

Enabling Environment Bottlenecks in Kenya's Emerging Circular and Agrifood Economies

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Front cover photo: Farmers carrying their produce (*photo:* Augustus Addo/IWMI)

Back cover photo: Farmer works on tomato farmland. (*photo:* Augustus Addo/IWMI)

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Abstract

Small and medium-scale enterprises (SMEs) are vital to Kenya's transition toward climate-smart, circular agri-food systems. However, firms in novel value chains, such as insect-based biofertilizers, urban waste composting, and indigenous plant-based milks, face enabling environments poorly aligned with their regulatory needs. This paper examines three Kenyan enterprises—EcoRich, Rebug2Debug, and OnlyPlants—to highlight how outdated frameworks and fragmented agency mandates stifle innovation. Despite aligning with national priorities for soil restoration and waste valorization, these SMEs are constrained by regulatory "grey zones," lack of product certification pathways, and exclusion from public procurement and subsidies. These barriers increase compliance costs and delay approvals, particularly for firms lacking the financial bandwidth to navigate institutional complexity. To address these hurdles, the paper identifies critical technical assistance needs. For SMEs, priorities include support for food safety classification, Access and Benefit Sharing compliance, and quality assurance. At the system level, the paper calls for urgent reforms: developing standards for insect-based fertilizers, clarifying plant-based food oversight, and improving national-county coordination. By providing new empirical evidence on regulatory fragmentation, this study outlines actionable reforms for partners like IWMI and WFP to unlock the potential of frontier SMEs in Kenya's circular economy.

Acronyms

ABS	Access and Benefit Sharing
AfDB	African Development Bank
BETA	Bottom-Up Economic Transformation Agenda
CCAFS	Climate Change, Agriculture and Food Security (CGIAR Research Program)
EABC	East African Business Council
EAC	East African Community
FAO	Food and Agriculture Organization of the United Nations
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
HLPE	High Level Panel of Experts on Food Security and Nutrition
IFDC	International Fertilizer Development Center
IFC	International Finance Corporation
ILO	International Labour Organization
IWMI	International Water Management Institute
KEBS	Kenya Bureau of Standards
KEPSA	Kenya Private Sector Alliance
KEPHIS	Kenya Plant Health Inspectorate Service
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
KNFFA	Kenya National Farmers Federation Alliance
MoALD	Ministry of Agriculture and Livestock Development
NEMA	National Environment Management Authority
NCCAP	National Climate Change Action Plan
OECD	Organisation for Economic Co-operation and Development
PCPB	Pest Control Products Board
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WFP	World Food Programme

1. Introduction

Small and early-stage enterprises play a central role in transforming Kenya's agrifood and circular economy sectors. Yet empirical evidence shows they operate in some of the least supportive regulatory and institutional environments. Kenyan small- and medium-scale enterprises (SMEs) face disproportionately high regulatory and administrative burdens, including unclear product standards, slow licensing procedures, and fragmented cross-agency mandates (World Bank 2020; FAO 2022; IFC 2022). These constraints are especially acute for firms working with non-traditional agricultural inputs, such as insect-based biofertilizers, and emerging food categories like plant-based milk, which fall outside regulatory frameworks designed for conventional products and lack recognized certification or quality assurance procedures (IFDC 2021; Mucheru-Muna et al. 2022). In Kenya, organic fertilizers are often excluded from subsidy programs or licensing platforms due to the absence of legal classification under statutes, while enterprises using indigenous crops face unclear obligations. Similarly, plant-based food processors must comply with general food safety regulations that do not reflect their product characteristics or risk profiles (UNEP 2021; HLPE 2020). These regulatory gaps are compounded by fragmented county procedures, weak extension services, and limited technical support, leaving regenerative and circular economy SMEs structurally marginalized despite the strong alignment of their agrifood innovations with national agricultural policy and climate action objectives. However, few studies have drawn directly from SME experiences to document how these bottlenecks play out in practice, or explored how targeted technical assistance can help overcome institutional fragmentation and unlock climate-smart innovation at the SME level.

This paper examines how enabling environment constraints manifest in practice by analyzing the experiences of three Kenya-based enterprises: EcoRich, which produces organic fertilizer from food waste; Rebug2Debug, which manufactures insect-based biofertilizers through Black Soldier Fly bioconversion; and OnlyPlants, a startup producing plant-based milk from Bambara groundnut. Each enterprise was selected for technical assistance under the World Food Programme (WFP) Innovation Accelerator, in collaboration with the International Water Management Institute (IWMI), as part of the CGIAR Food Frontiers and Security Program. The analysis is based on a structured review of public documents, regulatory frameworks, and semi-structured interviews with founders and teams from each SME, conducted in 2025. Findings from the three case studies highlight systemic gaps, such as absent certification pathways, unclear regulatory mandates, exclusion from subsidies and procurement, and county-level frictions. Despite operating in different sub-sectors, all firms face institutions unprepared for innovation. Their experience reflects a broader disconnect between Kenya's sustainability policies and the operational tools needed to integrate circular, bio-based SMEs. This paper offers new empirical evidence on how misaligned rules and financing systems constrain regenerative enterprises from contributing to agricultural transformation. Based on these findings, a set of action steps has been discussed and agreed upon with the three SMEs to guide technical assistance at both the firm level and the broader enabling environment, covering regulatory reform, policy dialogue, and network facilitation, for IWMI and WFP to support going forward.

This paper is structured as follows. Section 2 provides a brief overview of the regulatory and institutional barriers facing SMEs in Kenya's climate-smart and circular agri-food sectors, situating these within the broader business environment. Section 3 presents detailed findings from three case studies—EcoRich, Rebug2Debug, and OnlyPlants—highlighting firm-level experiences across biofertilizer, waste-to-value, and plant-based food innovation. Each sub-section analyzes specific enabling environment bottlenecks, from product classification gaps and mandate fragmentation to exclusion from subsidies, extension services, and trade facilitation systems. Section 4 synthesizes these findings into a dual technical assistance framework, outlining both enterprise-level and system-level support priorities co-developed with the SMEs. Section 5 concludes by distilling lessons for policy reform, institutional coordination, and donor engagement. This paper contributes new empirical insights into how fragmented regulatory regimes affect frontier agri-food enterprises in Kenya and proposes targeted technical assistance through structural enabling environment reform.

2. An Overview of Barriers to SME Growth in Kenya's Business Environment

Kenya's small and medium-sized enterprises (SMEs) are widely acknowledged as the backbone of the country's economy, contributing over 30% to GDP and accounting for more than 80% of employment in some sectors (KNBS, 2022; IFC, 2021). They are vital to the realization of inclusive economic development, industrial diversification, and rural transformation. Estimates suggest that SMEs account for over 90% of all private sector establishments and absorb more than 80% of Kenya's labor force, particularly in informal and semi-formal settings (KNBS, 2022; IFC, 2021). Despite this strategic role, the enabling environment for SMEs in Kenya remains highly uneven. The broader institutional landscape in Kenya, encompassing regulatory frameworks, financial systems, and business support infrastructure, remains in favor of large, capital-intensive firms and traditionally defined sectors. SMEs, by contrast, face disproportionate barriers, especially those operating in emerging, cross-sectoral, or climate-aligned industries. These firms encounter more policy uncertainty,

administrative complexity, and structural exclusion from mainstream regulatory and financing mechanisms (Mugambi & Jagongo, 2021; GIZ, 2021). Their marginalization is further reinforced by institutional designs that lack the flexibility or technical capacity to accommodate novel business models or sustainability-oriented innovations (FAO, 2022).

