Africa Food Systems Report 2025

AGRA
Sustainably Growing Africa's Food Systems

DRIVERS OF CHANGE AND INNOVATION

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Foreword

Africa's agrifood systems are at the heart of the continent's transformation agenda. They hold the promise not only of feeding a growing population, but also of creating jobs, driving inclusive economic growth, strengthening resilience, and positioning Africa as a key player in global food security. The progress made in recent decades demonstrates the potential of agriculture as a catalyst for prosperity. At the same time, persistent challenges, such as weak agro-processing capacity, high post-harvest losses, and uneven access to finance, remind us that the task ahead demands ambition, innovation, and collaboration.

The Africa Agriculture Status Report (AASR) has, for over a decade, been an authoritative reference point for evidence and insights that guide policy, investment, and practice in Africa's agriculture sector. It has provided the analytical base for CAADP biennial reviews and informed investment planning in several member states.

The shift from the Africa Agriculture Status Report (AASR) to the Africa Food Systems Report (AFSR) is not merely semantic. It reflects a recognition that Africa's future depends on an integrated system linking production, nutrition, trade, environment, governance, and markets to resilience.

This year's report is both a reflection and a call to action. It highlights the resilience and ingenuity of African farmers, agribusinesses, and institutions. It also makes clear that siloed solutions will not be enough. To achieve food systems transformation, we must build integrated approaches, underpinned by innovative financing models that leverage public, private, and blended capital, and draw on partnerships across governments, private sector, farmers' organizations, youth, women, researchers, financiers, and development partners.

As a partner committed to Africa's transformation and to AGRA's convening role, I recognize the value of this report in providing a balanced, evidence-driven assessment of Africa's journey and in equipping decision-makers with practical insights. It is a timely contribution as we approach the next round of CAADP commitments and as global conversations on food systems increasingly look to Africa for leadership and innovation.

The challenge before us is urgent, but it is also an opportunity. Africa has the talent, the resources, and the energy of its young people to drive this transformation. Reports such as the AASR, and now the AFSR, provide the roadmap for action. I encourage all stakeholders to engage deeply with its findings and to act boldly on its recommendations. Engaging with its findings is essential not only to meet the 2025 CAADP Kampala Declaration goals but also to position Africa at the center of global food systems solutions.

His Excellency Moses Vilakati
Commissioner of Agriculture, Rural Development,
Blue Economy, and Sustainable Environment for the African Union Commission.

Preface

Africa stands today at a defining moment in its agrifood systems journey. Over the past three decades, the continent has witnessed remarkable progress: agricultural output has expanded faster than in any other region, poverty has declined, and millions of its citizens are living longer, healthier lives. Intra-African trade is deepening, stunting rates are falling, and farmers continue to demonstrate resilience and innovation, yet progress has not been uniform across regions or demographic groups.

Yet, these gains remain uneven and fragmented. Too many households still struggle with hunger and poor diets, and the number of undernourished Africans continues to rise. Climate shocks, conflict, rapid urbanization, and global crises have revealed the vulnerabilities of food systems. The cost of a healthy diet is out of reach for most people, and many young people remain trapped in low-productivity work despite agriculture's vast potential to drive inclusive growth, rural transformation, and large-scale job creation.

Africa's youth population is the fastest growing in the world, and with nearly 60% of Africans under the age of 25, the continent's food systems transformation must be a transformation for and by youth. Young people must be positioned at the heart of strategies to modernize food systems, whether as farmers, agripreneurs, processors, traders, or digital innovators. Creating youth-led viable, dignified employment across the value chain is not only an economic necessity but also it is a political and social imperative.

The lesson is clear: piecemeal progress will not deliver the transformation Africa needs. We must move beyond fragmented gains to systemic change, anchored in strong governance, regional integration, and inclusive markets, backed by investment in infrastructure and finance, guided by sustainability, and powered by knowledge and innovation.

It is in this spirit that AGRA is evolving the Africa Agriculture Status Report (AASR) into the Africa Food Systems Report (AFSR). This shift reflects the reality that agriculture cannot be viewed in isolation. Food systems are interconnected, from production to markets, nutrition, finance, trade, environmental sustainability, and technology. The new framing allows us to capture the full breadth of Africa's agrifood transformation, ensuring that our analysis and recommendations speak to the complexity of challenges and opportunities facing the continent.

This report introduces, for the first time, a selected set of food systems key indicators (Chapter 1 page 3), which measure Africa's performance across five domains: food supply chains, diets, food environment, systemic drivers, and outcomes. These indicators are fertilizer use, irrigation, mechanization, dietary diversity, cost of diet, intra-African trade, access to finance, policy coherence, poverty, stunting, and greenhouse gas emissions. It provides a baseline which will enable Africa to monitor progress year-on-year and show progress towards the CAADP commitments.

The transformation we seek must be built on strong governance, strategic investment, inclusive markets, robust infrastructure, and the power of data and knowledge. It must also prioritize youth inclusion, labor productivity, and pathways to decent work for the next generation. At AGRA, we believe that the future lies in building resilient food baskets and corridors, leveraging catalytic finance, and strengthening partnerships across governments, the private sector, development partners, and our farmers themselves, while investing in knowledge systems to ensure decisions are evidence-driven. The upcoming CAADP commitments provide us with an opportunity to chart this path collectively.

This report calls for bold action and integrated solutions. It reminds us that Africa has the talent, the resources, and the vision to feed itself and the world. What we need now is the commitment to work together, at scale, to turn potential into lasting prosperity for all, while meeting Africa's CAADP 2025 targets, contributing to the SDGs, and positioning Africa as a leader in global food systems.

Alice Ruhweza
President, AGRA

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We extend our gratitude to all who contributed to the development of the Africa Food Systems Report 2025 (AFSR25), a publication that highlights the key drivers shaping Africa's food systems. The insights and expertise shared by each contributor have been invaluable in shaping and delivering this comprehensive resource.

On behalf of AGRA, I particularly recognize John M. Ulimwengu for his technical contributions. We also extend our appreciation to the Data and Analytics Team, under the Technical Leadership of Sibusiso Nhlengethwa and Paul Thangata, for their guidance and commitment throughout the production of this report. Our sincere thanks go to all the individuals and institutions whose diverse forms of support were instrumental in the preparation and completion of this publication.

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AFSR25 represents a significant accomplishment, and we trust it will serve as a timely and relevant resource. We extend our gratitude to all who contributed to its conceptualization and completion, and we apologize for any inadvertent omissions.

Andrew Cox
Director - Strategy, Monitoring & Evaluation and Learning
AGRA

Acronyms and Abbreviations

AAATM	Africa Agriculture Trade Monitor
AATIF	Africa Agriculture and Trade Investment Fund
ACC	Agricultural Commercialization Clusters
ACET	African Center for Economic Transformation
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AFSIA	Africa Solar Industry Association
AGDI	Africa Gender and Development Index
AGF	African Guarantee Fund
AGRA	Alliance for a Green Revolution in Africa
AgWA	Africa Agricultural Watch
AGRIFOOD	Agriculture and Food (used as short form for agrifood systems)
AI	Artificial Intelligence
AIDF	Africa Infrastructure Development Fund
ALP	Action-oriented Learning Project
ANIMA	ANIMA Investment Network
ARAF	Acumen Resilient Agriculture Fund
ASBP	African Seed and Biotechnology Program
ATA	Agricultural Transformation Agency
ATAI	Agricultural Technology Adoption Initiative
ATE	Average Treatment Effect
ATI	Agricultural Transformation Institute
ATEX	African Trade Exchange
ATOR	Africa Transformation Outlook Report
AU	African Union
AUDA	African Union Development Agency
AUC	African Union Commission
BCG	Boston Consulting Group
BMGF	Bill & Melinda Gates Foundation
BOAD	West African Development Bank (Banque Ouest Africaine de Développement)
BR	Biennial Review
CAADP	Comprehensive Africa Agriculture Development Programme
CALA	Centre for African Leaders in Agriculture
CASU	Conservation Agriculture Scaling Up
CBA	Cost Benefit Analysis
CEEC	Citizens Economic Empowerment Commission
CGAP	Consultative Group to Assist the Poor
CGIAR	Consultative Group on International Agricultural Research
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
COMESA	Common Market for Eastern and Southern Africa
COVID	Coronavirus Disease
CSA	Climate-Smart Agriculture
CTA	Technical Centre for Agricultural and Rural Cooperation (ACP-EU)
DAFF	Department of Agriculture, Forestry and Fisheries (South Africa)
DC	Direct Current
DFI/DFIs	Development Finance Institution(s)
DIE	German Institute for Development Evaluation (Deutsches Institut für Entwicklungsevaluierung)
DQQ	Diet Quality Questionnaire
DRC	Democratic Republic of the Congo
DRES	Decentralised Renewable Energy Systems
EAC	East African Community
ECA	Economic Commission for Africa
ECOWAS	Economic Community of West African States
EHS	Environmental Health and Safety
EIB	European Investment Bank

