'Ivoire. In Nigeria, given the country's size and diverse CE landscape, two separate FGDs were held in the major active circular economy hubs of Abuja and Lagos. These discussions brought together a diverse group of stakeholders, including SME owners, waste collectors, innovators, academia and policy experts, to explore shared experiences, challenges and aspirations.

- **Key Informant Interviews (KIIs):** 28 KIIs were conducted with sector experts, policymakers and leaders of CE organisations. These one-on-one interviews provided critical insights and perspectives that helped to contextualise the survey findings and shed light on complex issues such as policy harmonisation and the broader ecosystem dynamics.

2.3 Data Analysis

The collected data was subjected to a rigorous analysis process:

- **Quantitative Analysis:** The survey data was analysed using statistical software to identify key patterns, trends and differences across countries and respondent demographics.

- **Qualitative Analysis:** The transcripts from the FGDs and KIIs were coded thematically. A thematic analysis approach was used to identify recurring themes, patterns and insights related to digital innovation, policy, funding and gender.

- **Triangulation:** The qualitative and quantitative findings were then triangulated to provide a comprehensive and robust set of conclusions. The survey data helped to quantify the prevalence of certain issues and perceptions, while the interview and FGD data provided the rich, descriptive context behind those numbers. This ensured that the recommendations were grounded in both empirical evidence and practical, on-the-ground realities.

3.0 Demographics

Profile of Respondents:

Figure 1: Demographic Analysis of Respondents by Country and Gender

% of Respondents by Country

Nigeria	57.0%
Côte d'Ivoire	26.8%
Ghana	14.6%
Senegal	1.6%

% of Respondents by Gender

Male	66.1%
Female	32.2%
Not Specified	1.6%

Most of the survey respondents, 57%, are from Nigeria. The remaining respondents are from Cote d'Ivoire (26.8%), Ghana (14.6%), and Senegal (1.6%). The majority of respondents are male (66.1%), while female respondents make up 32.2%.

Figure 2: Distribution of Respondents by Sectors

% of Respondents by Sector

Sector	%
Waste (Collection, sorting, recycling)	25.7%
Farming/Food	15.5%
Other	13.5%
Clothing/Textiles	12.4%
Automobile	8.7%
Software/Digital	8.0%
Energy (Solar, gas, etc)	6.2%
E-waste/Electronics	6.0%
Water	4.0%
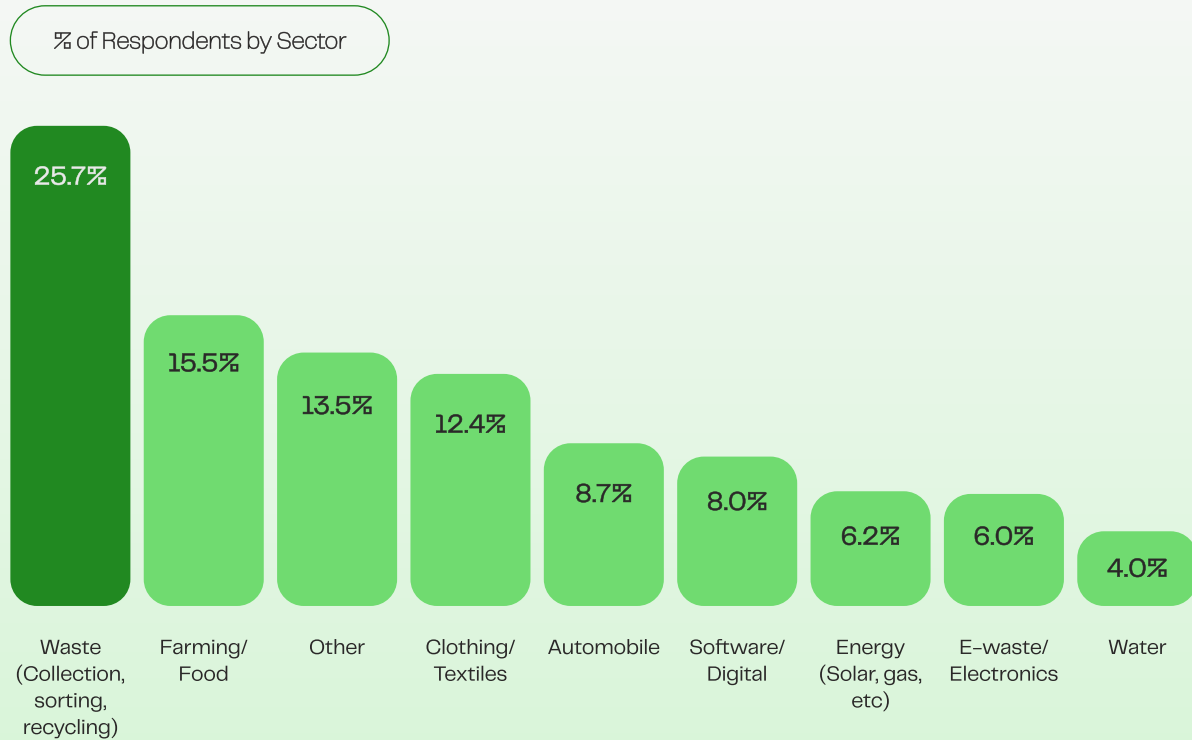
For business sectors, the survey reveals that waste management – including collection, sorting and recycling – represents the largest proportion of businesses at 25.7%. This is followed by the farming and food industry at 15.5%, clothing and textiles at 12.4%, and the automobile sector at 8.7%.

Figure 3: Roles of Respondents in their Business

% of Respondents by Role

Business owners (46.1%) accounted for a greater proportion of the respondents, followed by workers (33%), and managers (16.2%). Others constituted 4.7% of respondents
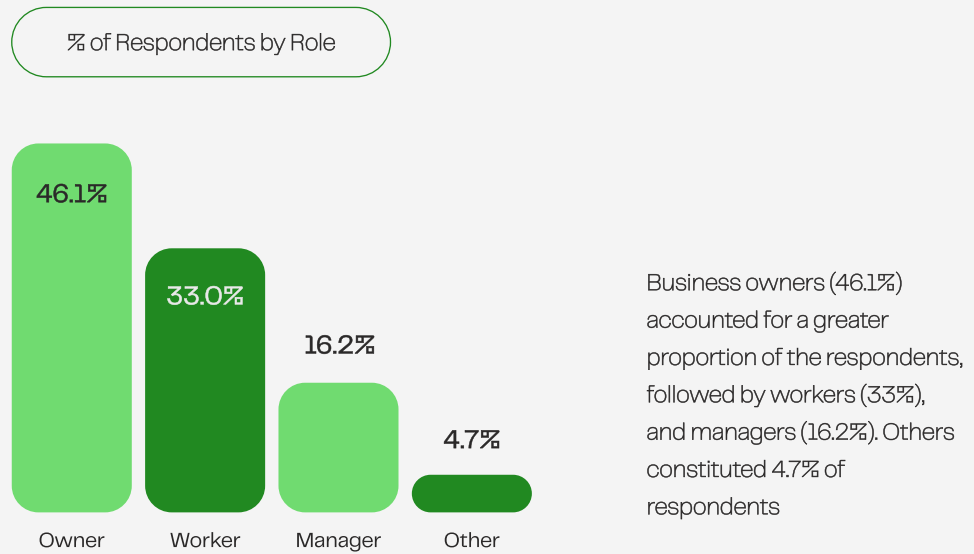
Figure 4: Years in Business and Cluster/Network Affiliation

% of Respondents Years in Business
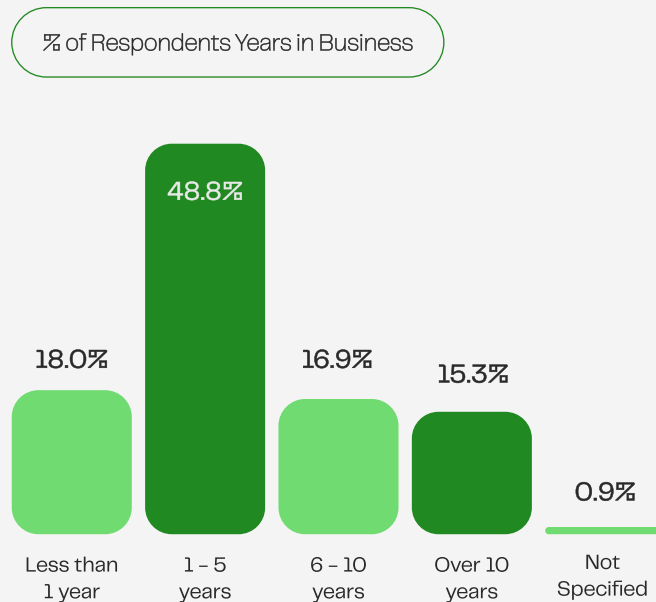
Based on the survey, nearly half of the respondents (48.8%) have been in business for 1 to 5 years. The remaining businesses are split between those that have been operating for less than a year (18%), 6 to 10 years (16.9%) and over 10 years (15.3%).