At the macro level, Kenya presents a mixed picture when assessed through international benchmarks such as the World Bank's *Ease of Doing Business* index. As of the 2020 rankings (the most recent prior to the index's discontinuation), Kenya placed 56th globally, reflecting improvements in digital registration and credit access, including its high score in obtaining credit (ranked 15th) and starting a business (50th) (World Bank, 2020). These reforms, such as the eCitizen portal and the movable collateral registry, have simplified some aspects of business formalization and asset-backed lending. However, Kenya still ranked poorly in critical areas that affect operational predictability and cost: enforcing contracts (88th), paying taxes (94th), and trading across borders (117th). These dimensions speak directly to the bottlenecks that SMEs routinely face, including legal uncertainty, high compliance burdens, and customs inefficiencies. For instance, it can take over 400 hours per year for a Kenyan firm to comply with tax regulations—one of the highest figures in Sub-Saharan Africa—posing a heavy burden on small enterprises that lack specialized financial personnel (IFC, 2022; OECD, 2021).

Beyond the overall rankings, Kenya's business climate is shaped by deep-seated institutional and operational challenges. Chief among these is the fragmentation of regulatory oversight. The literature shows that SMEs often navigate overlapping jurisdictions, contradictory mandates, and poorly harmonized compliance regimes across sectors such as health, agriculture, trade, and environment (UNIDO, 2022; Government of Kenya, 2023). For example, a small food processing firm may be required to engage separately with the Kenya Bureau of Standards (KEBS) for standards certification, the National Environment Management Authority (NEMA) for environmental approvals, the Ministry of Health for hygiene permits, and the county government for local business licenses—often with no inter-agency coordination or consolidated guidance. These redundancies increase transaction costs and delay market entry, with limited legal recourse for clarification or appeal. Comparative research shows that countries, such as Rwanda and Mauritius, that have introduced centralized SME one-stop shops and risk-based compliance mechanisms tend to see stronger outcomes in business formalization, regulatory compliance, and private investment (World Bank, 2019; AfDB, 2020).

Kenya's 2010 Constitution introduced a devolved system of government that further complicates the regulatory environment. While devolution was designed to localize service delivery and spur regional economic growth, it has also created inconsistencies in how trade, licensing, and inspection are administered across Kenya's 47 counties (Boone et al., 2019; KIPPRA, 2021). County governments have authority over key regulatory functions, including public health, environmental sanitation, and trade development, but there is no standardized mechanism to ensure mutual recognition of permits, alignment with national policies, or coordination across jurisdictions. This results in frequent duplication of inspections, the need for multiple licenses when selling across counties, and unpredictable enforcement practices at checkpoints or local authorities. These issues disproportionately impact SMEs that operate with thin margins or perishable goods, and often discourage firms from scaling geographically. Empirical studies confirm that Kenya's internal market is fractured, with regulatory fragmentation undermining the potential of devolution to support enterprise growth and regional value chain integration (World Bank, 2020; EABC, 2022).

Financing remains another structural constraint for SMEs in Kenya. While the country is often praised for its mobile banking ecosystem and the rapid growth of fintech solutions, these innovations have primarily benefited short-term consumer lending or urban-based digital enterprises. SMEs in agriculture, manufacturing, or sustainability-focused sectors continue to face limited access to affordable, long-term capital (AfDB, 2020; OECD, 2021). Financial institutions often classify such enterprises as high-risk due to lack of collateral, unclear regulatory status, or limited market validation, particularly when their models are based on circular production, indigenous crops, or low-emission technologies. Without formal recognition in existing laws or certification systems, these businesses struggle to qualify for loans, public tenders, or investor confidence. Venture capital and impact investment, though growing, have remained concentrated in digital services, with few firms venturing into food systems, waste valorization, or regenerative agriculture, where perceived complexity and unfamiliarity deter engagement (KEPSA, 2022; Dalberg, 2021).

In addition to regulatory and financing barriers, Kenya's business support ecosystem is highly uneven in its geographic and sectoral reach. Nairobi and a handful of urban centers host most of the country's incubators, accelerators, legal advisory services, and startup hubs. Enterprises based in peri-urban or rural areas, particularly in arid and semi-arid lands, are often disconnected from these support systems, despite operating in sectors like agriculture and water where innovation is critically needed (WFP & Dalberg, 2023; FAO, 2022). Moreover, most support programs target youth entrepreneurship or information and communication technology-based innovations, with limited tailoring for climate-smart or nature-based enterprises. Public institutions such as the Micro and Small Enterprises Authority or the Kenya Industrial Estates suffer from chronic underfunding and limited technical specialization, making it difficult for them to serve as effective intermediaries for SMEs navigating regulatory and market systems (ILO, 2020; UNIDO, 2022). Without spatially distributed, technically competent, and sector-

sensitive support infrastructure, many high-potential SMEs are left to navigate a fragmented and often exclusionary system on their own

Finally, policy coherence remains a significant gap in Kenya’s SME environment. National strategies frequently articulate ambitious visions for inclusive growth, green transition, and value addition, but implementation is slowed by institutional silos, conflicting mandates, and a lack of operational instruments (Government of Kenya, 2023; Tegemeo Institute, 2021). For instance, the Kenya Climate-Smart Agriculture Strategy, the Circular Economy Roadmap, and the National Industrialization Policy all reference the role of SMEs and innovation, yet none provides concrete tools, budget lines, or coordinating frameworks to support enterprise engagement. As a result, policy remains aspirational while enterprise support is inconsistent. This has led to a proliferation of donor-led initiatives attempting to fill the gap, ranging from GIZ-supported green SME hubs to USAID-funded agribusiness accelerators, but these are often short-term, geographically concentrated, and uncoordinated with state-led mechanisms (KEPSA, 2022; WFP and Dalberg, 2023).

Overall, Kenya’s enabling environment for SMEs presents a contradictory picture: a vibrant entrepreneurial base and progressive policy discourse exist alongside fragmented institutions, inconsistent enforcement, and limited support systems. These structural weaknesses are particularly disabling for early-stage enterprises operating at the frontier of climate adaptation, circular production, and agri-food transformation. The following sections examine three such enterprises in detail, tracing how regulatory, financial, and institutional frictions shape their operational realities and identifying opportunities for targeted technical assistance and reform.

3. Findings from Interviews

Interviews with three Kenyan enterprises—EcoRich, Rebug2Debug, and OnlyPlants—revealed a consistent set of regulatory and institutional barriers that restrict the scaling of biofertilizers and non-traditional food innovations. Across all cases, firms reported gaps in product classification, missing or misaligned certification standards, mandate confusion among regulators, and exclusion from subsidy, procurement, or extension platforms. Table 1 synthesizes these shared and firm-specific constraints, highlighting how legacy regulatory systems fail to accommodate emerging circular and regenerative models. This section unpacks these challenges in detail through three subsections, each focused on one enterprise. For each enterprise, the analysis identifies key enabling environment bottlenecks and outlines targeted technical assistance priorities, designed for the WFP and IWMI teams to address both immediate operational challenges and broader systemic constraints.