ESG	Environmental, Social, and Governance
EUDR	European Union Degradation Regulation
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
FAS	Foreign Agricultural Service
FDI	Foreign Direct Investment
FMNR	Farmer-Managed Natural Regeneration
FS-TIP	Food System Transformative Integrated Policy
FSCI	Food Systems Countdown Initiative
GDP	Gross Domestic Product
GERD	Grand Ethiopian Renaissance Dam
GHI	Global Hunger Index
GIIN	Global Impact Investing Network
GIEWS	Global Information and Early Warning System
GIS	Geographic Information System
GGGI	Global Green Growth Institute
GIRSAL	Ghana Incentive-Based Risk-Sharing System for Agricultural Lending
GMM	General Method of Moments
GSMA	Global System for Mobile Communications Association
GW	Gigawatt
HHI	Herfindahl–Hirschman Index
HLPE-FSN	High Level Panel of Experts on Food Security and Nutrition
IAE/IEA	International Energy Agency
IATA	International Air Transport Association
ICIPE	International Centre of Insect Physiology and Ecology
ICM	Integrated Crop Management
ICRAF	World Agroforestry Centre
ICT	Information and Communication Technology
IDH	The Sustainable Trade Initiative (from Dutch: Initiatief Duurzame Handel)
IDP	Integrated Development Plan
IFI	International Financial Institution
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
II	International Infrastructure (context-specific)
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISFM	Integrated Soil Fertility Management
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
JSR	Joint Sector Review
JTEP	Journal of Transport Economics and Policy
KAOP	Kenya Agricultural Observatory Platform
KEPHIS	Kenya Plant Health Inspectorate Service
LAPSSET	Lamu Port–South Sudan–Ethiopia Transport Corridor
M&E	Monitoring and Evaluation
MAM	March to May
MDD	Minimum Dietary Diversity
MDD-W	Minimum Dietary Diversity for Women
MTN	Mobile Telecommunications Network
MW	Megawatt

NAIP	National Agricultural Investment Plan
NCD	Non-Communicable Disease
NEPAD	New Partnership for Africa's Development
NIRSAL	Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending
NSIA	Nigeria Sovereign Investment Authority
NTM	Non-Tariff Measure
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OMVS	Organisation pour la mise en valeur du fleuve Sénégal
OND	October to December
PAPSS	Pan-African Payment and Settlement System
PDB/PDBs	Public Development Bank(s)
PEBEC	Presidential Enabling Business Environment Council
PIDA	Programme for Infrastructure Development in Africa
PoU	Prevalence of Undernourishment
PPP	Public-Private Partnership
RA	Regenerative Agriculture
REC	Regional Economic Community
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
ROI	Return on Investment
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
R&D	Research and Development
SADC	Southern African Development Community
SAATM	Single African Air Transport Market
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SAP	Structural Adjustment Programme
SDG/SDGs	Sustainable Development Goal(s)
SHS	Solar Home Systems
SME/SMEs	Small and Medium Enterprise(s)
SO1, SO2, SO4	Strategic Objectives 1, 2, and 4
SOCO	State Owned Company
SOFA	State of Food and Agriculture (FAO report)
SPIS	Solar Powered Irrigation Systems
SPS	Sanitary and Phytosanitary Standards
SSA	Sub-Saharan Africa
SSPI	Seed System Performance Index
TAZARA	Tanzania Zambia Railway Authority
TCX	The Currency Exchange Fund
TIP	Transformative Integrated Policy
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNSD	United Nations Statistics Division
USAID	United States Agency for International Development
US	United States
USDA	United States Department of Agriculture
VBA	Village-Based Advisor
WFP	World Food Programme
WHO	World Health Organization
WISER	Weather and Climate Information Services for Farmers
WMO	World Meteorological Organization

1 From fragmented gains to systemic transformation

John M. Ulimwengu[1], Sibusiso B. Nhlengethwa[2], Jonthan Said[3]

KEY MESSAGES

1 **Progress is evident but fragmented**
Africa's agrifood systems have achieved measurable gains since the 1990s, including a decline in extreme poverty from 58% to 35%, improved child nutrition, and higher life expectancy. Yet these improvements are uneven across regions and domains, leaving persistent gaps in resilience, equity, and sustainability.

2 **Productivity growth has not translated into food security**
Agricultural output has grown at 4.3% annually since 2000, the fastest globally, but one in three children remain stunted, and the number of undernourished people is rising, exposing the disconnect between production gains and nutritional outcomes.

3 **Commitments drive progress but remain narrow**
Continental frameworks such as the Maputo, Malabo, and Kampala Declarations have spurred public investment and policy reforms. Still, gains are often concentrated in production, with limited spillover to nutrition, climate resilience, and inclusivity.

4 **Hunger trends are reversing**
The Prevalence of Undernourishment (PoU) fell to 15% by 2015 but rose above 19% by 2022, driven by conflict, climate shocks, and COVID-19, pushing Africa off-track from achieving SDG 2 targets.

5 **Financing dynamics are shifting**
Declining Official Development Assistance (ODA) and competing global priorities are reshaping the funding landscape, requiring catalytic use of public resources to leverage larger flows from DFIs, IFIs, and private capital.

6 **Systemic transformation is the new imperative**
Future progress depends on integrated strategies combining governance, infrastructure, finance, and sustainability, reinforced by spatial approaches such as food baskets and corridors, and anchored in strong knowledge systems.

Introduction

Over the past 30 years, Africa's agrifood systems have made significant strides, but these gains remain fragmented across regions, domains, and time periods, and are often disconnected from broader food system outcomes. Multiple development indicators show improvement since the 1990s: from rising GDP per capita and declining poverty rates to better health and education outcomes (AGRA, 2021; Fofana et al., 2023). For instance, the extreme poverty headcount in sub-Saharan Africa fell from an average of approximately 58% in the 1990s to about 35% by the mid-2010s. Agricultural production value has expanded at the fastest rate globally since 2000 (about 4.3% per year), contributing to improved food availability.

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Child malnutrition indicators have also improved. According to Skoufias (2018), stunting prevalence in Africa declined from nearly 40% in 1990 to around 30% today. Life expectancy has increased by over 14 years since 1990, rising from around 50 to 64 years, reflecting improved health systems, nutrition, and disease control across the continent. These long-term trends highlight progress, painting a picture of gradual transformation in Africa's food and agriculture sector.