Figure 5: Cluster Analysis

% of Respondents by Business group or network

50.5%

40.1%

8.7%

0.7%

Yes

No

Not Sure

Not Specified

About half (50.5%) of businesses worked in a business group or network, while 40.1% did not.
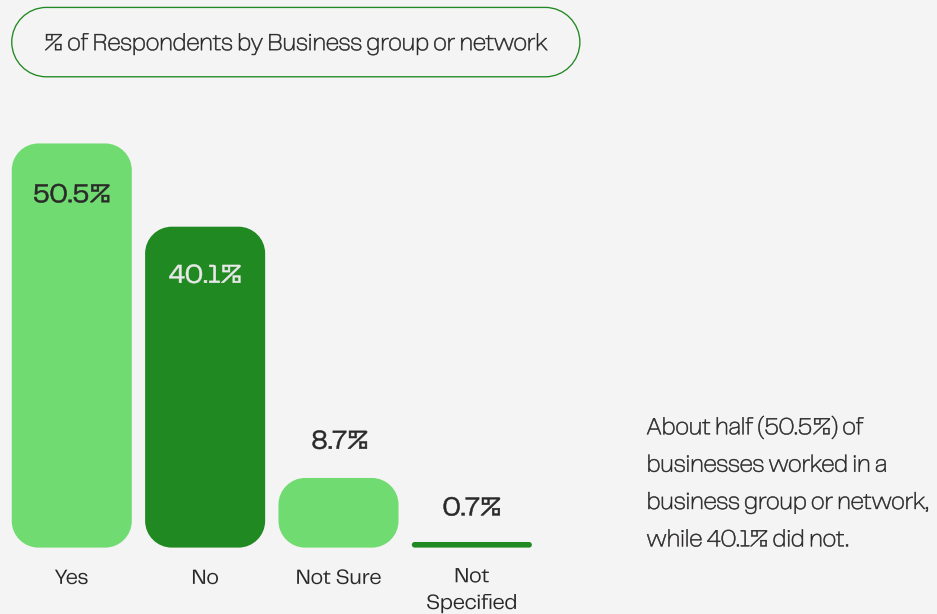
Figure 6: Size of Enterprises

% of Respondents by Enterprise Class

40.1%

39.3%

16.2%

2.6%

1.8%

Nano

Micro

Small

Large

Medium

Among the businesses surveyed, nano businesses represent the largest proportion at 40.1%. They are closely followed by micro businesses at 39.3%. Small businesses make up 16.2% of the total, while large businesses account for a smaller proportion at 2.6%.
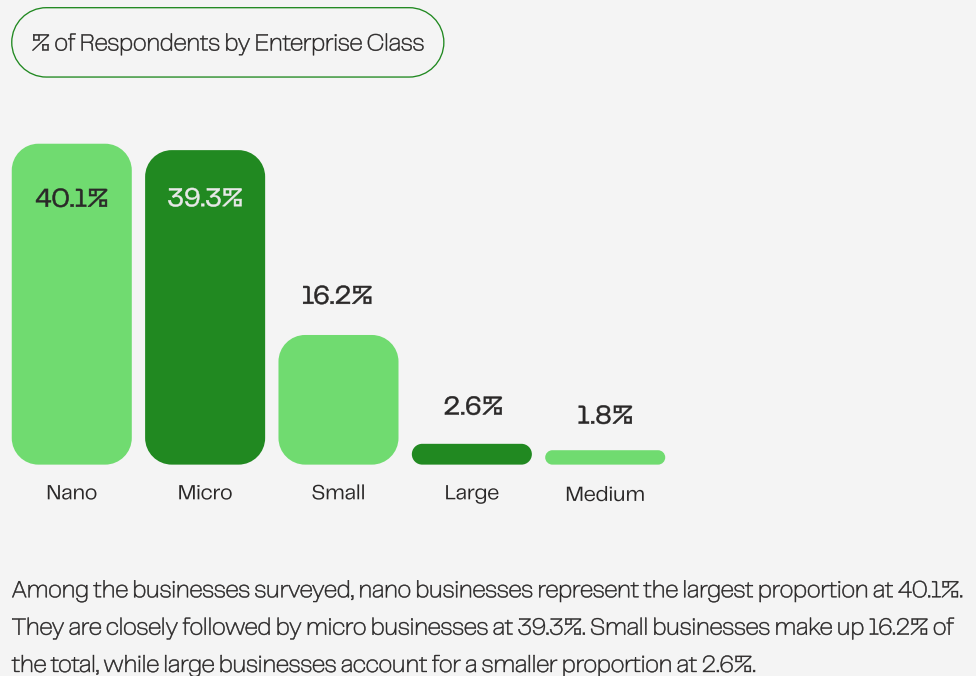
4.0 Digital Innovations for Scalability and Climate Finance

Digital technology is beginning to play a crucial role in circular economy practices, paving the way for greater scalability and potential access to climate finance. While some businesses are still using basic tools like Excel for record–keeping, more advanced innovations are emerging.

Some businesses are adopting sophisticated digital tools to improve their operations. For example, Geographic Information Systems (GIS) are being used to track customers and waste depositors, which helps to optimise waste collection routes. Another example is the use of reverse vending machines (RVMs) combined with mobile apps. These systems not only make waste collection more efficient but also incentivise participation, enhancing user engagement. These tools are helping to streamline processes and deepen the integration of circular economy principles.

These digital advancements are also key to unlocking climate finance. Funders and investors in the green and climate sectors require verifiable data to assess environmental impact, resource efficiency and project scalability. Digital tools from simple record-keeping to advanced GIS and RVM systems provide the systematic data collection and traceability needed to meet these strict reporting requirements. By demonstrating quantifiable environmental benefits and a clear path to scalability through digital means, projects become more appealing to climate investors and grant providers.

To better understand the challenges and successes of securing this type of funding, a survey was conducted. The results, showing participants' experiences in accessing climate finance across different countries, are presented in the figure below.

Figure 7: Digital Innovation's Contribution to Climate Finance

% of Respondents by Climate or green funding

Did you get climate or green funding? ● No ● Yes

Country	No	Yes
Côte d'Ivoire	92.1%	7.9%
Ghana	86.5%	13.5%
Nigeria	84.3%	15.7%
Senegal	100%	
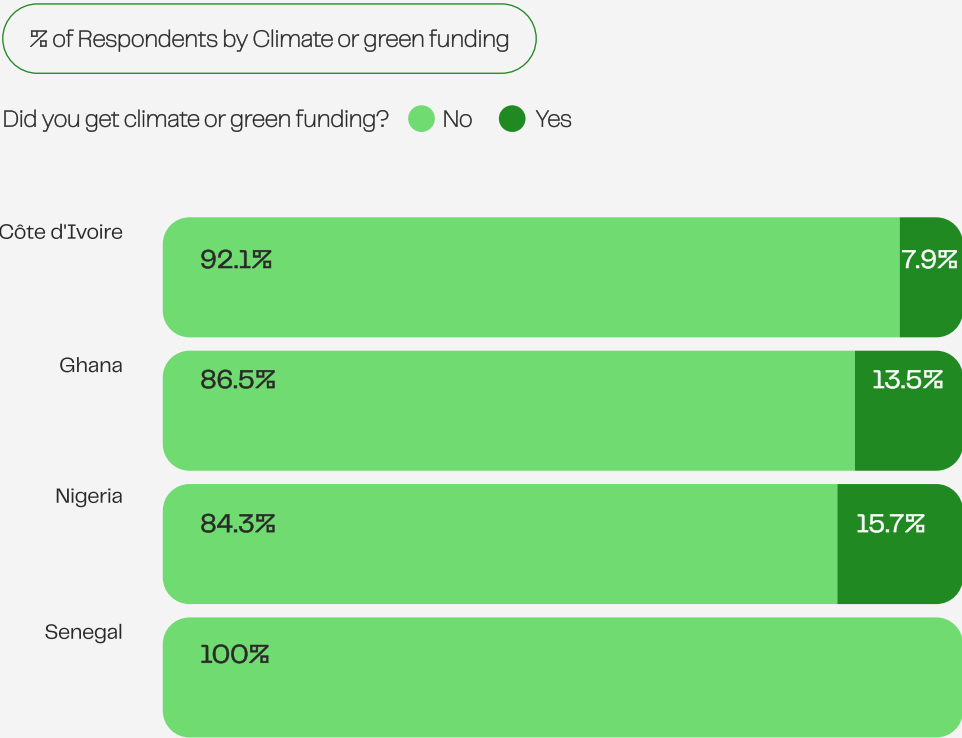
Most respondents in Cote d'Ivoire (92.1%), Ghana (86.5%), and Nigeria (84.3) reported not receiving funding, indicating a substantial unmet funding need.