Table 1. Comparative Table of Regulatory Challenges by the Interviewed SMEs

Regulatory Challenge	EcoRich	Rebug2Debug	OnlyPlants
Lack of product classification or legal standards	Compost not covered under Cap 345; no formal classification	Insect-based inputs not recognized under Cap 345	Plant-based milk not defined in food standards
No certification pathway or quality labeling	No KEBS or Kenya Plant Health Inspectorate Service (KEPHIS) certification for organic fertilizers	No standards or labeling for insect-based biofertilizers	No benchmarks for vegan milk labeling
Unclear regulatory mandates across agencies	Agriculture, NEMA, KEBS, KEPHIS all partially involved	No clear jurisdiction between Pest Control Products Board (PCPB) and KEPHIS	KEBS applies general food law without tailored oversight
Exclusion from subsidy or procurement programs	Excluded from e-voucher; compost not eligible input	Not listed in subsidy or procurement schemes	Not eligible for public food procurement programs
No inclusion in public extension systems	Extension agents not trained on compost use	Extension agents lack familiarity with insect-based inputs	Public guidance excludes plant-based options
Regulatory ambiguity around waste sourcing	Informal waste cartels block formal sourcing channels	Biosafety concerns and unclear rules on waste input classification	Not applicable
Unclear Access & Benefit Sharing (ABS) procedures	-	-	ABS compliance unclear for Bambara groundnut

Trade/import frictions for inputs	-	-	Import delays, unclear classification for Bambara beans
Wastewater regulation gaps	-	-	No clear wastewater reuse guidance for SMEs
Cross-county market fragmentation	-	-	Duplicate inspections, permits not recognized across counties

Source: Author's

3.1. Rebug2Debug

Rebug2Debug is a waste-to-value enterprise converting post-harvest food losses and biodegradable waste into biofertilizer using Black Soldier Fly larvae. Originally developed through a collaboration between the agri-biotech company PROTEEN and the WFP Innovation Accelerator in Rwanda, the company now operates across East Africa and is expanding into Kenya. The core of its model lies in the biological conversion of organic waste into nutrient-rich inputs for regenerative agriculture. This aligns closely with Kenya's stated goals in food waste reduction, soil restoration, and climate-smart agriculture. Rebug2Debug's products not only help recover nutrients from waste streams but also contribute to reduced methane emissions, lower chemical fertilizer use, and improved soil moisture retention—outcomes that are critical for drought-prone regions and degraded soils. Through semi-structured discussions, Rebug2Debug identified the following key enabling environment challenges, ranked according to their impact on the firm's operations.

Regulatory Vacuum and Product Classification Gaps: Rebug2Debug representatives noted that the absence of a formal legal category for insect-based biofertilizers is the foremost barrier to market integration. Kenya's Fertilizers and Animal Foodstuffs Act (Cap 345) continues to define fertilizers based on chemically formulated compounds, leaving no legal pathway to register or certify biologically-derived inputs. As a result, the firm cannot obtain product licenses, participate in national tenders, or access subsidy programs. In Rwanda, where the company operates under a clearer regulatory framework, the same products are approved based on well-defined biosafety and nutrient testing standards. The lack of such mechanisms in Kenya reflects a broader trend across sub-Saharan Africa, where legal regimes remain biased in favor of industrial agrochemical products and lag behind commercial developments in regenerative input technologies (IFDC, 2021; Mucheru-Muna et al., 2022).

Institutional Siloing and Unclear Mandates: Rebug2Debug's regulatory ambiguity is exacerbated by institutional siloing. Neither the Pest Control Products Board (PCPB), which regulates biopesticides, nor the Kenya Plant Health Inspectorate Service (KEPHIS), which oversees seed and plant health, exert authority over biofertilizers. This results in a regulatory vacuum, prolonged licensing delays, and inconsistent guidance. Similar mandate fragmentation has been identified as a systemic barrier to biofertilizer adoption across Africa (FAO, 2019; Sánchez Ramírez et al., 2024), where agencies operate in silos and lack technical capacity to evaluate emerging input types.

Misalignment Between Policy Goals and Regulatory Instruments: Kenya's regulatory gap is further contradicted by its stated policy ambitions. The National Soil Fertility Policy (2023), the Climate-Smart Agriculture Strategy, and the Circular Economy Strategy all emphasize the importance of transitioning to non-chemical, sustainable inputs. However, these policies lack operational clarity: no responsible agency is designated, no certification standards are outlined, and no legal guidance is provided for integrating such inputs into formal markets. Rebug2Debug representatives noted that this contradiction between policy language and institutional action results in an "invisible barrier" where the company is rhetorically aligned with national goals but practically excluded. Experience from countries, such as Brazil and India, showed that for the development of certification pathways, efficacy trials, and public procurement eligibility for biofertilizers, appropriate legal frameworks are both feasible and necessary (FAO, 2019; Mahapatra et al., 2020).

Lack of Cross-Sectoral Coordination: Enterprises like Rebug2Debug sit at the intersection of waste management, agriculture, and environmental regulation, yet no interagency coordination mechanism exists to facilitate integrated oversight. Nairobi County, for example, issues generic waste handling permits, but these do not address the transformation of food waste into agricultural inputs. This leads to inconsistent inspections, biosafety concerns, and institutional confusion. The Circular Economy Roadmap (Ministry of Environment, 2021) articulates high-level principles but remains aspirational in the absence of functional coordination across relevant authorities.

Absence of Quality Assurance and Market Validation Mechanisms: Despite rigorous internal quality controls, including nutrient profiling, microbial screening, and consistency checks, Rebug2Debug lacks access to any formal certification or national quality assurance system to validate its insect-based biofertilizers. This absence of recognized product verification limits credibility with institutional buyers, such as agrodealers, export-oriented horticulture firms, and public procurement agencies, all of whom require standardized proof of safety and efficacy. Without official recognition, the company will remain significantly excluded from formal distribution networks and largely confined to informal channels targeting smallholder farmers with limited purchasing power. This disconnection between product innovation and market access reflects a broader structural gap in Kenya's input ecosystem, where regulatory and subsidy systems continue to favor chemically defined fertilizers, leaving climate-smart alternatives like Rebug2Debug's products without institutional pathways to scale (Mucheru-Muna et al., 2022; GIZ, 2021).

Exclusion from Input Subsidy and Procurement Schemes: Despite contributing to national objectives in soil health and climate adaptation, Rebug2Debug's products are excluded from the National Fertilizer Subsidy Program and the e-voucher system, which list only conventionally registered chemical inputs. Rebug2Debug noted that this exclusion distorts farmer incentives: smallholders often choose subsidized chemical fertilizers over more sustainable, but unsubsidized, biofertilizers. In price-sensitive contexts, public procurement rules determine not just affordability but also legitimacy. Without state recognition, biofertilizers remain commercially disadvantaged despite their production-related and environmental benefits. This mirrors global evidence that subsidy programs often reinforce legacy technologies unless restructured to account for ecological alternatives (IFC, 2022; OECD, 2021).

Weak Integration into Agricultural Extension Systems: Public agricultural extension systems, responsible for guiding farmer input choices, are unfamiliar with biofertilizers and do not include them in demonstration trials or training curricula. Rebug2Debug reported that county extension officers promote conventional agrochemical packages and lack the technical background to support farmers in transitioning to biologically-derived inputs. Without visibility in these advisory systems, Rebug2Debug's products remain excluded from mainstream distribution, knowledge dissemination, and farmer trust-building channels. This knowledge asymmetry limits demand and slows the adoption of regenerative inputs. These findings are echoed in regional studies, which show that unclear government communication and a lack of technical validation are key barriers preventing the wider adoption of organic soil inputs in African countries (IFDC, 2021; Mucheru-Muna et al., 2022).

Rebug2Debug's experience reveals the structural misalignment between Kenya's sustainability goals and its agricultural input governance systems. The company offers a scalable solution to waste management, soil restoration, and emissions reduction—yet is blocked by outdated legislation, institutional fragmentation, and exclusion from public support systems. Representatives described a policy environment where alignment on paper does not translate into legal recognition, financial access, or extension support. To unlock the potential of insect-based biofertilizers, Kenya must establish legal classification standards, develop certification protocols, harmonize interagency coordination, and expand procurement eligibility to include ecological inputs. Without these reforms, the country risks undermining its stated commitments to climate-smart agriculture and circular economy growth.