Africa's agricultural transformation agenda, anchored in the 2003 Maputo Declaration and expanded in the 2014 Malabo Declaration, has driven significant policy commitments and measurable progress (AUC, 2023). These gains are, however, often narrowly concentrated in production domains and have not consistently translated into improvements in food system resilience, nutrition, or environmental outcomes. Africa still holds the world's highest child stunting rate, affecting one in three children under five (33%). It has also experienced the slowest decline in stunting since 1990 (Skoufias, 2018). In absolute terms, the number of undernourished people on the continent has risen in recent years, a worrying reversal driven largely by conflict, climate shocks, and the COVID-19 pandemic. The Prevalence of Undernourishment (PoU) fell to about 15% by 2015 but climbed back above 19% by 2022 (GHI, 2023), pushing Africa further off track from ending hunger. Critically, these trends expose a systemic disconnect: improvements in productivity and GDP have not yielded equitable or sustainable outcomes across populations or sectors. Fragmented progress, while real, is insufficient.

Today, a shift in global development finance, characterized by declining Official Development Aid (ODA) budgets and competing priorities, compounds the urgency for African governments to take a systemic approach to food systems transformation. The post-COVID world has ushered in a new financing landscape, where public grants must act as catalysts to crowd in larger volumes of capital from development finance institutions (DFIs), international financial institutions (IFIs), and the private sector. In this new era, achieving impact means moving from thousands to millions to billions, using limited ODA to leverage structural investments.

INSIGHT

Infrastructure and agrifood systems in Africa

- **40%** of food produced in sub-Saharan Africa is lost before reaching markets, largely due to poor storage, transport, and processing facilities (FAO).
- **90%** of rural roads in Africa are unpaved, constraining market access for farmers and raising post-harvest losses.
- **<7%** of cropland in Africa is irrigated, compared to a global average of about **20%**, limiting resilience to climate variability.
- **Electricity access in rural areas** of sub-Saharan Africa averages below **30%**, restricting cold storage and agro-processing opportunities.
- **Intra-African trade in food products** stands at only about **20%**, compared to over **60%** in Europe, reflecting weak transport and logistics systems.
- **Digital connectivity**: Only about **28%** of people in sub-Saharan Africa use mobile internet, constraining adoption of digital platforms that link farmers to markets.

The 2025 Comprehensive Africa Agriculture Development Programme (CAADP) Kampala Declaration (AU, 2025) marks a decisive strategic pivot. It adopts a holistic agrifood systems lens, stressing that agriculture must be understood within the broader food system, encompassing activities, outcomes, and policies. The declaration sets ambitious goals and codifies six commitments centered on sustainability, inclusion, and governance. The message is clear: piecemeal gains are no longer enough. Only integrated, systemic transformation can deliver higher output alongside equity, nutrition, health, and resilience.

Understanding what such transformation entails requires a clear framework. This chapter draws on Ingram and Thornton's (2022) conceptual model, which defines systemic transformation as the shift from suboptimal to optimal food system outcomes. Achieving this change demands that actors adapt their activities in response to multiple signals, from policies and markets to

climate and technology. Recent work by Haddad (2023) reinforces this idea, emphasizing that sustainable food system transformation requires coordinated actions across policy, finance, and data, supported by strong implementation capacity. Governance and policy serve as levers for behavior change, while infrastructure, finance, and sustainability act as key drivers. Spatial strategies, such as developing food baskets and trade corridors, can pool resources and accelerate required transformation.

Africa's agrifood systems status (1985–2023)

To assess the performance and trajectory of Africa's agrifood systems over the past three decades, this report draws upon a curated set of indicators across five domains adapted from: (i) Food supply chains; (ii) Diets; (iii) Food environment; (iv) Systemic drivers; and (iv) Outcomes (see Table 1.1).

These indicators were selected based on their relevance, data availability, and their collective capacity to reflect both the structural and functional dimensions of agrifood transformation. They provide a baseline that reflects historical trends and highlights current challenges and opportunities. This inaugural edition adopts a long-term perspective to establish a baseline for Africa's food systems and sets the analytical foundation for subsequent reports. Going forward, future editions will build on this baseline to track year-on-year changes in the same indicator set, enabling consistent and comparable monitoring over time. This longitudinal framing is essential for measuring incremental progress, evaluating policy

Table 1.1: Key food systems indicators. Source: Authors, using Food Systems Countdown Initiative (FSCI) data.

Food systems components	Indicator	Trend (1985-2023)	Latest value (2016-2023)	Regionally Uneven?	Color code
Food Supply Chains	Fertilizer use (kg/ha)	Up	21.55	Yes	
	Irrigation coverage (%)	Mixed	6%	Yes	
	Mechanization (tractors/100 km^2)	Up	2.3	Yes	
	Agro-processing value added (% of ag GDP)	Mixed	12-15%	Yes	
	Post-harvest losses (%)	Stable/High	19.95%	Yes	
	Certified seed use (% of farmers)	Up	45%	Yes	
Diets	Calories from non-staples (%)	Mixed	28%	Yes	
	MDD-W prevalence (%)	Up	32%	Yes	
Food Environment	Cost of diet as % of income	Worsening	60-70%	Yes	
	Ease of doing business (rank)	Mixed	94/190	Yes	
	Intra-African ag trade (%)	Up	43.20%	Yes	
Drivers	Public ag expenditure (% of govt budget)	Stable	1.97%	Yes	
	Access to ag finance (% of smallholders)	Worsening	<10%	Yes	
	Policy coherence index (score)	Mixed	N/A	Yes	
	Food system infra spending (% of total)	Worsening	Low	Yes	
Outcomes	Poverty headcount (%)	Down	31.30%	Yes	
	Stunting in under-5s (%)	Down	30.20%	Yes	
	Wasting in under-5s (%)	Stable	6.70%	Yes	
	GHG emissions per capita (kt CO_2eq)	Down	2583 kt	No	
	Food supply variability (kcal/day)	Down	37.4	Yes	

Green means desirable trend Yellow means stable trend Red means undesirable trend

effectiveness, and guiding strategic adjustments across the continent.

This section presents a regional and thematic diagnostic of Africa's agrifood systems. While long-term progress is evident in many indicators, improvements remain geographically uneven and fragmented across domains, with key weaknesses in sustainability, equity, and implementation capacity.

Food supply chains

Food supply chains represent the foundational infrastructure of agrifood systems, encompassing the key activities of production, processing, storage, distribution, and logistics. While these domains have seen considerable improvement across many African countries over the past three decades, progress remains highly uneven, both between and within regions. Such disparities reflect deep-rooted differences in investment capacity, governance quality, institutional coordination, and private sector engagement.

Fertilizer use

Fertilizer use remains one of the most tangible indicators of agricultural intensification. In regions such as Southern Africa, the increase in fertilizer consumption has been significant, rising from less than 50 kilograms per hectare in the early 2000s to approximately 73.5 kg/ha in recent years. This growth has been supported by targeted government interventions, including subsidy programs and fertilizer voucher systems, particularly in countries such as Zambia and Malawi (FAO, 2023). These efforts have contributed to higher cereal yields, more stable food supply, and increased farmer incomes.

By contrast, fertilizer use in Central Africa remains critically low, averaging less than 7 kg/ha. This falls short of the Abuja Declaration's 50 kg/ha target, set in 2006 by African leaders to triple fertilizer use across the continent. The reasons for this stagnation are multifaceted:

- Limited purchasing power among smallholders
- Poorly developed agro-dealer networks
- High transport costs
- Weak extension services that fail to promote efficient use

Without deliberate investments to improve both the availability and affordability of fertilizers, this region risks falling further behind in productivity and food security outcomes.

Seeds

Seed system development tells a similar story of regional divergence. Countries in Eastern and Southern Africa have led efforts to strengthen formal seed sectors through regulatory harmonization, investment incentives, and regional trade integration. Ethiopia's state-led seed sector has made certified seeds widely available, whereas Zambia's liberalized approach has encouraged private sector participation and introduced diverse crop varieties tailored to local conditions (Access to Seeds Foundation, 2023). In both models, success has hinged on clear government strategy, public-private coordination, and active dissemination of improved varieties.