For the organisations that successfully secured funding, it is essential to understand the type of support they received and the role, if any, that digital tools played in the process. The following chart breaks down the funding and support into three categories: Grants, Loans and Training.

Figure 8: Funding Dynamics for Circular Businesses

% of Respondents by type of fund

Did digital tools help you get funding? ● No ● Yes

	No	Yes
Grant	19.4%	80.6%
Loan	16.7%	83.3%
Training	25.0%	75.0%
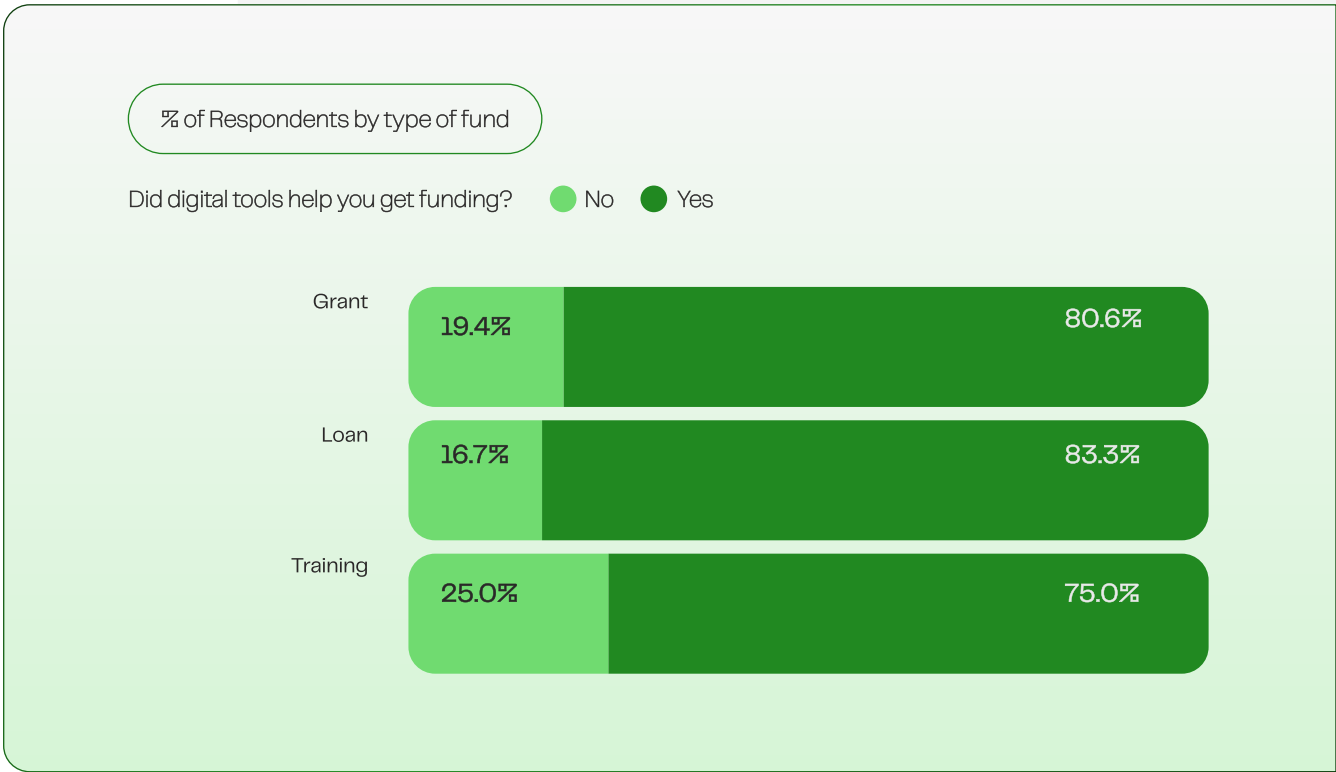
Based on the findings, digital tools played a significant role in helping organisations secure various types of support.

Key Findings by Funding Type

- **Grants:** A substantial 80.6% of grant recipients said that digital tools were crucial to their success. Only 19.4% found them unhelpful.

- **Loans:** Among those who received loans, an even higher percentage – 83.3% – confirmed that digital tools were useful in the application process. 16.7% reported no help from these tools.

- **Training**: For training opportunities, 75% of the beneficiaries reported that digital tools helped them gain access, while 25% said they did not.

- These results indicate that using digital tools is a strong factor in successfully acquiring different forms of support.

These findings show that digital tools are seen as a powerful enabler for securing various types of climate and green funding. This highlights their growing importance in navigating the funding landscape. The results suggest that digital proficiency and access to digital platforms are becoming essential assets for circular economy SMEs seeking financial support.

4.1 Use of digital tools

Figure 9: Funding Dynamics for Circular Businesses (Cont'd)

How much does your business use digital tools (like apps, software)?