3.2. EcoRich

EcoRich Solutions, founded in 2013 in Nairobi, represents one of Kenya's few enterprises at the intersection of urban waste management and sustainable agriculture. The company's core model involves transforming biodegradable waste collected from households and markets into compost-based organic fertilizer for use in peri-urban horticulture and smallholder farming systems. Its flagship product, EcoRich Gro+, is marketed as a regenerative soil input, contributing to improved soil structure, nutrient cycling, and water retention. The enterprise has adopted a decentralized approach to waste collection, partnering with women's groups and community-based organizations to secure organic inputs while creating local livelihoods. EcoRich, therefore, aligns strongly with the principles of circular economy, green employment, and agroecological transition. Its operations respond directly to Kenya's National Climate Change Action Plan (NCCAP 2018–2022), which identifies organic waste reuse and soil health restoration as climate mitigation and adaptation priorities. However, as this case study shows, alignment on paper has not translated into an enabling environment in practice. The findings from semi-structured discussions with EcoRich highlight the specific regulatory and institutional hurdles that the SME identifies as the most significant threats to its growth:

Lack of a Regulatory Framework for Organic Fertilizers: Like Rebug2Debug, EcoRich operates in a policy vacuum. Kenya's Fertilizers and Animal Foodstuffs Act (Cap 345) provides no legal recognition for compost as a regulated agricultural input. EcoRich representatives reported that the absence of classification standards prevents product registration, restricts access to certification, and blocks entry into national procurement and extension programs. KEBS has not developed technical criteria for assessing compost quality or microbial safety. KEPHIS lacks protocols for certifying organic nutrient products, while PCPB is entirely outside the scope of soil

input regulation. This institutional gap is similar to the challenges faced by insect-based fertilizers, but with an important distinction: whereas biofertilizers like those produced by Rebug2Debug are based on newer biotechnologies, EcoRich's compost is derived from long-established organic recycling methods. This makes the lack of regulatory recognition even more striking, given that compost is a mature and widely used input.

Lack of Clear Institutional Ownership: While Rebug2Debug operates within a context of regulatory ambiguity, EcoRich faces a different but equally constraining challenge: the absence of clear institutional ownership. No government agency, including the Ministry of Agriculture and Livestock Development (MoALD), the National Environment Management Authority (NEMA), the Kenya Bureau of Standards (KEBS), or the Kenya Plant Health Inspectorate Service (KEPHIS), has formally assumed jurisdiction over compost as an agricultural input. MoALD continues to prioritize chemically registered fertilizers, while NEMA's mandate on waste management does not extend to its productive reuse in agriculture. As a result, compost producers find themselves situated between overlapping but uncoordinated regulatory domains. EcoRich representatives underscored the lack of a "home institution" responsible for integrating compost into extension programs, public tenders, or demonstration plots. This situation reflects a broader pattern of sectoral fragmentation, in which climate and soil restoration objectives are embedded in policy frameworks but not consistently implemented through inter-agency coordination (Candel & Biesbroek, 2016).

Extension, Public Procurement, and Market Access Gaps: Both EcoRich and Rebug2Debug are excluded from public input programs, but EcoRich's exclusion is compounded by invisibility in advisory and extension systems. Compost remains largely absent from the formal training curricula of most county agricultural extension systems in Kenya. Extension officers typically receive limited guidance on compost production, application, or efficacy, and organic inputs are rarely featured in government-led farmer field schools or demonstration trials. While some counties have incorporated composting into training through NGO partnerships or agroecology programs, these efforts remain fragmented and insufficient to mainstream compost within Kenya's extension landscape. Moreover, public procurement guidelines continue to prioritize chemically registered inputs, marginalizing organic alternatives. As EcoRich noted, this gap adversely affects demand: without formal institutional endorsement, farmers perceive compost as informal or untested. The lack of a national labeling system or traceability standard further weakens commercial credibility, especially among larger buyers and agrodealers who demand consistent, certified supply. Unlike Rebug2Debug, which leverages technical biosafety narratives, EcoRich must rely almost entirely on informal networks and direct outreach to sustain distribution.

Financial Exclusion and Lack of Product Recognition: Echoing findings from Rebug2Debug, EcoRich reported challenges in accessing formal financing, public tenders, or donor procurement due to its uncertified product status. The e-voucher system lists only chemical fertilizers, while banks remain hesitant to finance enterprises without certified, tradable inputs. As with other biofertilizer producers, EcoRich's exclusion from certification pathways raises its risk profile, discouraging investment and limiting working capital access. Furthermore, despite compost's well-documented role in enhancing soil carbon stocks, SMEs like EcoRich are currently unable to participate in Kenya's emerging climate finance mechanisms. There is currently no mechanism to quantify or accredit compost's mitigation value at the SME scale, barring access to carbon finance, results-based funding, or blended finance instruments.

Political economy and governance of urban waste: EcoRich also indicated that it faces significant structural and political constraints in accessing consistent feedstock for compost production, rooted in the complex governance of urban waste in Nairobi. Initially, the enterprise sourced food waste in bulk from municipal markets, leveraging Nairobi's large volumes of organic waste. However, this strategy was undermined by the presence of informal waste cartels and unregulated intermediaries who exercise control over landfill access, waste flows, and tipping fees. These actors, embedded in the city's waste collection economy, often operate through informal arrangements that circumvent official contracts, creating barriers for formal enterprises. The influence of such actors, and the weak enforcement capacity of municipal authorities, has been well documented in Kenya's urban governance literature (Hope, 2020; UNEP, 2022).

In response, EcoRich adopted a decentralized, community-based sourcing model, partnering directly with women's groups and residential households to collect segregated food waste in exchange for small payments or in-kind compensation. While this approach has improved community engagement and social inclusion, it also introduces operational inefficiencies, including inconsistent waste volumes, higher per-unit collection costs, and logistical challenges in areas with limited infrastructure or waste sorting practices. These issues are exacerbated in informal settlements, where waste management services are irregular and recycling systems remain underdeveloped.

EcoRich's experience reveals how systemic gaps in regulation, institutional mandates, and urban waste governance constrain Kenya's circular economy ambitions. In contrast to Rebug2Debug's challenges with biotechnology regulation, EcoRich's difficulties stem from the failure to incorporate well-known composting practices into the agricultural, environmental, and procurement frameworks. The company's inability to certify its product, access public tenders, or secure reliable feedstock flows highlights how structural barriers limit scale. Addressing these issues requires clear legal recognition of compost as an agricultural input, agency-level

coordination mechanisms, and integration into subsidy, advisory, and climate finance systems. Without such reforms, Kenya's ambition to close the loop between waste and soil health will remain aspirational.

3.3. OnlyPlants

OnlyPlants is a Nairobi-based SME producing plant-based milk from Bambara groundnuts, also known as Bambara beans. The company's flagship product is a colloidal vegan milk that uses a minimalist recipe—just Bambara beans, oil, water, and calcium—with no additives or stabilizers. Initial production began with 100-liter batches using a single pasteurizer, with plans to incrementally scale as demand increases. The company has developed an innovative processing method involving soaking, blanching, milling, enzymatic treatment to naturally enhance sweetness, and pasteurization, delivering a clean, nutrient-dense milk alternative targeting urban consumers, especially those with lactose intolerance.