In contrast, seed systems in West and Central Africa remain dominated by informal exchange networks, often characterized by poor varietal quality and low yield potential. Certification systems are underdeveloped, regulatory oversight is limited, and farmer demand is constrained by both limited awareness and affordability. These deficiencies represent a missed opportunity for large-scale productivity gains, especially considering mounting climate pressures and growing food demand.

Mechanization

Mechanization remains a major constraint on agricultural transformation in Africa. Although there has been some progress, particularly in Nigeria and Ghana, where public-private tractor-hire schemes are gaining traction, most of the continent continues to rely heavily on manual

> ***"As this inaugural edition adopts a long-term lens to establish the status of Africa's food systems, it also sets the analytical foundation for subsequent reports. Going forward, future editions will build on this baseline to track marginal annual changes in the same indicator set..."***

labor and animal traction. South Africa stands out as an exception, with widespread mechanization reflecting its large-scale commercial farming systems.

In much of Central Africa, however, the mechanization gap is stark. High capital costs, limited access to finance, weak repair and maintenance services, and inadequate infrastructure all limit the viability of mechanized farming. Small and fragmented landholdings also pose a structural constraint, making adoption of large-scale machinery economically inefficient. Addressing this challenge requires innovative financing models, land consolidation efforts, and investment in rural service delivery ecosystems.

Irrigation

Irrigation is another underutilized lever of productivity and resilience. Across the African continent, only about 6% of cultivated land is irrigated, with Sub-Saharan Africa averaging less than 3%, a figure far below global norm (AUC, 2023). Egypt and Sudan account for the lion's share of irrigated land, benefiting from extensive river systems and long-established water management institutions.

Elsewhere, rain-fed agriculture dominates, leaving farmers highly vulnerable to erratic rainfall, droughts, and floods. Yet small-scale irrigation systems, such as solar-powered drip irrigation for horticulture, have shown considerable promise in boosting productivity and stabilizing farm incomes. Scaling these systems will require coordinated investment in water infrastructure, farmer training, and localized governance frameworks that ensure equitable and sustainable water access.

Agro-processing

Agro-processing remains underdeveloped and continues to constrain Africa's agrifood value chains. Although Africa produces substantial volumes of raw agricultural commodities, it continues to import a large share of processed foods such as rice, dairy, vegetable oils, and cereals. This dependence drove a food import bill exceeding USD 100 billion in 2021 (AGRA, 2022). Limited agro-processing perpetuates trade deficits and reduces opportunities for job creation, rural industrialization, and value retention.

Nonetheless, some encouraging cases demonstrate the sector's potential. In Ethiopia, agro-industrial parks have helped scale processing of high-value products like coffee and leather. Ghana has made strides in cocoa processing, while Nigeria's domestic rice milling industry has grown through a combination of import restrictions and local investment incentives. These cases underscore the potential of targeted policy support and industrial strategy to catalyze local value addition. As emphasized in the Malabo Montpellier Panel's VALUE-UP report (2023), scaling these successes requires investment in energy, logistics, finance, and midstream market linkages.

Post-harvest losses

Post-harvest losses remain high, particularly for perishable goods such as fruits, vegetables, dairy, and fish. Estimates suggest that up to 20% of agricultural output is lost post-harvest, largely due to inadequate storage, limited refrigeration, and inefficient transport systems (FAO, 2021). These losses represent a dual failure, both economic and ecological. They reduce farmer incomes and food availability while wasting scarce inputs including water, land, and fertilizers.

Reducing post-harvest losses offers one of the most cost-effective and scalable opportunities to strengthen food security. Innovations such as hermetic storage bags, solar cold rooms, and decentralized aggregation hubs are showing promise, but need greater support and dissemination to become widespread.

Diets

Dietary quality is a central outcome of agrifood systems and a key determinant of human health and nutritional well-being. While Africa has made measurable progress in increasing caloric availability, the quality and diversity of diets remain major concerns across much of the continent. Many countries are experiencing a double burden of malnutrition, that is, persistent undernutrition coexisting with rising rates of overweight, obesity, and noncommunicable diseases. This pattern reflects food systems that are inefficient in delivering healthy diets and increasingly skewed toward ultra-processed and energy-dense foods, particularly in urban settings (FAO et al., 2023).

Diet diversity

One widely used indicator of diet diversity is the proportion of daily caloric intake derived from non-staple foods such as fruits, vegetables, dairy, animal-sourced products, legumes, nuts, and seeds. In many African countries, this share remains low, indicating continued

dependence on cereals and starchy staples such as maize, rice, cassava, and sorghum. According to FAOSTAT data, non-staples constitute only about 28% of dietary energy supply in Sub-Saharan Africa, compared to over 50% in many middle-income countries (FAO, 2023). This limits micronutrient density and weakens resilience to supply shocks in staple crops.

Recent initiatives have sought to improve dietary diversity through market interventions, school feeding programs, and behavior change communication, often targeting women and children. These efforts remain fragmented and underfunded. Structural barriers such as low income, seasonal variability, and poor market access continue to restrict consumer choices, especially in rural areas. A systemic transformation of diets will require coordinated efforts across production, trade, urban food environments, and public procurement.

Minimum Dietary Diversity for Women (MDD-W)

Targeted indicators such as the MDD-W provide insights into nutritional equity. The MDD-W measures the proportion of women aged 15–49 who consume at least five of ten defined food groups in the past 24 hours, a proxy for adequate micronutrient intake. In Sub-Saharan Africa, only about 32% of women meet the MDD-W threshold, indicating persistently low prevalence (DQQ, 2023). This outcome reflects both poverty and structural gender inequalities that limit women's access to nutritious foods.

- Countries like Rwanda, Ethiopia, and Senegal have made strides in improving MDD-W through integrated nutrition-sensitive agriculture programs.
- Governance quality
- Institutional capacity
- Public and private investment
- Policy coherence
- Integration of climate and demographic considerations into long-term planning

These often combine home gardening, poultry production, and nutrition education with targeted safety nets. However, the scale of such programs remains limited, and national food systems largely continue to prioritize staple crop production over diverse, nutrient-dense foods.

Cost of a healthy diet

Affordability remains a critical but often overlooked barrier to improved dietary quality. FAO defines the cost of a healthy diet as the least-cost combination of locally available foods that meet nutrient needs, which remains prohibitively high across much of Africa. Recent FAO modeling suggests that in Sub-Saharan Africa, such a diet costs between 60% and 70% of average household income, making it unaffordable to over 80% of the population (FAO et al., 2023). The affordability gap is most severe in conflict-affected areas, landlocked countries, and rural districts with weak transport infrastructure.

Food prices are only one part of the equation. Income volatility limited social protection, and high expenditure shares on non-food essentials (such as energy, housing, and school fees) compound the challenge. Nutritious foods such as dairy, fruits, and fish face higher post-harvest losses and greater price volatility, discouraging both production and consumption.

Addressing this issue requires systemic reforms that go beyond food price stabilization. Investments in local food processing, transport infrastructure, and cold chains can reduce costs and improve availability. At the same time, policy instruments such as subsidies, taxes, and school feeding programs must be recalibrated to promote consumption of healthy foods over ultra-processed alternatives.

Food environment

The food environment, defined as the interface between food supply systems and consumer behavior, influences dietary choices, nutritional outcomes, and long-term health. It includes the availability, affordability, accessibility, and desirability of foods in homes, markets, schools, and workplaces. In Africa, food environments are shifting rapidly due to urbanization, income growth, infrastructure expansion, and evolving retail structures. These shifts remain uneven and often reinforce, rather than reduce, inequalities in food access and diet quality.