Legend: None at all, A liitle, Some, A lot

Côte d'Ivoire: 17.3%, 37.4%, 0.7%, 44.6%
Ghana: 24.7%, 31.5%, 43.8%
Nigeria: 16.1%, 33.3%, 21.8%, 28.8%
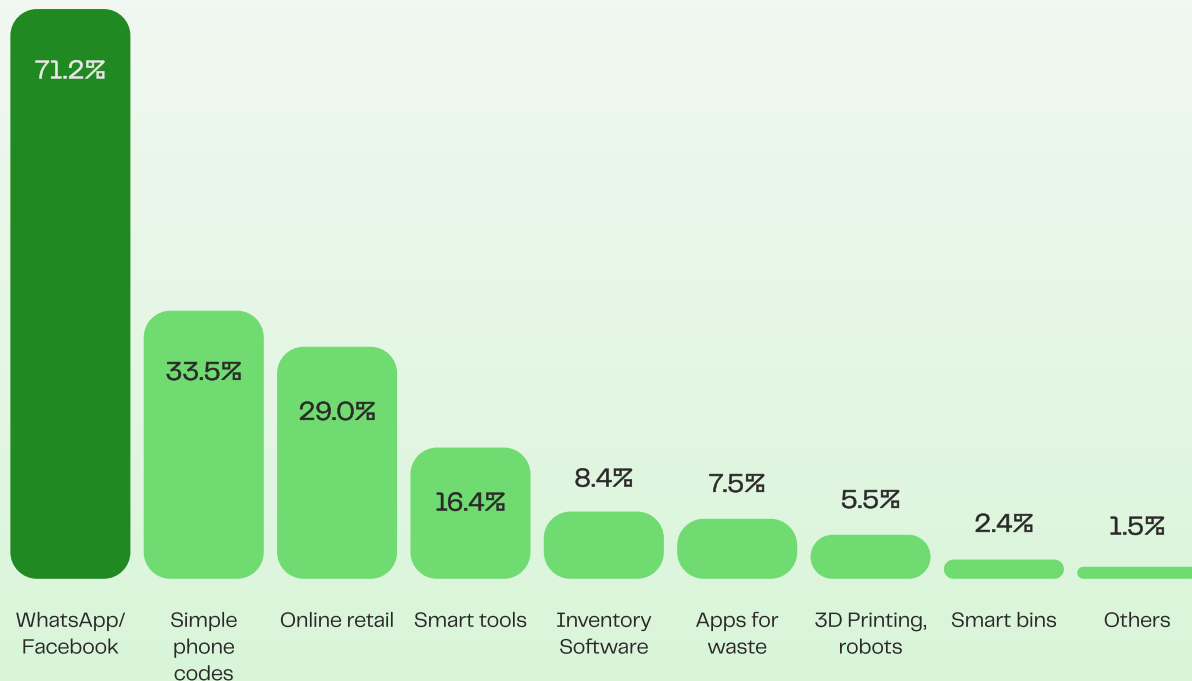Senegal: 42.9%, 57.1%
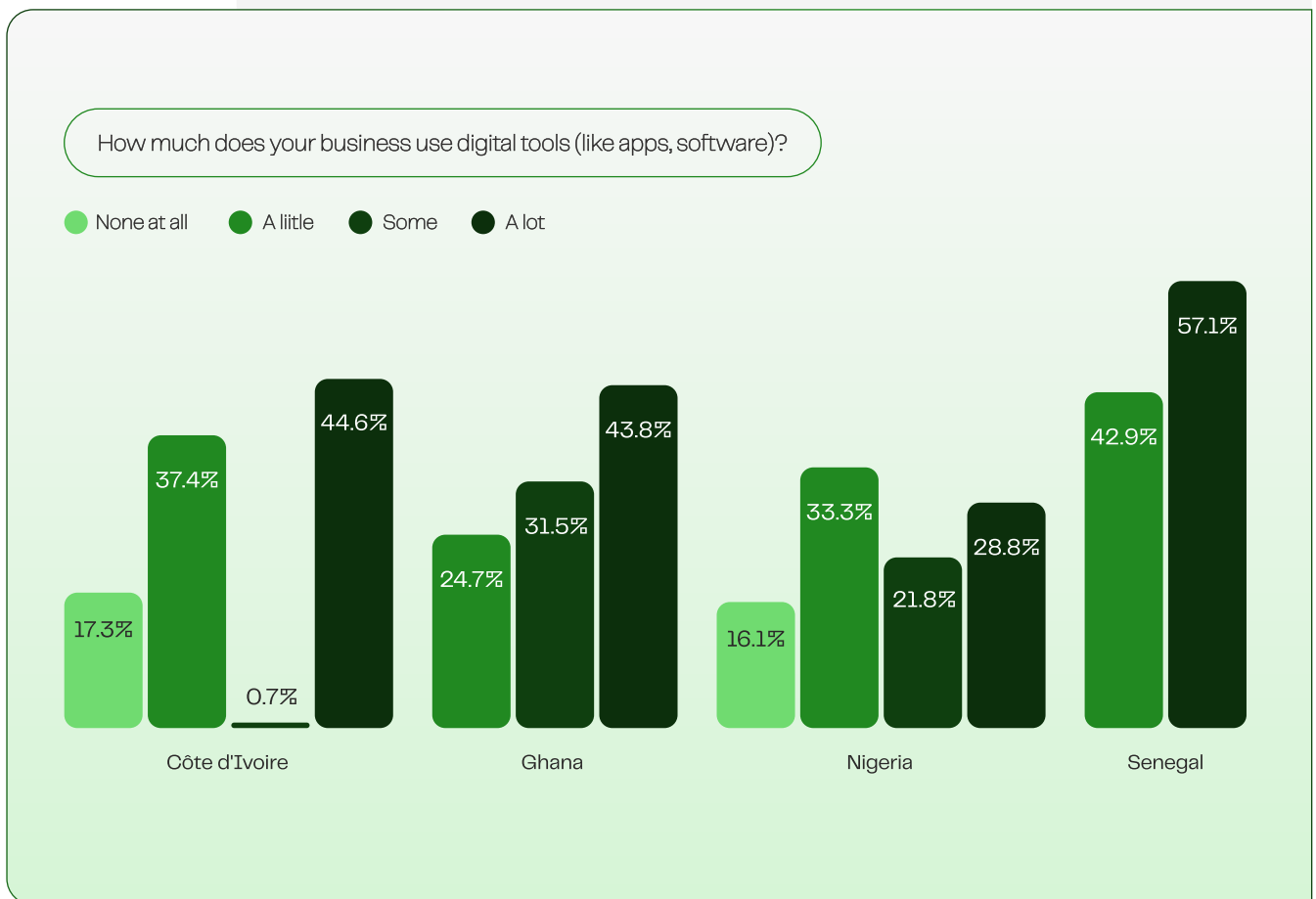
4.2 Digital tool Usage by Countries

Usage of digital tools varies significantly among businesses in different countries.

- **Ivory Coast:** Most businesses in Ivory Coast use digital tools frequently, with 46% using them "a lot." A smaller portion uses them "sometimes" (0.7%) or "a little" (37.4%).

- **Ghana:** Most Ghanaian businesses also frequently use digital tools (43.8%). The remaining businesses use them "sometimes" (31.59%) or "rarely" (24.7%).

- **Nigeria:** Nigeria shows a different trend, with the largest group of businesses (33.3%) rarely using digital tools. This suggests a notable gap in digital adoption. Only 28.8% of businesses use digital tools frequently, 21.8% use them sometimes, and 16.1% have yet to use any digital tools at all.

- For **Senegal,** more than half (57.1%) of the respondents use digital tools frequently and 42.9% use them a little.

Figure 10: Digital Tools Usage Analysis

Which of these digital tools do you use?

WhatsApp/Facebook	Simple phone codes	Online retail	Smart tools	Inventory Software	Apps for waste	3D Printing, robots	Smart bins	Others
71.2%	33.5%	29.0%	16.4%	8.4%	7.5%	5.5%	2.4%	1.5%

By a large margin, WhatsApp and Facebook are the most widely used digital tools, with 71.2% of businesses reporting their use. This is followed by mobile phone codes (USSD) (33.5%), e-commerce platforms (29.0%). More advanced and specialised tools, such as smart tools (sensors), inventory software and technologies like 3D printing, robotics and AI, have very low usage rates (8.4% and below). This highlights a preference for common social and communication platforms over specialised business tools.

Figure 11: Impact of Digital Tools on Circular Businesses

Digital tools and your business

Digital tools fit well with our current way of working — **47.7%**

We can try out digital tools before fully adopting them — **35.3%**

Digital tools work better than what we use now — **30.2%**

Digital tools are simple to use — **28.2%**

Digital tools cost less to run — **6.9%**
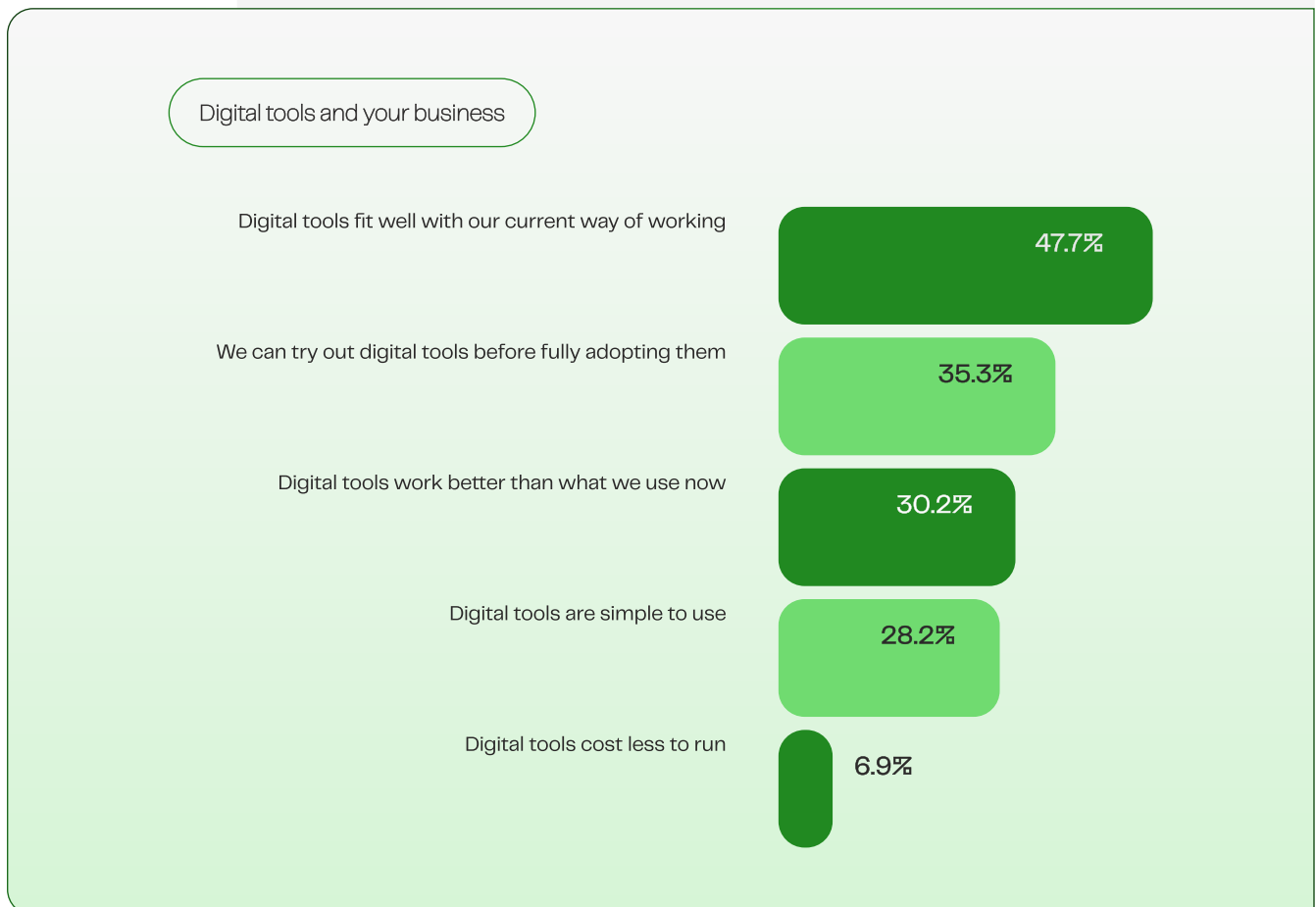
4.3 Perception of Digital Tools

The survey reveals businesses' perceptions of digital tools, highlighting key areas of alignment and friction. The highest level of agreement (47.7%) was with the statement, "Digital tools fit well with our current way of working," which suggests that for many, these tools are a seamless and compatible part of their operations.