To secure a reliable supply of raw materials, OnlyPlants is establishing a smallholder farmer program across different regions in Kenya. This includes partnerships with agricultural researchers (e.g., Egerton University) to identify and multiply high-protein, light-colored Bambara varieties suitable for milk production. Farmers receive preferred seeds and agronomic training and are offered a guaranteed offtake at harvest. As of 2025, the company has launched pilots in Homa Bay and Kilifi, working with approximately 30 farmers and aiming to scale this to over 60 in the short term. While Kenya is home to indigenous Bambara varieties, much of the available local seed stock is mixed in color or lower in protein. As such, OnlyPlants is also importing selected beans to meet quality specifications until its smallholder supply chains mature. Long-term plans include regional and international expansion, particularly into East Africa, the Middle East, and the EU. For these markets, the company is exploring a model of exporting Bambara concentrate or powder rather than liquid milk to reduce shipping costs. Despite its product and social impact potential, OnlyPlants faces a complex enabling environment in Kenya that reflects deeper structural barriers confronting SMEs in emerging sectors such as plant-based foods and indigenous crop processing. These barriers identified through interviews with the SME founder and the team are as follows:

Regulatory Ambiguity and Standards Gaps: One of the most immediate and systemic challenges confronting OnlyPlants is the absence of product-specific regulatory standards for plant-based milk in Kenya. Vegan milk alternatives, including those based on Bambara groundnut, are not formally categorized under any national standard. Instead, they fall under generic food safety provisions administered by the Kenya Bureau of Standards (KEBS), leaving product quality, labelling, and safety compliance largely at the discretion of the producer. The firm has secured a business permit, hygiene certification, and KEBS registration—but all under broad standards that do not account for the specific risks or properties of legume-based beverages.

This regulatory vacuum generates cascading uncertainties. KEBS lacks protocols tailored to underutilized crops like Bambara, and regulators reportedly provided inconsistent guidance during inspections. Key areas such as aflatoxin thresholds, wastewater discharge, food safety testing, and labelling are governed by outdated or misaligned standards, raising transaction costs and compliance risks. This experience aligns with broader findings that food start-ups working with non-traditional or sustainable products in Kenya operate in legal grey zones, facing both overregulation and regulatory neglect (FAO, 2022; GIZ, 2021; KNFFA, 2020). For OnlyPlants, the lack of classification not only complicates daily operations but limits investor confidence and delays market approvals.

Indigenous Crop Use and Access & Benefit Sharing: As OnlyPlants works with Bambara groundnut—an indigenous African legume—the company faces potential regulatory obligations under Kenya's Access and Benefit Sharing (ABS) framework. Governed by the 2006 ABS Regulations under the Environmental Management and Coordination Act and administered by the National Environment Management Authority (NEMA), this framework is intended to ensure equitable benefits for communities from the commercial use of indigenous biological resources. However, the operationalization of ABS in Kenya remains fragmented and unclear. The company understands that agreements may be required when using indigenous crops, especially if genetic material is modified or improved. Yet the legal thresholds for what constitutes "utilization," the types of permits needed, and which agency holds authority are all ill-defined. Even legal advisors struggled to obtain consistent guidance, underscoring the absence of practical, sector-specific support for agri-food SMEs attempting to comply. This reflects broader critiques in the literature, which show that while ABS regimes exist in law, their enforcement mechanisms are weak and poorly suited to food sector applications (Mulwa et al., 2020; UNEP, 2021). Institutional mandates are overlapping—NEMA and the Kenya Plant Health Inspectorate Service (KEPHIS) often defer responsibility to one another—resulting in administrative and legal uncertainty. For OnlyPlants, this lack of regulatory clarity creates compliance risks, makes it harder to attract investors, and complicates long-term business planning—especially because there is a possibility that the government could enforce rules later that were unclear or not communicated at the time the business began operations.

More fundamentally, the firm's experience reveals a misalignment between Kenya's biodiversity protection goals and the enabling environment for domestic enterprises trying to build inclusive indigenous value chains. Although the ABS framework aspires to promote equity and sustainability, in practice it operates as a structural barrier,

particularly for local SMEs that are not multinational bioprospectors but agri-food actors working with smallholder farmers. Despite national strategies such as the National Biodiversity Strategy and the Bioeconomy Strategy, Kenya has not created streamlined or sector-specific ABS procedures that would enable SME compliance with legal certainty. International experiences suggest that simplified ABS pathways for SMEs, clear distinctions between commercial and non-commercial use, and pre-approved benefit-sharing models can reduce transaction costs and promote regulatory compliance (UNEP, 2021; ABS Initiative, 2023), but these remain absent in Kenya. As a result, enterprises like OnlyPlants remain stuck in bureaucratic limbo—aware of their legal obligations but lacking a viable pathway to fulfill them. This regulatory disjuncture reflects a broader coherence gap: while agricultural and trade policies encourage commercialization of underutilized crops, biodiversity laws impose procedural burdens with little implementation support. Unless Kenya reforms its ABS system to align with enterprise development goals, SMEs working with indigenous crops will continue to face uncertainty, limiting their potential to scale, attract investment, or contribute meaningfully to bioeconomy and food system transformation.

Import Restrictions and Border Frictions: OnlyPlants anticipates importing Bambara groundnut during its early operational phase to supplement the domestic supply while its smallholder sourcing program develops. However, the company faces a highly opaque and inefficient import environment marked by inconsistent documentation requirements, overlapping agency mandates, and unpredictable border delays. Although Kenya participates in the East African Community Common External Tariff and has formally harmonized phytosanitary protocols, implementation remains fragmented. Enterprises frequently struggle to classify novel commodities, determine inspection protocols, and navigate conflicting responsibilities between the Kenya Plant Health Inspectorate Service (KEPHIS), the Kenya Revenue Authority, and port health officers. For OnlyPlants, these uncertainties compromise its ability to plan production, maintain consistent input supply, and remain price-competitive. Even for a non-GMO, non-toxic product like Bambara, the company must secure multiple approvals, including import permits from KEPHIS and plant health certificates from exporters, while dealing with regulators who themselves appear unclear on classification protocols. Interviews reveal instances where unclear or conflicting guidance led to repeat submissions and inspection delays, echoing broader critiques of Kenya's border system, which is characterized by weak digital integration, duplicative inspections, and discretionary enforcement (World Bank, 2020; UNCTAD, 2021).

These frictions generate cascading effects on the company's operations. Based on the literature, delays at Mombasa Port or border crossings may increase input costs by 10–25% (Hoekman & Shepherd, 2020; EAC Secretariat, 2022), disrupt batching schedules, inflate storage and demurrage fees, and undermine supply chain predictability. For a product like plant-based milk, whose market appeal depends on affordability and quality consistency, such delays pose direct commercial risks. The issue is not just logistical but institutional: Kenya's import oversight for agricultural inputs has not kept pace with its ambitions for value addition and agroprocessing. While export systems are comparatively streamlined, import functions remain underdeveloped, particularly for indigenous or underutilized crops lacking established Harmonized System codes or regulatory precedents (FAO, 2022; GIZ, 2021). These contradictions reflect systemic misalignment: the state promotes agroprocessing but provides no reliable mechanism for importing the raw materials required to drive it. As a result, companies like OnlyPlants face rising costs and operational delays that threaten their ability to scale in Kenya's competitive consumer market. These challenges mirror broader regional patterns of SME exclusion from trade due to unclear documentation, limited pre-arrival support, and a lack of streamlined low-risk channels (OECD, 2019). Unless Kenya reforms its trade facilitation systems to accommodate new inputs and early-stage firms, high-potential agroprocessors will remain challenged by administrative inefficiencies that stifle innovation and competitiveness.