Affordability and accessibility

Affordability is a central constraint. In most Sub-Saharan African countries, the cost of a healthy diet exceeds 60% of average household income (FAO et al., 2023). Even when nutritious foods are available, they are often priced beyond the reach of low-income

households. This affordability gap is not only a function of household purchasing power but also of systemic inefficiencies within food systems, including poor logistics, high food loss, and limited investment in cold storage and distribution.

Urban centers offer better access to diverse foods, including imported fruits, vegetables, and animal-source products, but they are also where ultra-processed foods are expanding most rapidly. In rural areas, seasonal access to fresh produce is often limited by transportation bottlenecks and underdeveloped retail infrastructure, further constraining diet diversity. Public institutions such as schools and clinics remain underutilized for improving food environments, as most lack procurement systems or standards to deliver healthy meals.

Ease of doing business and food retail growth

A critical enabler of food environment development is the business climate, particularly in terms of barriers to entry, logistics, and regulatory clarity. The World Bank's Ease of Doing Business Index provides a proxy for how conducive a country's environment is to agrifood enterprise development. Many African countries perform poorly on this index because of regulatory complexity, high start-up costs, and weak legal frameworks (World Bank, 2020). These challenges limit the entry and scaling of SMEs that could otherwise expand access to fresh, affordable, and locally processed foods.

Retail growth is nonetheless accelerating in several urban hubs. The rise of informal markets, modern supermarkets, and e-commerce platforms is reshaping food access, albeit unevenly. Countries like Kenya, Nigeria, and South Africa have seen rapid expansion in digital food delivery services and grocery apps. Yet, such innovations remain largely confined to urban elites and are not yet transformative for national food environments. Moreover, regulatory systems are struggling to keep pace with the growth of informal food vendors and the influx of imported, often ultra-processed, foods.

Intra-African agricultural trade

A functional food environment is closely tied to the movement of agricultural products within and across borders. Intra-African trade in food and agriculture has increased steadily, facilitated by regional integration initiatives such as the African Continental Free Trade Area (AfCFTA). Intra-African agricultural trade has risen from under 10% in the 1990s to about 43% of total agricultural exports in recent years (UNECA, 2023).

This trend is encouraging, as it indicates growing regional connectivity and the potential to stabilize supply chains and reduce volatility. However, major bottlenecks remain, including non-tariff barriers, inconsistent food safety standards, and weak border infrastructure. Without harmonized regulations and stronger investment in trade corridors, intra-African trade cannot fully support resilient food environments. In landlocked countries in particular, food prices remain volatile, reflecting high transaction costs and dependence on a limited number of trade routes.

Changing consumer preferences and marketing

Africa's food environments are increasingly shaped by evolving consumer preferences, especially among urban youth. Aspirational eating, global branding, and convenience foods are rising in prominence, often displacing traditional staples and fresh foods. Marketing plays a critical role in this shift, with aggressive promotion of sugar-sweetened beverages, packaged snacks, and fast foods now common across billboards, social media, and retail stores.

The nutritional consequences are becoming more evident. Overweight and obesity rates are rising in both adults and children, particularly in urban settings. Policies regulating unhealthy food marketing, such as front-of-pack labeling, sugar taxes, and restrictions on advertising to children, remain rare in most African countries. Strengthening the regulatory governance of food marketing is essential if food environments are to become more health-promoting and equitable.

Systemic drivers

Beneath the visible elements of food production and consumption lie systemic drivers that shape the trajectory of Africa's agrifood systems, including:

- Governance quality
- Institutional capacity
- Public and private investment
- Policy coherence
- Integration of climate and demographic considerations into long-term planning

Without significant and sustained transformation of these underlying drivers, even well-designed sectoral interventions are unlikely to achieve scale, inclusivity, or durability.

Public investment and budget prioritization

Public investment serves as a key driver of food system transformation. Most African governments however fall short of the CAADP commitment to allocate at least 10% of national budgets to agriculture. Recent data show that public agricultural expenditure averages just 1.97% of total government budgets across the continent (AUC, 2023). This underinvestment limits the expansion of critical public goods such as rural infrastructure, extension services, and research and development.

Where funds are allocated, they often support short-term subsidy programs or administrative overheads rather than long-term capacity building or catalytic investments. Redirecting public budgets to systemic enablers such as irrigation infrastructure, rural finance institutions, and market intelligence systems could yield more resilient and transformative outcomes.

Access to agrifood finance

Access to finance remains a significant constraint for smallholders and agrifood enterprises. Despite the recognized need for expanded rural financial services, only about 10 percent or fewer smallholder farmers in Sub-Saharan Africa access formal credit (CGAP, 2025). Barriers include lack of collateral, high transaction costs, underdeveloped rural banking networks, and limited use of digital financial tools. Women and youth, in particular, face additional hurdles due to discriminatory norms and limited asset ownership.

At the macro level, many African countries lack a coherent strategy to attract and deploy blended finance or climate finance instruments within the food system. Reports from the Malabo Montpellier Panel (2023) and AGRA (2022) emphasize that catalytic public finance, even in modest amounts, can leverage larger flows of development finance such as IFIs, DFIs, and PDBs, which can also attract private capital. This layered financing strategy, from hundreds of thousands to billions, is especially urgent in the context of declining Official Development Assistance (ODA).

Policy coherence and governance

Food systems are cross-sectoral, spanning health, education, environment, trade, and finance. Policymaking remains fragmented, characterized by weak inter-ministerial coordination and misalignment between national plans and local implementation. For example, agricultural strategies may prioritize staple production while nutrition policies emphasize dietary diversity, often without integration in budgeting, programming, or monitoring.

Tools to assess and strengthen policy coherence are emerging. Recent work by the Global Alliance for Improved Nutrition (GAIN) in Ethiopia, Benin, Kenya, Nigeria, and Tanzania demonstrates how diagnostic frameworks help governments identify contradictions and synergies across policy domains (GAIN, 2023). However, uptake remains limited, and most countries still lack institutionalized processes for cross-sectoral planning. Building capacity within civil services, especially at decentralized levels, is essential to translate coherence into action.

Infrastructure

Infrastructure is a foundational enabler of agrifood system performance, linking production zones to markets, reducing transaction costs, and improving access to inputs and services. The Africa Infrastructure Development Index (AIDI) indicates modest improvements over the past decade, particularly in port efficiency and digital connectivity (UNECA, 2023). Investments in port upgrades in countries such as Kenya and Morocco have accelerated export processing, while expanded mobile broadband coverage has enhanced market information flows and access to digital financial services. However, rural transport infrastructure remains inadequate in many countries, limiting smallholder farmers' ability to access markets and services. Poor feeder roads increase post-harvest losses, raise input costs, and reduce farm-gate prices. Cold chain capacity, essential for perishable products such as fruits, vegetables, dairy, and fish, remains underdeveloped across Africa, with only a few countries, including South Africa and Egypt, maintaining relatively comprehensive networks.

Data, evidence, and decision-making

Sound policy and investment decisions require high-quality, timely, and disaggregated data. Many African countries face data gaps in food systems, spanning input use, dietary diversity, market prices, and climate vulnerability. Where data does exist, it is often siloed across ministries or development partners and rarely used in decision-making.

Fragmentation is especially acute at subnational levels, where local governments, though increasingly responsible for implementation, lack dashboards, analytic tools, and training to act on evidence. The Food Systems Countdown Initiative (FSCI) framework, together with platforms such as FAOSTAT and GAIN's diet quality mapping, provides models for systematically tracking progress across food system domains (FAO, 2023; GAIN, 2023).

Investments in open data platforms, local research institutions, and policy feedback loops are foundational to long-term transformation. Moreover, building trust in data among decision-makers and communities is crucial to overcoming political inertia and fostering accountability.