However, fewer businesses agreed that "Digital tools work better than what we use now" (30.2%) or that they are "simple to use" (28.2%). This indicates a gap between how well the tools fit into existing workflows and their perceived effectiveness or ease of use. The lowest agreement was for the statement, "Digital tools cost less to run," at just 6.9%. This points to the cost of running digital tools as a significant concern for most businesses.

Figure 12: Impact Analysis on Digital Tools

How has digital tools helped you?

○ None at all ● To a small extent ● To some extent ● To a large extent ● Very much

	None at all	To a small extent	To some extent	To a large extent	Very much
Saved money	20.9%	25.3%	28.7%	15.2%	9.9%
Grew revenue	20.1%	29.3%	25.9%	14.9%	9.8%
Hire more workers	35.1%	27.8%	19.9%	9.4%	7.7%
Got funding	49.4%	15.5%	16.6%	8.8%	9.7%

4.4 Impact of Digital Tools on Business Growth

The following chart shows how digital technologies are impacting key areas of business development.

Savings and Revenue Generation

Digital tools are seen as most effective for improving financial outcomes. Over half of the respondents (53.8%) said digital tools helped them save money to "some extent," to a "large extent," or "very much." A similar number (50.6%) felt the same way about growing revenue. This suggests that businesses are using digital tools to improve operational efficiency and boost sales, which helps with the overall scalability of circular economy SMEs.

Hiring More Workers

The positive financial impact of digital tools does not seem to extend to job creation. Nearly two-thirds of the respondents (62.9%) reported that digital tools did not help with hiring more workers at all or "to a small extent." This indicates that, as they are currently being used, digital tools are not a significant driver of job growth in these businesses. This finding highlights a need for strategies that directly connect digital adoption to new employment opportunities within the circular economy.

Despite some positive impacts, the chart reveals a significant disconnect between using digital tools and securing financing. A striking 64.9% of the respondents felt that digital tools did not help them, or had a minimal impact, in accessing funding. This is the highest negative perception across all categories.

While digital tools might help businesses save money and grow revenue internally, they are clearly not seen as effective for securing external funding, particularly climate finance – a key goal of this study. This contrast between internal financial benefits and the external funding challenge highlights an urgent need for digital solutions designed specifically for financial access. These tools should help with robust financial record-keeping, impact reporting, and direct connections to funding platforms to truly enhance the scalability of these SMEs.

Table 1: Impact of Digital Tools on Financial Outcomes

The table below illustrates the average responses across the 4 regional countries on the impact of digital tools on financial outcomes, on a scale of 1-5, with 1 representing no impact and 5 representing large impact.

Average Respondents by Country (How has digital tools helped you?)

| Country	Got Funding	Grew Revenue	Hired more workers	Saved money
Côte d'Ivoire	2.01	2.82	2.45	2.80
Ghana	2.46	2.70	2.57	2.78
Nigeria	2.11	2.56	2.09	2.58
Senegal	2.71	2.29	2.29	3.00

Overall, the data shows that digital tools have the biggest impact on financial outcomes.

Impact on Savings and Revenue

Across all countries surveyed, digital tools are seen as most effective for saving money and growing revenue. The scores for "Saved Money" and "Grew Revenue" across countries are relatively higher than other impact areas, suggesting that businesses feel digital tools contribute to these financial benefits, though not to a major degree.

Impact on Funding and Job Creation

In contrast, digital tools are perceived as having a much smaller impact on securing funding and creating jobs. The lesser average scores for "Got Funding", suggest that while digital tools might help a little with getting funding, their role is modest compared to their impact on revenue and savings. The lowest average score for "Hired More Workers" (Nigeria, 2.09) shows that businesses do not see digital tools as a primary driver for job creation.
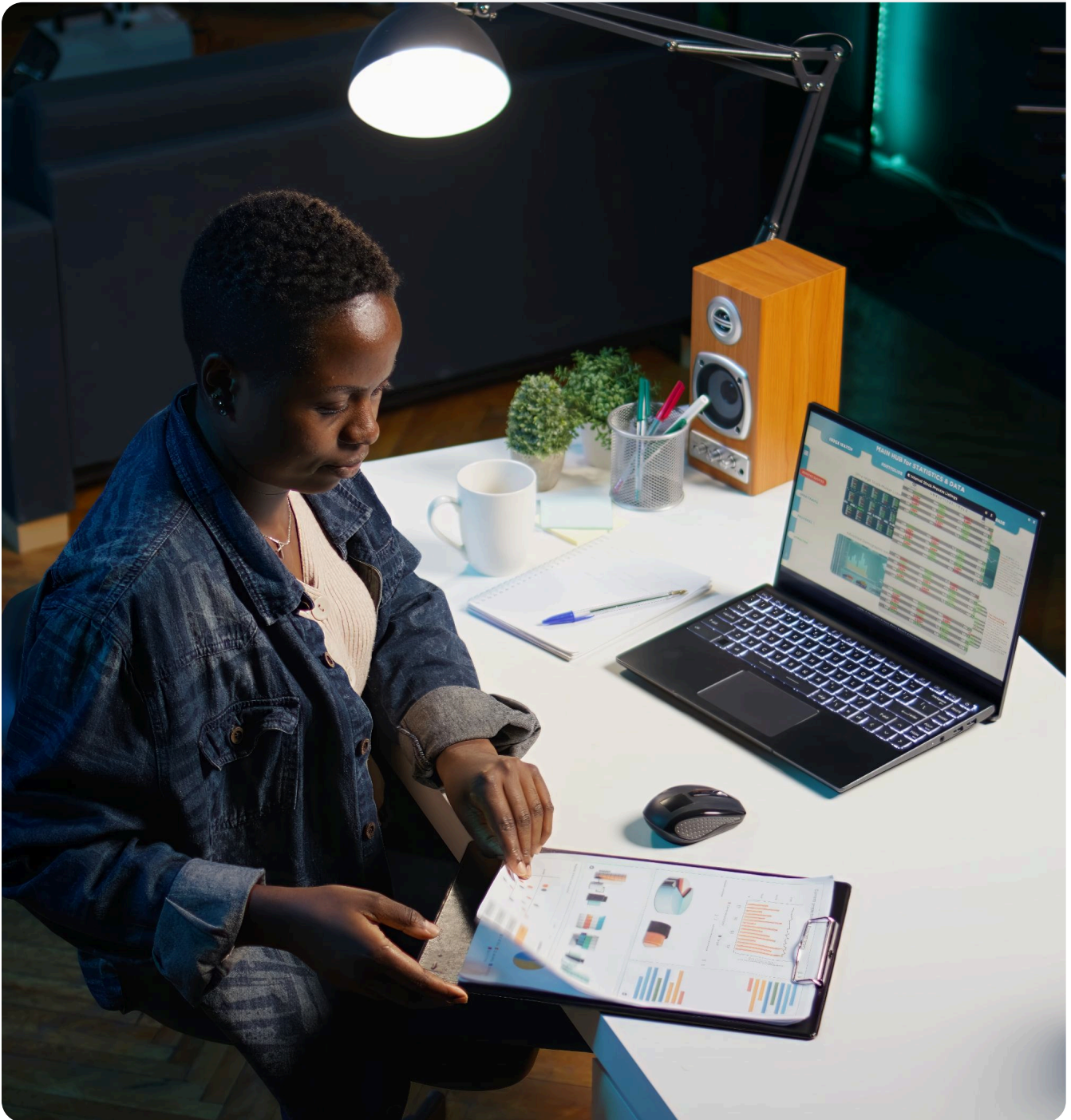
5.0 Key Barriers and Enablers to Digital Innovation Adoption amongst Green SMEs

Findings from the study revealed the key systemic barriers limiting digital innovation transformation among Nigerian CE-focused SMEs.