Wastewater Management Regulations: As OnlyPlants scales production, wastewater management has emerged as a critical operational and regulatory challenge. Processing Bambara groundnut into plant-based milk, particularly during soaking, blanching, and rinsing, produces large volumes of greywater rich in organic residues. While non-toxic, this wastewater contains suspended solids requiring treatment before discharge or reuse. However, Kenya's environmental and municipal regulatory systems provide little support for SMEs attempting to manage these streams sustainably. In Nairobi, responsibilities are split between the Nairobi Water and Sewerage Company, NEMA, and county health departments, but none offers clear, affordable, or fit-for-scale guidelines for food SMEs. OnlyPlants has expressed interest in adopting a closed-loop system for filtering and reusing wastewater for non-potable purposes like toilet flushing, but interviews reveal no accessible route for SMEs to secure regulatory approval for such reuse models. The Environmental Management and Coordination (Water Quality) Regulations (2006), designed for large industrial sites, mandate effluent discharge limits and Environmental Impact Assessments but offer no guidance on low-risk or decentralized SME-level reuse. This gap creates exclusion of smaller enterprises from water reuse options.

The challenge is not only regulatory but infrastructural. Nairobi's sewer system is overstretched, with no decentralized wastewater treatment options for industrial clusters. SMEs like OnlyPlants must either invest in costly in-house treatment or discharge untreated water—both carrying regulatory and reputational risks. Efforts to partner with engineering firms or NGOs on sustainable reuse models have stalled due to the absence of government-backed pilot programs or SME-specific financing tools. These barriers mirror wider findings that Kenyan SMEs often operate in “compliance vacuums,” where available environmental rules are either overly complex or inapplicable to their scale (World Bank, 2021; GIZ, 2022). This undermines the viability of

sustainability investments, even when technically feasible. The disconnect is particularly striking given Kenya's commitments under the National Climate Change Action Plan and its Nationally Determined Contribution, both of which emphasize industrial water efficiency. Without flexible, risk-based regulatory tools and clear institutional support, environmentally responsible practices, such as wastewater recycling, remain inaccessible to SMEs. For firms like OnlyPlants, this turns climate-aligned innovation into a liability, underscoring the urgent need for coordinated reform across NEMA, the Ministry of Water, Nairobi County, and the Kenya Bureau of Standards.

Market Fragmentation and Cross-County Trade: OnlyPlants faces significant operational friction from Kenya's fragmented county-level trade regulations—a structural consequence of the country's 2010 devolution framework. While devolution was intended to improve service delivery and localize governance, it has resulted in a patchwork of inconsistent policies and administrative procedures governing food safety, transport, and inspection. For a firm like OnlyPlants, which produces plant-based milk in Nairobi but seeks to sell in other counties, the lack of harmonized regulatory systems translates into duplicative compliance requirements and unpredictable enforcement. Although the Kenya Bureau of Standards (KEBS) provides national-level food safety benchmarks, many counties apply their own inspection protocols, licensing rules, and documentation requirements, often without mutual recognition. For example, a public health certificate issued by Nairobi County is not automatically accepted by regulators in Kiambu and Mombasa, requiring additional inspections, permits, or informal payments. Interviews confirm that routine business operations such as distributing goods to supermarkets frequently trigger new authorizations or checkpoint delays, inflating logistics costs and undermining supply chain efficiency, especially problematic for perishable products like fresh vegan milk.

These inter-county regulatory frictions also constrain market expansion and discourage SMEs from scaling beyond their home jurisdictions. OnlyPlants reports that retailers operating nationally often request additional documentation when crossing county borders, even when the product meets national food safety standards. This creates a trade barrier within the country, exacerbated by the absence of functional mechanisms for mutual recognition or joint policymaking among counties. The literature confirms these patterns: studies highlight how Kenya's internal market is hampered by weak intergovernmental coordination, discretionary enforcement, and regulatory capture at the county level (World Bank, 2020; KIPPRA, 2021). While Article 189 of the Constitution mandates cooperation between levels of government, implementation remains limited. For early-stage enterprises like OnlyPlants, which lack the legal bandwidth or economies of scale to absorb redundant compliance costs, these inefficiencies are not just administrative burdens, but structural impediments to national growth. Addressing this challenge will require coordinated action by KEBS, the Ministry of Trade, and the Council of Governors to standardize food trade regulations, promote mutual recognition of licenses, and reduce transaction costs for inter-county transport. Without such reforms, regulatory fragmentation will continue to suppress the scaling potential of SMEs, particularly those pioneering new food categories in Kenya's evolving agri-food landscape.

Regulatory Knowledge Gaps and Navigation Challenges: OnlyPlants pointed to the persistent information and coordination gaps that confront early-stage enterprises operating in non-traditional sectors like plant-based food production. While the company has leveraged outsourced legal and human resources services, such as WorkPay, its founders emphasized the absence of a centralized and accessible source of guidance on sector-specific regulatory requirements. For emerging product categories like plant-based milk, this results in critical knowledge gaps around licensing, food safety compliance, sanitation protocols, export readiness, and environmental obligations such as Access and Benefit Sharing (ABS). The lack of a consolidated compliance roadmap slows down decision-making, increases the risk of non-compliance, and exposes firms to reputational or financial penalties. During interviews, OnlyPlants underscored the value of a "one-stop shop" to clarify responsible agencies, procedural timelines, and documentation requirements, covering key domains like KEBS certification, labelling rules, NEMA-administered ABS processes, and sanitary and phytosanitary regulations. In the current environment, regulatory mandates remain fragmented and siloed. SMEs must independently identify relevant authorities, interpret vague requirements, and navigate complex procedures without institutional support. These barriers are especially acute for businesses working with indigenous crops or circular production models, which often fall outside established regulatory precedents.

The experience of OnlyPlants reflects broader institutional limitations in Kenya's provision of public technical support, particularly for food innovation enterprises that fall outside conventional agri-food categories. In the case of plant-based milk, public agencies offer no tailored sanitation or microbial risk management guidelines, nor do they provide dedicated inspection or advisory services for such novel product lines. As a result, firms like OnlyPlants must develop internal compliance protocols without public benchmarks or official validation, often relying on expensive private consultants or informal peer networks. This stands in sharp contrast to more established sectors like animal dairy, where regulatory guidance, inspection routines, and government engagement are comparatively well developed. The literature affirms these structural weaknesses: Kenya's Micro, Small, and Medium Enterprises Policy (2016) calls for improved coordination among support agencies, yet implementation remains limited, especially in emerging sectors where regulatory agencies lack technical familiarity and procedural clarity (Mugambi & Jagongo, 2021; FAO, 2022). Without targeted public investment in SME-facing help desks, harmonized regulatory toolkits, and sector-specific guidance platforms, business formalization in non-traditional sectors will continue to face unnecessary friction and uncertainty. Ultimately, OnlyPlants exemplifies how high-potential, formally registered enterprises can be held back by fragmented

institutional systems that have yet to evolve in step with innovation. Addressing these gaps is fundamental to achieving Kenya's goals for an inclusive, climate-resilient, and innovation-led food system.

4. Technical Assistance Priorities and Next Steps

Interviews with the three SMEs point to a clear set of technical assistance needs at both the firm and broader enabling environment levels. While each SME operates within a distinct market segment, ranging from plant-based food to organic fertilizers derived from compost or insect bioconversion, their shared challenges underscore deeper structural gaps in Kenya's enabling environment. These gaps require coordinated interventions. Technical assistance needs agreed upon with SMEs and recommended for the WFP Innovation Accelerator and CGIAR teams is therefore structured across two tracks: firm-level support to accelerate immediate compliance and operational readiness, and broader enabling-environment support to address regulatory fragmentation, institutional misalignment, and the absence of supportive policy frameworks.