Outcomes

The outcomes of Africa's food systems are mixed. Gains in production, trade, and poverty reduction have been achieved but remain fragile and uneven across countries. Current systems do not yet deliver on the three overarching goals of health and nutrition, economic inclusion, and environmental sustainability. Progress is fragmented and vulnerable to climatic, economic, and political shocks.

Health and nutrition outcomes

Africa faces a persistent burden of malnutrition. While the share of undernourished people has declined since the early 2000s, the absolute number rose to 282 million in 2022, or more than 20% of the population (FAO et al., 2023). Child stunting remains above 30% in several countries, and overweight, obesity, and diet-related non-communicable diseases are increasing, particularly in urban settings.

These trends reveal a food system that is failing to deliver nutritionally adequate and affordable diets to a large segment of the population. As discussed in previous sections, structural weaknesses in food environments and supply chains continue to favor starchy staples and ultra-processed foods over fresh, diverse, and nutrient-rich options. Women and young children are particularly affected, with consequences for maternal health, school readiness, and intergenerational poverty.

Despite the growing emphasis on nutrition-sensitive agriculture and food-based dietary guidelines, most African countries still lack coordinated, funded, and multisectoral strategies to address malnutrition comprehensively. National Food Systems Pathways developed after the 2021 UN Food Systems Summit provide a starting point, but need to be anchored in long-term budget commitments, institutional leadership, and accountability mechanisms.

Economic inclusion and employment

Agrifood systems account for up to 40% of employment and one-third of GDP in some countries (AGRA, 2022), yet inclusive growth remains limited. Productivity is low, especially among smallholders, value addition is minimal, youth unemployment and underemployment are widespread, and women continue to face wage gaps and barriers to resources and leadership.

Informality remains a dominant feature of agrifood employment, especially in processing, retail, and food services. While informal jobs can offer entry points and resilience in low-income contexts, they often lack protections, fair wages, and opportunities for advancement. Without intentional investment in skills, infrastructure, and access to finance, food system transformation risks exacerbating labor market dualism rather than resolving it.

Examples from Ethiopia, Ghana, and Nigeria show that agro-industrial parks, youth agripreneur programs, and women-focused cooperatives can generate productive jobs (Malabo Montpellier Panel, 2023). Scaling these models requires coordinated action across agriculture, industry, and education policies.

Environmental sustainability

Africa's food systems are increasingly vulnerable to, and contributors to, environmental degradation. Land degradation, water scarcity, deforestation, and biodiversity loss are accelerating across much of the continent. At the same time, food systems are both victims and drivers of climate change: they are disrupted by floods, droughts, and heat stress, but also

contribute significantly to greenhouse gas emissions, especially through deforestation and livestock systems.

The continent's relatively low per capita emissions have historically justified less scrutiny, but this is changing. As food systems grow and intensify, sustainability must be embedded at the core of transformation strategies. This includes shifting to climate-smart practices, improving water and nutrient use efficiency, reducing post-harvest losses, and promoting circular economy principles such as composting and regenerative agriculture.

Progress is being made, for example, through regional initiatives on climate-resilient agriculture and the African Union's endorsement of the African Bioeconomy Strategy, but current efforts are often fragmented and lack enforcement mechanisms. Data gaps also impede environmental accounting, particularly at subnational levels.

Charting the path to a transformed agrifood system

Over the past three decades, Africa's agrifood systems have recorded measurable gains in output, trade, and food security. Poverty rates have fallen, agricultural output has expanded faster than in any other world region, intra-African trade in agricultural goods has grown, and in many countries, food security indicators have improved. Yet these gains remain uneven, emerging only in specific regions and periods, and have not yielded system-wide transformation.

This 2025 Africa Agriculture Status Report argues that this pattern reflects the absence of an integrated approach to food systems transformation. Isolated technical fixes or productivity increases, while valuable, do not shift the underlying systems. Incremental improvements have occurred, but they remain disconnected from each other and vulnerable to reversal in the face of climate shocks, market volatility, and policy discontinuities. To meet the ambitions of the 2025 CAADP Kampala Declaration, Africa must shift from a path of fragmented gains to one of systemic transformation, in which governance, investments, and innovations reinforce each other across the entire food system.

While multiple pathways can lead to stronger performance, this report focuses on governance and policy as the primary levers for triggering behavioral change, and on infrastructure, finance, and sustainability as the drivers that sustain and scale this change. The report presents food baskets and corridors as concrete, spatially targeted strategies that can converge critical resources, institutional capacity, infrastructure, finance, inputs, mechanization, and processing, into high-potential areas. In practice, these operate as "mini-food systems" that demonstrate how coordinated interventions can accelerate transformation. All of this must be underpinned by strong knowledge support systems to ensure adaptive, evidence-based decision-making.

Governance and policy: Leveraging leadership for change

Governance and policy are the linchpins of systemic transformation. They shape priority setting, resource allocation, and the alignment of sectors such as agriculture, trade, environment, finance, nutrition, and health. Evidence from selected countries show that coherent national strategies, anchored in accountable institutions, can double staple yields in less than two decades. However, such cases are exceptions. Going forward, governance must focus on cross-sector integration and coordination, ensure that policies are backed by budgets, and institutionalize mechanisms for monitoring and adaptation. This will allow policy levers to shape incentives for sustainable, inclusive, and resilient production and consumption patterns.

Infrastructure: Building the backbone of food systems

Infrastructure is the connective tissue of agrifood systems. Farm-level productivity gains cannot translate into market access or reduced losses without efficient transport, cold chains, storage, and energy infrastructure. While data shows gradual improvement in port efficiency and digital connectivity, rural roads remain underdeveloped, and cold chain capacity is far below demand, especially for fruits, vegetables, dairy, and fish. Inadequate feeder roads contribute to post-harvest losses approaching 20%, while storage deficits limit smallholders' ability to time markets for better prices. Strategic infrastructure investment, particularly in logistics corridors and regional market hubs, can lower transaction costs, reduce waste, and connect smallholders to domestic and export value chains. Infrastructure planning should be explicitly linked to priority production zones to ensure maximum return on investment.

Finance: Closing the agrifood investment gap

Finance is the engine that drives adoption, innovation, and scaling. Agriculture accounts for up to 30% of GDP in many African economies but receives only 3–8% of total bank lending. Fewer than 10% of Africa's 50 million smallholder farmers access formal credit or insurance. Globally, the smallholder financing gap is estimated at $170 billion. Emerging solutions, such as mobile-based lending (e.g., M-Pesa), value chain financing, and credit guarantee schemes (e.g., GIRSAL in Ghana, NIRSAL in Nigeria), are showing promise. However, their reach remains limited. Scaling up finance will require both public investments in public goods (R&D, extension, infrastructure) and private investments in agribusiness, agro-processing, and supply chain logistics. Without deeper penetration of financial services for SMEs and producer organizations, technology adoption and productivity gains will remain localized and uneven.

The real untapped potential lies in Africa's domestic financial landscape. Local capital markets, pension funds, sovereign wealth funds, insurance schemes, and even conglomerates from adjacent sectors (e.g., telecommunications, mining, and logistics) represent sizable pools of capital that could be strategically mobilized for agrifood transformation. Similarly, commercial banks and microfinance institutions, when supported by enabling regulation and de-risking mechanisms, can expand access to credit for agribusiness SMEs and producer groups. However, domestic financing is shaped by the complex interplay of political and economic forces. Trust, incentives, and the quality of governance influence how the public sector promotes inclusive development and how willing the private sector is to invest in underserved areas. Unlocking domestic finance, therefore, requires a dual strategy: strengthening inclusive market systems that expand access and opportunity, and reforming government institutions to reduce risk, attract investment, and maintain consistent policy.