Limited awareness

A consensus among focus group discussion participants is the limited awareness among SME operators about the existence and benefits of digital tools in circular business processes. Many entrepreneurs in the CE space, especially those operating informally, are unaware of how digital technologies can improve waste collection and sorting, enhance product traceability and lifecycle tracking, etc.

Limited Infrastructure

Poor digital infrastructure across many parts of Nigeria, particularly in rural or semi-urban areas, poses a significant barrier. Participants noted that unstable electricity supply, poor internet connectivity and low access to smart devices make it difficult to deploy or sustain digital tools. This infrastructural deficit hampers the overall scale-up of circular innovations.

Inadequate Technical Skills

Another critical challenge is the lack of technical skills among SME owners and their workforce. The adoption of digital technologies requires at least basic digital literacy, and in some cases, intermediate to advanced skills in use of digital platforms. Most CE-related SMEs, especially in waste collection, recycling and informal production, are run by individuals with little or no exposure to such technologies. The absence of structured training or support further entrenches this capability gap.

Policy Barriers and Lack of Government Will

The absence of an enabling policy environment is a core barrier to AI readiness for SMEs. Key issues include lack of targeted government incentives or subsidies for SMEs adopting circular digital innovations and weak institutional coordination between ministries responsible for technology, environment and MSME development.

Digital Insecurity and Lack of Legal Framework

Respondents also raised concerns about data privacy, cybercrime and lack of clear legal protections which further discourage SMEs from adopting AI and digital solutions. Some SME owners perceive digital tools as risky. This is especially true for SMEs dealing with sensitive customer data, payment systems or intellectual property in product development. The fear of being exploited or defrauded in a poorly regulated digital space undermines trust and adoption.

Figure 13: Limitations for Digital Usage

Why is it hard for small businesses to use digital tools

64.5%	48.5%	35.7%	25.7%	0.9%
High Cost	No training	Fear of fraud	No Internet	Other
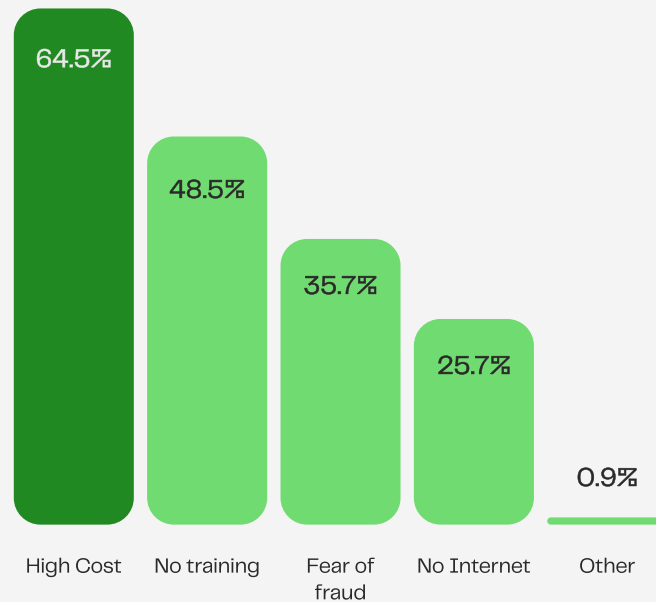
High Cost and No Training:

From the survey, the most significant barriers are "High Cost" (64.5%) and "No Training" (48.5%). This highlights a two-pronged problem: not only are the tools themselves a financial burden, but the lack of skills to use them effectively makes the investment unviable. This pinpoints that financial and capacity-building barriers are the most prevalent barriers.

"Fear of Fraud" (35.7%) and "No Internet" (25.7%) are also notable barriers.

The fear of fraud suggests a lack of trust in digital platforms and security, which is a significant psychological and practical barrier to adoption. The issue of internet connectivity, while a barrier, is not as prominent as cost or training, indicating that while infrastructure is a factor, it is not the sole or primary bottleneck.

**Figure 14:** Access to Funding Opportunities for Circular Businesses

What helps the most when trying to get funding

Good business structures — **46.8%**

Awareness of circular economy benefits — **36.9%**

Government incentives and subsidies — **16.3%**

SMEs report that having good business structures (46.8%) helps the most when trying to access funding, suggesting that key structural points like business formalisation, tax and regulatory compliance, etc, help in facilitating funds access. This is followed by awareness of circular economy benefits (36.97%) then government incentives and subsidies (16.3%)

Figure 15: Digital Usage Challenges

What are your biggest problem using digitals tools in your work?

Lack of finance	Equipment	Skills	Internet	Others
61.6%	48.8%	31.0%	30.1%	0.7%
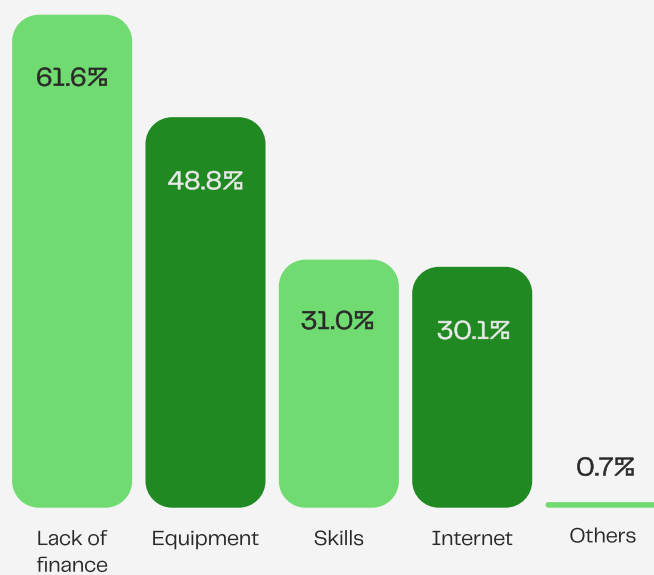
The top two barriers are lack of finance (61.6%) and equipment (48.8%). This indicates that the financial investment required for digital tools, both in terms of acquisition and ongoing costs, along with the availability and access to appropriate hardware, is a major impediment for SMEs. In addition, skills (31.0%) and internet (30.1%) are also substantial challenges. This highlights a critical need for capacity building in digital literacy and addressing connectivity issues, which are foundational for effective digital tool utilisation.

Gender Dynamics and Digital Inclusion

Across many Nigerian SMEs engaged in circular economy activities, particularly waste management, recycling and upcycling, women are heavily involved at the lower levels of the circularity chain. According to the respondents, many women serve as informal waste collectors and aggregators in both urban and rural areas. This work is physically demanding, poorly paid and often carried out under unsafe and unregulated conditions.

Women are also significantly involved in processing waste materials into reusable or sellable products. Women's involvement in the CE space exposes them to multiple unfavourable conditions, including limited social protection and safety nets as well as health risks and environmental hazards.

An important point to note is the exclusion from skills training that could enable women move up the value chain. These inauspicious conditions are compounded in the context of AI adoption. As circular SMEs integrate AI solutions for sorting, logistics and predictive maintenance, women risk being left behind if capacity-building efforts do not specifically target their inclusion.

Figure 16: Access to Capacity Building for Women

Are there programs for women to join digital or recycling work

45.3%
34.5%
20.2%

Yes   Not Sure   No
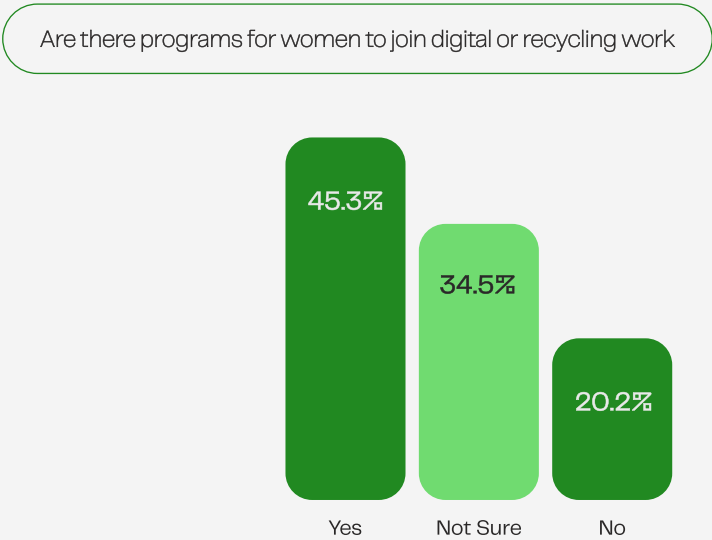
Findings from the survey show mixed perceptions about the availability of programmes for women in digital and recycling work. 45.3% of businesses agreed to the existence of these programmes. 34.5% were not convinced. 20.2% disagreed.