4.1. Firm-Level Technical Assistance for SMEs

At the enterprise level, OnlyPlants highlighted critical gaps in regulatory navigation, particularly regarding wastewater management, food safety compliance for plant-based milk, and access and benefit sharing (ABS) obligations related to the use of Bambara groundnut. The company requested support in interpreting and complying with Nairobi County and NEMA's wastewater discharge and reuse regulations, especially for low-risk, small-scale food processors that fall outside the scope of large industrial guidelines. It also requires tailored technical guidance on ABS registration and permitting procedures, including what triggers compliance, which agencies are involved, and how to structure benefit-sharing agreements in a legally secure and administratively feasible manner. Additionally, there is demand for support in clarifying product labeling and food classification procedures with KEBS, to avoid ambiguous or inconsistent inspections. A cost-benefit analysis of wastewater reuse systems, along with partnership brokering for appropriate engineering support, was proposed and will be pursued in follow-up engagements.

EcoRich, as a producer of biofertilizer from urban organic waste, seeks support in securing product certification and expanding into formal market channels. The company emphasized the need for assistance in preparing for eventual certification by KEBS or KEPHIS once relevant compost and biofertilizer standards are established. This includes sampling protocols, microbial and nutrient profiling, and documentation preparation. Moreover, EcoRich requested guidance on structuring pilot demonstrations in collaboration with public extension agents and farmer cooperatives to build trust and increase demand. Given ongoing challenges in feedstock supply due to informal waste market dynamics, the enterprise also identified the need for advisory support on structuring community-based collection models that are both socially inclusive and logistically viable.

For Rebug2Debug, the primary technical assistance need is clarity on product classification, biosafety protocols, and potential routes to product registration. The firm reported that neither PCPB nor KEPHIS have assumed regulatory jurisdiction over insect-based biofertilizers, resulting in a limbo that prevents market expansion. In response, the enterprise has requested support to initiate dialogue with both agencies, jointly explore legal classification options, and map the documentation and testing requirements needed for eventual approval. Rebug2Debug also expressed interest in connecting with agricultural organizations that can support farmer outreach and inclusion in extension content, particularly given the lack of public familiarity with insect-based inputs. The firm has also committed to engaging counterparts in Rwanda and Uganda, where regulatory progress has been made, and IWMI and WFP can facilitate cross-country knowledge exchange.

Across all three firms, a common theme emerged: a need for a consolidated, accessible compliance roadmap that outlines procedural timelines, responsible agencies, required documentation, and associated costs for SME compliance in food safety, sanitation, labeling, ABS, and fertilizer approval. SMEs repeatedly noted that the burden of regulatory interpretation falls entirely on founders—often requiring costly private consultants—and that government agencies lack coordinated helpdesks or SME-facing guidance systems. IWMI and WFP are encouraged to support the development of such a roadmap, potentially as part of a broader enabling environment toolkit.

4.2. Technical Assistance for Enabling Environment Reform

Beyond individual firms, the consultations identified several cross-cutting enabling environment bottlenecks that require coordinated engagement with regulators, ministries, and public agencies. WFP and IWMI, leveraging their convening power and policy influence, are recommended to co-lead and influence technical assistance efforts in the following areas:


- **Development of national standards and classification systems** for biofertilizers and plant-based food products. This includes supporting KEBS and KEPHIS in establishing quality protocols, safety testing procedures, and labeling guidelines for compost-based and insect-derived biofertilizers, as well as for plant-based milks made from underutilized indigenous crops like Bambara groundnut. IWMI can provide technical input on international best practices and testing benchmarks, while WFP can support stakeholder engagement and inter-agency coordination.
- **Clarification of ABS compliance procedures** for SMEs working with indigenous crops. IWMI can engage NEMA and the ABS focal point at the Ministry of Environment to co-develop SME guidance notes, define thresholds for utilization, and propose simplified benefit-sharing models tailored to agri-food enterprises. The goal is to prevent deterrent effects from unclear or overly burdensome ABS processes while upholding equitable benefit-sharing principles.
- **Support for wastewater regulation reform for small food processors.** Given the emerging challenge of wastewater from legumes and other food processing systems, WFP and IWMI can collaborate with NEMA, Nairobi Water, and relevant county authorities to develop risk-based discharge and reuse guidelines applicable to SMEs. This may include piloting low-cost decentralized wastewater treatment and exploring pathways for approval and monitoring. Partnerships with engineering experts and sustainability organizations will be explored to develop scalable, affordable solutions.
- **Integration of biofertilizers into public procurement and extension systems.** Technical assistance should focus on working with the Ministry of Agriculture, KEPHIS, and county agriculture departments to design inclusion pathways for certified biofertilizers within the e-voucher program and county distribution plans. Extension agents can also be supported through training and demonstration plots to ensure they are familiar with application practices and soil health benefits associated with organic inputs. Lessons from Rebug2Debug and EcoRich could be used to shape training modules.
- **Facilitating interagency coordination platforms.** Building on the enterprises' experiences with mandate fragmentation, IWMI and WFP can support the formation of an informal coordination working group across MoALD, NEMA, KEBS, KEPHIS, and PCPB to address grey areas in regulatory responsibility. This platform would help clarify roles, reduce delays, and streamline licensing for bio-based innovations in agri-food and waste management sectors.
- **Digital traceability and quality assurance systems.** To bolster market confidence, technical assistance must include exploring the design of a voluntary digital traceability and quality assurance scheme for SMEs producing organic inputs and plant-based food. Such a system, even in a basic form, could provide QR-code-based labeling and third-party-verified compliance markers for agro-dealers, retailers, and exporters. WFP and IWMI are advised to engage digital service providers and quality assurance experts to scope feasibility.

In all cases, continued coordination and communication between enterprises, development partners, and regulatory agencies will be essential. The SMEs committed to regular progress updates, joint engagement with target agencies, and participation in capacity-strengthening and outreach activities. WFP and IWMI could support follow-up by documenting regulatory bottlenecks, coordinating working group engagements, and providing technical backstopping where needed. These technical assistance pathways are critical first steps toward building a more coherent enabling environment for SMEs in Kenya's food, fertilizer, and waste valorization ecosystems.

5. Conclusion

The experiences of EcoRich, Rebug2Debug, and OnlyPlants collectively reveal how systemic regulatory ambiguity, institutional fragmentation, and opaque procedures constrain the growth of climate-smart and circular economy enterprises in Kenya. Despite strong alignment with national development objectives, including regenerative agriculture, waste valorization, and indigenous crop commercialization, these firms remain structurally marginalized within the country's input, food, and waste governance systems. The barriers they face indicate a significant institutional gap: an enabling environment that has not evolved to accommodate emerging product categories, circular production models, or sustainability-driven business innovations. The absence of recognized product classifications, biosafety protocols, certification standards, and integrated licensing systems places these enterprises in legal and operational grey zones. This not only elevates compliance risks and inflates transaction costs but also systematically excludes them from key levers of scale, such as public procurement platforms, concessional finance schemes, and agricultural extension services. As a result, market access remains narrow, visibility is limited, and the broader innovation ecosystem is deprived of high-impact solutions that could contribute to Kenya's environmental, agricultural, and economic transformation. In such a context, entrepreneurial innovation is insufficient on its own; without complementary institutional reform, even the most viable business models risk stagnation or failure.