Sustainability: Ensuring long-term resilience

The climate crisis, land degradation, and biodiversity loss threaten to undermine hard-won gains. Although per capita agrifood emissions have declined, environmental restoration remains slow and climate shocks continue to disrupt supply chains. Integrating climate-smart agriculture, regenerative practices, and sustainable water and land management into core strategies is essential. Successful examples, such as Ethiopia's integrated watershed management and Kenya's climate-smart villages, show how productivity, resilience, and sustainability can advance together when supported by enabling policies and adequate finance.

Food baskets and corridors: Spatial engines for accelerated transformation

Food baskets and corridors offer spatially targeted models that overcome fragmentation by concentrating investment and institutional support in high-potential areas. By combining infrastructure, finance, inputs, mechanization, processing, and governance reforms, they create integrated "mini-food systems" capable of rapid transformation. These initiatives also generate demonstration effects, showing how coordinated action can yield measurable results in productivity, market integration, and rural incomes. Linking these zones to regional trade corridors ensures that gains are not trapped locally but contribute to broader economic growth.

Knowledge support systems: Anchoring decisions in evidence

Strong knowledge systems that supply timely, accurate, and relevant data are indispensable for transformation. Africa currently invests just 0.5% of agricultural GDP in research and development, half the recommended benchmark. Strengthening national agricultural research systems, extension services, and data platforms can enable adaptive management, guide investment decisions, and improve accountability. Linking knowledge systems to spatial initiatives like food baskets ensures that interventions remain evidence-driven and responsive to local realities.

Over the past three decades, Africa's agrifood systems have recorded notable progress. Agricultural productivity has improved, poverty rates have declined, and regional trade integration has advanced. These gains, however, remain uneven across countries, regions, and timeframes, and have not consistently translated into improvements in nutrition, environmental sustainability, or resilience. While there are pockets of success, areas of persistent underperformance remain, leaving the continent off course to achieve the ambitions of the 2025 CAADP Kampala Declaration.

The central lesson from this trajectory is that incremental and isolated gains are insufficient. Enduring change requires systemic transformation in which governance and policy reforms are aligned with

sustained investments in infrastructure, finance, and sustainability. Such transformation must respond to the interconnected nature of food systems, ensuring that progress in production, trade, resilience, and equity reinforces one another.

This report underscores governance and policy as the primary levers to realign incentives and behaviors. Complementary drivers, including robust infrastructure, accessible and innovative finance, and sustainable resource management, are essential to sustaining change. Spatial approaches, such as food baskets and corridors, demonstrate how resources and capabilities can be concentrated to accelerate transformation.

A key constraint in the current era is the evolving financing landscape. Traditional development assistance is under pressure, with Official Development Assistance (ODA) plateauing or declining across many donors. This shift requires strategic use of limited public funds to catalyze larger flows from International Financial Institutions (IFIs), Development Finance Institutions (DFIs), and private capital. The imperative is to transition from small-scale interventions to scaled investment, moving from hundreds of thousands to millions and ultimately to billions. Achieving this requires blended finance, policy coherence, and a strong pipeline of investment-ready projects underpinned by evidence.

Sustained transformation must also be anchored in strong knowledge support systems to ensure that both policies and investments are evidence-driven, adaptive, and inclusive. Without this foundation, Africa risks remaining on a trajectory of fragmented gains that are insufficient for building a resilient, inclusive, and sustainable agrifood future.

Central to this integrated transformation are two coordinating anchors: inclusive market systems and effective government systems. Inclusive, growth-oriented markets, particularly those driven by a private sector committed to shared value rather than extractive gains, are critical to enabling innovation, enterprise expansion, and value chain integration. At the same time, a capable and accountable public sector, supported by research institutions and think tanks, must provide regulatory clarity, institutional coherence, and long-term strategic vision. The effectiveness of these systems lies not in isolation but in deliberate collaboration. True systemic transformation will require both public and private actors to jointly shape incentives, co-invest in solutions, and safeguard equity and resilience alongside growth.

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2 Governance and policies for agrifood systems transformation in Africa

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KEY MESSAGES

1. **Knowledge as a catalyst**
   Robust, dynamic knowledge systems are foundational to food system transformation, linking data to decision-making across agriculture, nutrition, and climate resilience.
2. **Systemic weaknesses persist**
   Africa's knowledge ecosystems remain fragmented and underfunded, with limited integration between research, policy, and frontline actors, hindering timely, evidence-based responses.
3. **Digital integration and co-production are essential**
   Future-ready systems must be digitally connected, policy-aligned, and co-created with stakeholders to ensure contextual relevance and inclusive learning.
4. **From data to governance**
   Moving from siloed data acquisition to systems-level knowledge governance is key to achieving Africa's food security, sustainability, and economic development goals.
5. **Systemic change demands integrated, multisectoral approaches**
   Food systems are deeply interconnected with agriculture, health, environment, and economics. Only integrated policies, coordinated across sectors and scales, can address the complexity of agrifood systems and deliver sustainable, inclusive transformation.

Background and context

Governance is a foundational determinant of food systems performance. It influences how food is produced, accessed, and consumed, and determines the effectiveness of policies designed to address hunger, malnutrition, and affordability. The quality of governance has emerged as a decisive factor in the performance of food systems across Africa. As food insecurity remains widespread, growing attention is being paid to how state capacity, institutional effectiveness, and policy coherence influence access to food, dietary adequacy, and nutrition.

Throughout this chapter, governance is treated not as a monolithic concept but as a set of interrelated dimensions, such as institutional coordination, regulatory capacity, fiscal transparency, and accountability mechanisms, that directly shape food system outcomes. The chapter aims to offer a structured, actionable understanding of governance as a transformative lever rather than a background condition by unpacking these dimensions and tracing their influence across the agrifood policy landscape. Recent research shows that governance quality not only correlates with, but also directly shapes food system outcomes in Africa, determining the extent to which populations experience hunger, achieve nutritional sufficiency, and access affordable, healthy diets (Ogunniyi et al., 2020; Cassimon et al., 2023).

Empirical evidence and scholarly literature overwhelmingly support the view that stronger governance enables more resilient, inclusive, and effective food systems. In contrast, weak governance exacerbates food insecurity, undermines service delivery, and impedes progress towards key development goals such as the Sustainable Development Goals (SDGs), particularly SDG 2: Zero Hunger (Vilakazi & Hendriks, 2019; Vyas-Doorgapersad et al., 2023).

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One of the clearest patterns to emerge is the inverse relationship between government effectiveness and food insecurity (see Figure 1). Countries with low governance scores, such as Somalia and South Sudan, report the highest rates of moderate or severe food insecurity, often exceeding 80%. In contrast, in nations like Mauritius and South Africa, where governance is more robust, demonstrate significantly lower food insecurity rates (Mwangi et al., 2021). The correlation between government effectiveness and Minimum Dietary Diversity (MDD) in children is also strong. Countries with higher governance quality, such as Tunisia and South Africa, achieve better outcomes in child nutrition, reflected in higher MDD scores (Ogunniyi et al., 2018).

The figure below illustrates the relationship between governance effectiveness and food system outcomes in selected African countries. It shows that higher governance scores are associated with lower rates of food insecurity, greater affordability of healthy diets, and higher minimum dietary diversity in children.

The figure illustrates that the countries with higher governance indicators like Cabo Verde and Mauritius, have a smaller proportion of people unable to afford a healthy diet. This pattern suggests that governance improves food affordability through mechanisms such as infrastructure investment, efficient food procurement systems and targeted subsidies (Mwangi et al., 2021). It illustrates key relationships: higher government effectiveness is associated with lower moderate or severe food insecurity and a smaller percentage of the population unable to afford a healthy diet. Conversely, increased government effectiveness correlates with higher minimum dietary diversity in children, indicating better nutritional outcomes. These patterns underscore the foundational role of strong governance in achieving food security and improved nutrition across African nations.