While a plurality of businesses agreed such programmes existed, a significant portion either disagreed or was uncertain. This highlights a need for better awareness and outreach to ensure that women-focused initiatives are effectively communicated to their target audience.

Figure 17: Gender Inclusivity on Equal Access to Opportunities

Do women in your group have equal say in tech or funding decisions
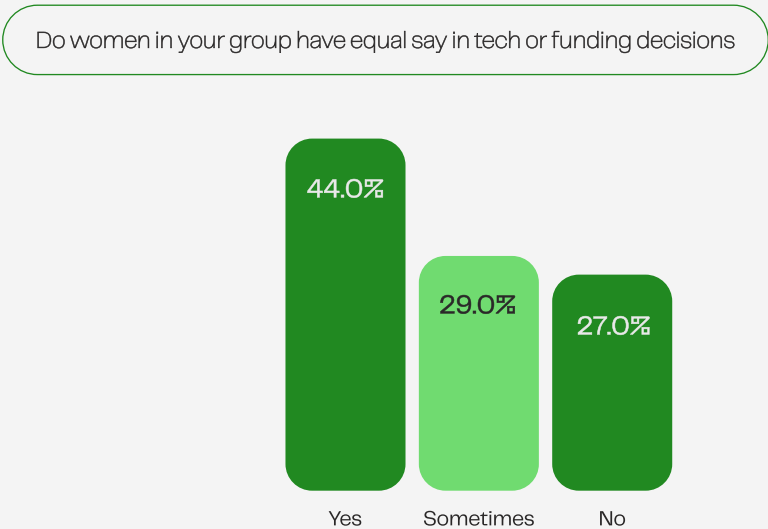
Responses about women's participation in decision-making are divided. 44.0% of respondents said that women had an "equal say." However, 29.0% reported that women sometimes had an "equal say" and 27.0% gave an outright "no" to the question. This split suggests that gender inequality in business decision-making, especially regarding technology and funding is a significant issue. Since more than half of the respondents did not give a definitive "yes," it is clear that women's voice is not always heard in the same way their male counterpart's is in critical business matters. This indicates that efforts to increase digital adoption and access to funding must also address power dynamics within business groups. Providing tools or resources may not be effective if women lack the authority to influence their use.

**Figure 18:** Factors Limiting Women Participation in Upskilling Programmes

What stops women from joining more?

Time/family	Skills gap	Discrimination	No tech access	No voice in group
62.5%	35.3%	27.1%	22.6%	18.2%
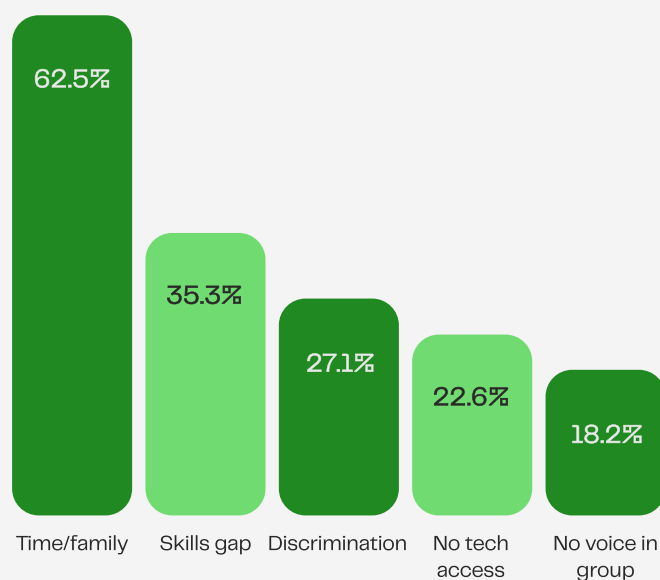
"Time/family" is, by a large margin, the most significant barrier identified, with 62.5% of respondents. This indicates that gender roles and domestic responsibilities are the primary obstacle for women's participation. "Skills gap" (35.3%) and "discrimination" (27.1%) are also notable barriers. This points to a need for targeted skills training that is both accessible and sensitive to women's schedules, as well as addressing systemic biases. The overwhelming response for "Time/family" means that any strategy to increase women's participation must consider flexible and family-friendly approaches. To ensure employment gains are distributed equally, interventions must address these specific barriers head-on, for instance by providing digital training that can be done remotely or at flexible times.

Figure 19: Gender Representation in Leadership and Digital Inclusion

How well are women represented in leadership and technical roles in digital innovation for the circular economy where you work?

Women and men are equally represented
50.4%

Not sure
27.2%

Women are not represented
22.4%
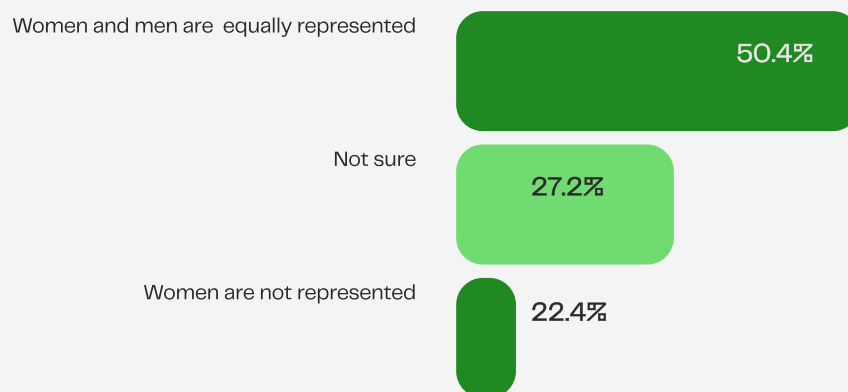
About half (50.4%) of the respondents believed that "women and men are equally represented" in leadership and technical roles. 27.2% were not sure while 22.4% believed that women were not represented.

Policies and Support

A key finding from interviews is the ineffectiveness of existing policies, such as Extended Producer Responsibility (EPR) in Nigeria, due to a lack of enforcement and incentives. While EPR is intended to shift waste management duties to manufacturers and promote circular practices, its mandatory nature is undermined by a lack of implementation. This places compliant companies at a disadvantage, as there are no penalties for those who fail to comply.

One participant highlighted this issue, stating "

For those that have been doing it for six, seven years now, what is their benefit? What kind of incentive can they get? It's possible that 44 people will wake up one day and say, oh, why do I have to do this? Other people are not doing it. Nothing comes to me if I do it. And no punishment comes to those that don't do it. So, let's just leave and use our money for something else.

This lack of recognition/incentives could lead them to abandon their efforts, as there are no rewards for compliance and no consequences for non-compliance.

The interviews suggest that to encourage widespread adoption of circular economy practices, policies must offer tangible benefits rather than just assigning responsibility. Recommended incentives include:

- Tax breaks
- Waivers on levies
- Discounts on general waste fees for both producers and citizens.

These incentives would make circular practices more economically viable and encourage greater participation.

Interviews also emphasised the need for advocacy and behaviour change in addition to policy and infrastructure. The system will fail if consumer behaviour, such as illegal waste dumping, is not addressed. This challenge can be tackled through digital innovation, with a uniform digital platform for on-demand waste pickup suggested as a potential solution. This reinforces the idea that policies must support infrastructure and business models while also integrating digital tools to influence and manage public engagement.

To further understand the impact of policy and support on digital adoption among circular economy businesses, quantitative insights from a survey are presented below.

Figure 20: Awareness on Government Policies

% of Respondents Awareness of Government Circularity Rules and Plans
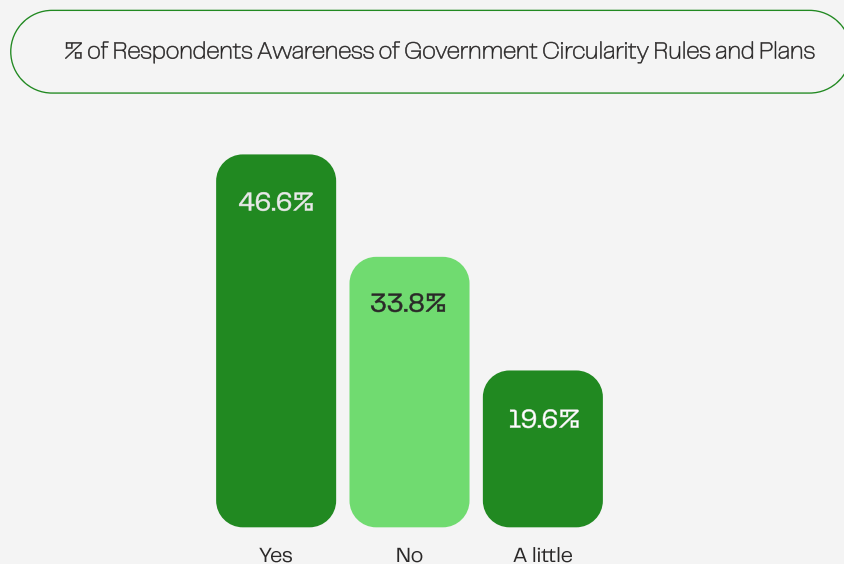
46.6% of respondents were aware of government policies. A significant portion either had minimal awareness (19.6%) or completely unaware (33.8%), highlighting a major gap in policy communication.