This reality points to the need for a dual approach that combines targeted technical assistance at the firm level with broader interventions to reform Kenya's enabling environment. These two layers of support are mutually reinforcing. On the one hand, firm-level assistance, such as guiding firms through wastewater compliance, drafting product documentation, or navigating access and benefit-sharing protocols, can help them survive and



grow despite current regulatory dysfunction. On the other hand, these engagements generate granular, context-specific evidence that can inform broader enabling environment reforms, including the development of new product standards, the clarification of regulatory mandates, and the design of cross-sectoral coordination mechanisms. The technical assistance roadmaps developed in collaboration with these enterprises reflect this duality: they address short-term bottlenecks while identifying entry points for medium-term policy reform. Organizations such as the WFP, IWMI, and their partners are well-positioned to serve as conveners, technical intermediaries, and policy translators in this process. By grounding technical assistance in the lived realities of enterprises and connecting these insights to concrete institutional reforms, this approach provides a practical and scalable pathway to unlock innovation within constrained regulatory systems, helping ensure that high-potential solutions are not stalled by structural bottlenecks, but actively supported to advance a more sustainable and inclusive economy.

6. References

African Development Bank (AfDB). (2020). *African Economic Outlook 2020: Developing Africa's Workforce for the Future*. Abidjan, Côte d'Ivoire: African Development Bank Group. 222 pages.

Boone, Catherine, Dyzenhaus, Alex, and Kundu, Shreya. (2019). The politics of land-related investment in Ethiopia and Kenya: Devolution and state-building. *World Development*, 113, 204–215. <https://doi.org/10.1016/j.worlddev.2018.09.006>

Candel, Jeroen J. L., and Biesbroek, Robbert. (2016). Toward a processual understanding of policy integration. *Policy Sciences*, 49(3), 211–231. <https://doi.org/10.1007/s11077-016-9248-y>

Dalberg. (2021). *Unlocking Impact Capital for Kenya's Frontier Enterprises*. Nairobi, Kenya: Dalberg Advisors. 54 pages.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). (2021). *Green SME Support in Sub-Saharan Africa: Status Quo and Future Potential*. Bonn, Germany: GIZ GmbH. 88 pages.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). (2022). *Environmental Compliance for Small Enterprises in East Africa*. Eschborn, Germany: GIZ GmbH. 62 pages.

East African Business Council (EABC). (2022). *EABC Business Climate Index Report 2022*. Arusha, Tanzania: EABC. 45 pages.

East African Community (EAC) Secretariat. (2022). *Trade Facilitation Framework in the East African Community*. Arusha, Tanzania: EAC. 112 pages.

Food and Agriculture Organization of the United Nations (FAO). (2019). *Legal Frameworks for Biofertilizers: A Global Review*. Rome, Italy: FAO. 134 pages.

Food and Agriculture Organization of the United Nations (FAO). (2022). *Enabling the Business of Agriculture: Country Profile – Kenya*. Rome, Italy: FAO. 28 pages.

Government of Kenya. (2023). *National Circular Economy Roadmap*. Nairobi, Kenya: Ministry of Environment, Climate Change and Forestry. 96 pages.

High-Level Panel of Experts on Food Security and Nutrition (HLPE). (2020). *Food Security and Nutrition: Building a Global Narrative Towards 2030*. Rome, Italy: HLPE/CFS. 112 pages.

Hope, Kempe Ronald. (2020). Urban waste management and informality in Kenya: Sustainability through a circular economy. *Urban Forum*, 31(3), 281–298. <https://doi.org/10.1007/s12132-020-09393-2>

International Fertilizer Development Center (IFDC). (2021). *Regulatory Bottlenecks to Scaling Biofertilizers in Africa*. Muscle Shoals, AL: IFDC. 74 pages.

International Finance Corporation (IFC). (2021). *MSME Finance Gap: Assessment of the Shortfalls and Opportunities in Emerging Markets*. Washington, DC: World Bank Group. 42 pages.

International Finance Corporation (IFC). (2022). *Navigating the SME Ecosystem in Kenya: A Market Analysis*. Washington, DC: World Bank Group. 58 pages.

International Labour Organization (ILO). (2020). *MSME Policy and Regulatory Reform in Kenya: A Diagnostic*. Geneva, Switzerland: ILO. 94 pages.

Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2021). *County Business Environment for Micro and Small Enterprises in Kenya*. Nairobi, Kenya: KIPPRA. 156 pages.

Kenya National Bureau of Statistics (KNBS). (2022). *Economic Survey 2022*. Nairobi, Kenya: KNBS. 312 pages.

Kenya National Food Fortification Alliance (KNFFA). (2020). *Challenges Facing Smallholder Farmers in the Kenyan Food System*. Nairobi, Kenya: KNFFA. 38 pages.

Kenya Private Sector Alliance (KEPSA). (2022). *Policy Priorities for Kenya's Private Sector: The 2022-2027 Agenda*. Nairobi, Kenya: KEPSA. 52 pages.

Mahapatra, Snigdha, Bhunia, Gouri Sankar, and Shit, Pravat Kumar. (2020). Biofertilizer policy and market frameworks in India. *Journal of Sustainable Agriculture*, 44(6), 823–841. <https://doi.org/10.1080/14735903.2020.1788647>

Mucheru-Muna, Monicah, Ngetich, Felix, Mugendi, Daniel, and Mairura, Franklin. (2022). Organic inputs and policy challenges in Kenya's smallholder agriculture. *Agriculture and Food Security*, 11(1), 35. <https://doi.org/10.1186/s40066-022-00372-9>

Mugambi, Franklin, and Jagongo, Ambrose. (2021). The effect of regulatory framework on MSME growth in Kenya. *International Journal of Business and Law Research*, 9(2), 45–59.

Mulwa, Richard, Muasya, Mutuku, and Otieno, Purity. (2020). Operationalizing access and benefit sharing in Kenya's agrobiodiversity. *Environmental Policy and Law*, 50(6), 421–430. <https://doi.org/10.3233/EPL-200249>

Organisation for Economic Co-operation and Development (OECD). (2019). *Trade Facilitation and the Global Economy*. Paris, France: OECD Publishing. 164 pages.

Organisation for Economic Co-operation and Development (OECD). (2021). *Fostering Green Growth in Africa through SME Financing*. Paris, France: OECD Publishing. 78 pages.

Sánchez Ramírez, Claudia, Andersson, Jens, and Giller, Ken E. (2024). Institutional barriers to biofertilizer adoption in African agriculture. *Journal of Development Studies*, 60(1), 112–129. <https://doi.org/10.1080/00220388.2023.2285642>

Tegemeo Institute of Agricultural Policy and Development. (2021). *Policy Coherence and Agricultural Transformation in Kenya*. Nairobi, Kenya: Egerton University. 46 pages.

United Nations Conference on Trade and Development (UNCTAD). (2021). *Border Procedures and Trade Delays in East Africa*. Geneva, Switzerland: UNCTAD. 64 pages.

United Nations Environment Programme (UNEP). (2021). *Access and Benefit Sharing in the Agri-Food Sector*. Nairobi, Kenya: UNEP. 82 pages.

United Nations Environment Programme (UNEP). (2022). *Solid Waste Management in Nairobi: Policy Gaps and Opportunities*. Nairobi, Kenya: UNEP. 74 pages.

United Nations Industrial Development Organization (UNIDO). (2022). *Regulatory Challenges Facing African SMEs*. Vienna, Austria: UNIDO. 90 pages.

World Bank. (2019). *Enabling the Business of Agriculture 2019*. Washington, DC: World Bank Group. 104 pages.

World Bank. (2020). *Doing Business 2020: Comparing Business Regulation in 190 Economies*. Washington, DC: World Bank Group. 148 pages.

World Bank. (2021). *Greening SMEs in Sub-Saharan Africa*. Washington, DC: World Bank Group. 56 pages.

World Food Programme (WFP) and Dalberg. (2023). *Mapping SME Constraints in Food Systems Transformation*. Rome, Italy: WFP. 72 pages.



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