Do these rules mention digital tools (apps, internet, tech)?

Figure 21: Awareness on Government Policies

Do Government circularity rules and plans mention digital tools?

|				
29.5%	25.6%	18.9%	18.5%	7.5%
Not really	Don't know	Somewhat	A lot	A little
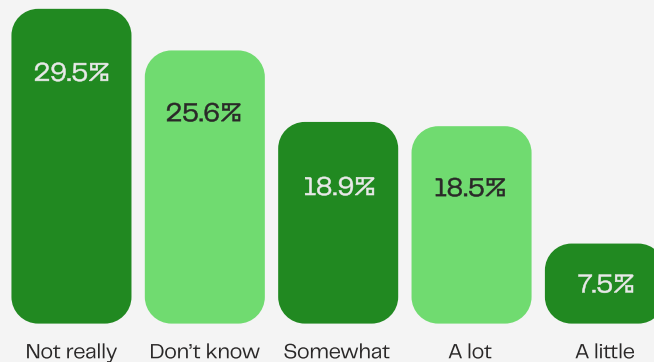
A combined 55.1% reported that government did not integrate digital solutions, while only 18.5% reported frequent mention of digital tools in government policies and support.

Are these government rules helping your business with digital tools?

Figure 22: Impact of Government Policies on Circular Economy Businesses

Are the Government circularity rules helping your business with digital tools?

|				
26.5%	24.0%	22.5%	17.3%	9.8%
Not helpful	Don't know	Somewhat	Very helpful	A little
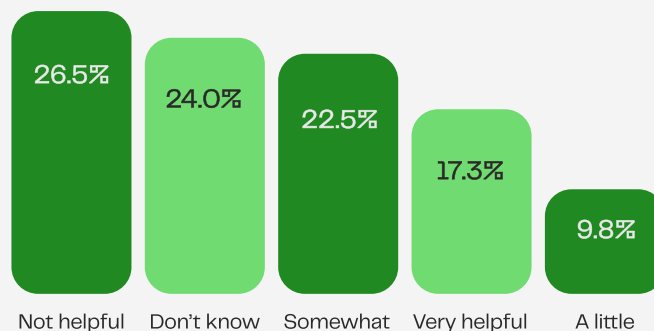
A combined 50.5% found circular policies unhelpful (26.5%) or were unaware of its benefits, suggesting gaps in circular policies to hasten digital adoption. Only a minority found the policies very helpful (17.3%).

What help did your business get from the government for digital work?

Figure 23: Impact Analysis on Government Digital Policies for Circular Economy Businesses

What help did your business get from the government for digital work?
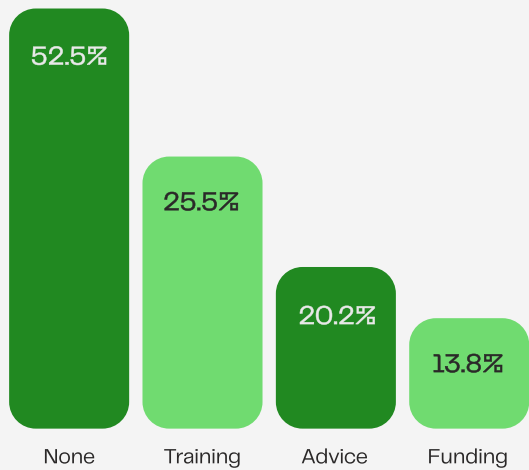
A dominant 52.5% of respondents reported receiving "no help" from the government, which is a significant finding. Of those who did receive help, the most common form was training (25.5%), followed by advice (20.2%) and funding (13.8%).

This overwhelming "no help" response reinforces earlier findings and indicates a substantial lack of direct government support for digital initiatives in circular economy SMEs. While some training and advice are provided, funding, a critical enabler for digital adoption due to high costs, is the least common form of assistance.

Recommendations

To unlock the full potential of digital innovations in scaling circular economy SMEs across West Africa, the following interventions would be germane.

Digital Awareness

Many SMEs in CE sectors remain unaware of how and available digital innovations/ technologies can improve efficiency, transparency and market access. In driving awareness, there should be targeted digital literacy and circular economy awareness campaigns for SME owners and operators, with a focus on practical applications of digital tools in product innovation, waste management, recycling, reuse, remanufacturing, etc.

Training and Capacity Building

Technical skills gap limits the ability of SMEs to adopt and sustain digital solutions. There is a need to establish training hubs and mobile learning platforms offering skills development in digital tools use, basic data analytics, etc. Since time/family is a major hindrance for inclusive participation in CE, any training intervention should consider flexible & family-friendly approaches like remote training or flexible training schedule.

Infrastructure and Support

Infrastructure deficit limits the adoption of innovations among SMEs in the CE. Through public-private partnerships, investments in reliable digital infrastructure in key CE clusters should be made. Priorities should include broadband internet, off-grid power supply for small enterprises, shared digital labs with access to CE-relevant technologies, among others.

Policies

- Establish Clear Incentives and Enforcement Mechanisms: Policy should shift from being solely a mandatory responsibility to providing tangible incentives for compliance. This includes offering tax breaks, waivers on levies or subsidies for producers and citizens who actively participate in EPR schemes and recycling. Equally important is the strict enforcement of policies for non-compliant actors, as the current lack of repercussions undermines the efforts of those who are doing the right thing.

- Formalise and integrate the Informal Sector: Because of the vital role of waste pickers, policy should focus on their formalisation rather than their exclusion. Policies should facilitate the registration of informal collectors into associations like WAPAN, providing them with official recognition, ID cards and uniforms. This will not only legitimise their work but also enable partnerships with formal organisations and government programmes, creating a more inclusive and efficient value chain.

- Incorporate Digital Solutions into Policy Design: Given the advocacy challenges, policies should be designed to leverage digital innovation to influence behaviour and streamline processes. These may include promoting the creation of a uniform, nationwide digital platform where citizens and businesses can easily arrange for the pickup of recyclables. Such a system, supported by policy, would make recycling more convenient and effective, tackling the issue of illegal dumping. Companies like Ecobarter run this at two major metropolises – Lagos and Abuja. Private-public partnerships can be formed to drive this initiative.

Cooperatives and Digital Credit Schemes

Most SMEs in the CE space lack collateral or formal credit histories. Digital financial services, when linked to cooperative structures, enable shared risk and greater bargaining power, especially for women-led businesses. SMEs should leverage cooperatives to facilitate group access to digital credit, insurance, and mobile banking tools that use transaction histories, digital records, and supply chain data for credit scoring.

Cluster Support and Innovation Hubs

Clusters reduce the cost of digital adoption through shared infrastructure and encourage peer learning. There should be the strengthening of existing CE clusters and create digital innovation hubs where SMEs can share resources, co-develop technology solutions and access finance and mentorship.

E-commerce Adoption

Online sales channels help SMEs scale without the burden of physical expansion and allow products to reach broader markets, including international buyers.
 There should be deliberate support for SMEs to leverage digital marketplaces by providing access to simplified e-commerce platforms tailored to CE products. This should be complemented by training on digital marketing and customer engagement tools (e.g., WhatsApp Business, Instagram, logistics APIs)

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   - Emmanuel Alabi
6. NCIC Project Team:
   - Bankole Oloruntoba (Research Director)
   - Adamu Garba
   - Precious Olarinde
   - Precious Francis
7. Board Chairman, Nigeria Climate Innovation Center (NCIC) – Dr. Peter Bamkole
8. Board of Directors, Nigeria Climate Innovation Center:
   - Yemi Keri
   - Hakeem Olopade
   - Nike Olafimihan
   - Sele Inegbedion
9. Managing Director, Global Entrepreneurship Network (GEN) Nigeria – Dr. Olawale Anifowose
10. Leadership of the Global Entrepreneurship Network, Africa
11. Executive Director, Food and Beverage Recycling Alliance – Agharese Onaghise
12. CEO GIVO, Victor Boye–Komolafe
13. Jonathan Ikeolumba
14. Founder, The Ecobacter Company – Rita Idehai
15. Regional Project Consultants in Ghana, Senegal and Cote d' Ivoire.