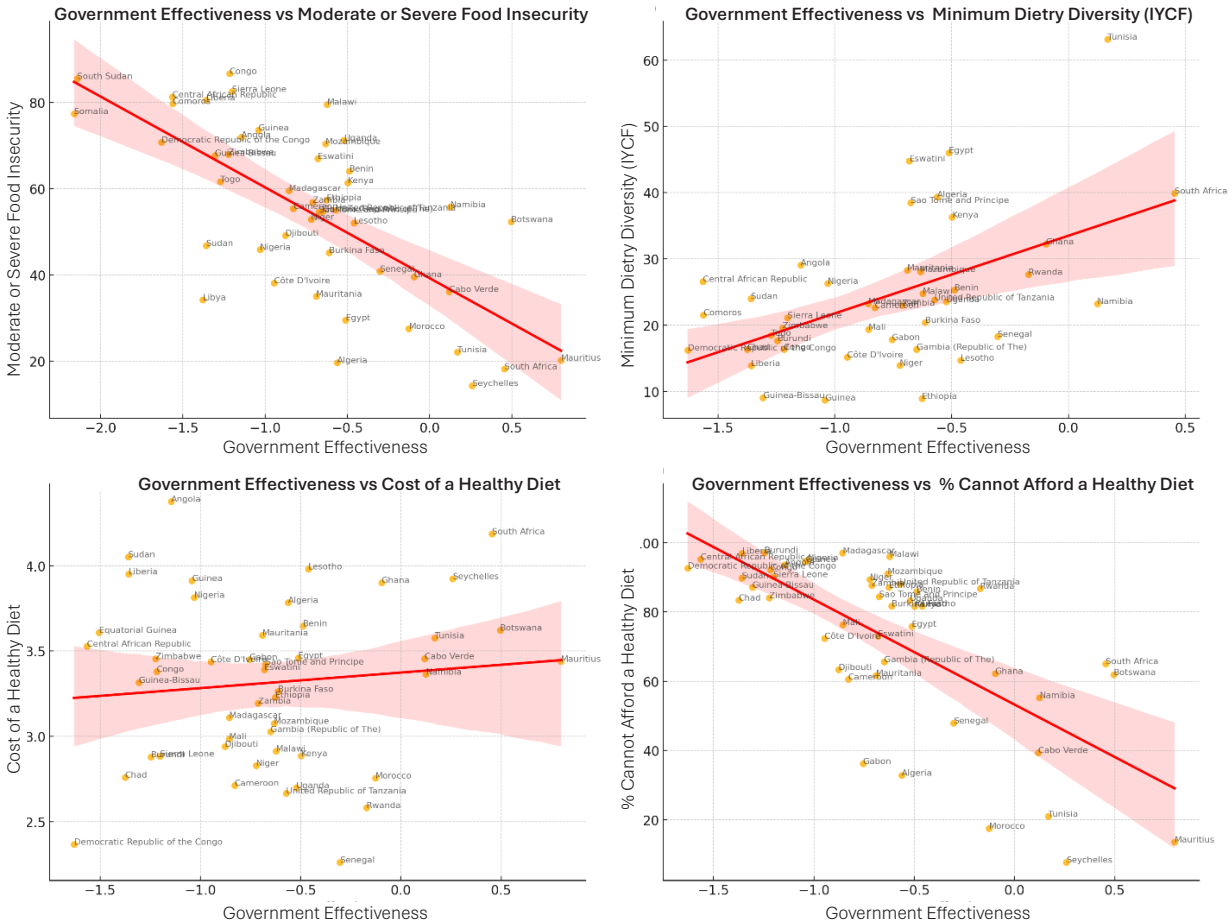


Figure 2.1: Governance and food systems outcomes. Adapted from Mwangi et al. (2021).

While the association between governance and food systems outcomes is clear, understanding how specific governance mechanisms such as regulatory enforcement, budget allocation processes, or cross-ministerial coordination translate into measurable change is critical for policy relevance. Governance also plays a critical enabling role at the local and regional levels. Smit (2018) presents cases of urban food governance in Kenya, Zambia and Zimbabwe, showing how local planning and policy shape urban food distribution, safety and access. In South Africa, proactive local governance in supporting agroecological practices has led to better nutrition, ecological resilience, and local economic gains.

As African countries work toward achieving SDG 2 on Zero Hunger, strengthening governance must be treated as a foundational element of food systems transformation.- Investments in public institutions, local accountability, and cross-sector policy coherence should be central to continental strategies for enhancing food and nutrition security (Cassimon et al., 2023; Vyas-Doorgapersad et al., 2023).

Despite notable progress in policy design over the past two decades, the current policy environment remains fragmented and unevenly implemented, limiting its capacity to drive transformative change across production, processing, and consumption. This section examines the evolution and status of food systems policies in Africa, with reference to the CAADP framework, recent empirical evidence, and the policy landscape as captured in the 2025 Global Food Policy Report (Ulimwengu et al., 2025).

The trajectory of agrifood policy in Africa reflects a history of cyclical reform. In the post-independence period, state-led industrialization overshadowed agricultural development, while market controls stifled smallholder innovation and efficiency. Structural Adjustment Programs (SAPs) in the 1980s and 1990s liberalized markets but dismantled institutional support

Table 1: Evolution of agrifood policies in Africa.

Period	Policy phase	Focus and characteristics	Key outcomes and gaps
1960s–1970s	Post-independence state-led models	Government-controlled pricing, input subsidies, parastatals, focus on industrialization over agriculture.	Agricultural productivity stagnated; Smallholders marginalized.
1980s–1990s	Structural Adjustment Programs (SAPs)	Liberalization, m-arket deregulation, removal of subsidies, privatization.	Stabilized macroeconomics but dismantled institutional support systems and exposed farmers to market volatility
2003	CAADP launch	Introduction of coordinated and evidence-based agriculture policy under AU leadership.	Provided continental framework but uneven uptake.
2003	Maputo Declaration	Target of 10% public expenditure in agriculture and 6% annual growth.	Most countries failed to meet expenditure and growth targets.
2014	Malabo Declaration	Expanded focus to include resilience, inclusivity, nutrition, and trade integration.	Broader ambition but limited in implementation and accountability.
2023	Kampala Declaration	Reinforces governance, policy coher-ence, and mutual accountability as cross-cutting pillars.	Emphasizes subnational implementation and leadership reform.
2026 – 2035	CAADP Strategy	Operationalizes Kampala Declaration through six strategic objectives and integrated governance framework.	Opportunity to reset food systems governance with strong institutional alignment and measurable impact.

Source: Authors

for farmers, exposing rural producers to volatility and marginalization (Badiane & Makombe, 2014). While these reforms restored macroeconomic stability in some countries, they failed to stimulate inclusive agrifood transformation due to weak markets and limited infrastructure (Kherallah et al., 2000; Taube, 1993). It was in this context that the African Union launched the Comprehensive Africa Agriculture Development Programme (CAADP) in 2003, a major shift towards coordinated, evidence-based agricultural policy. The table below highlights the evolution of agrifood policies in Africa, spotlighting the key outcomes and gaps.

Since its launch, CAADP has evolved into a continental policy platform that links national investment plans with regional priorities. The 2003 Maputo Declaration established initial targets for agricultural spending (10% of public budgets) and growth (6% annually), while the 2014 Malabo Declaration expanded the agenda to include climate resilience, trade integration, nutrition, and inclusivity. Despite these ambitions, most African countries have failed to meet the core Maputo and Malabo targets. According to the Fourth CAADP Biennial Review Report (AUC, 2024), while countries such as Rwanda, Uganda and Morocco made progress in areas like policy coordination and evidence use, no country met all CAADP goals across all commitment areas. The persistent gap between policy ambition and implementation underscores a central finding of this chapter: that technical frameworks alone are insufficient without robust governance structures that ensure continuity, coherence, and accountability. As this chapter argues, improving agrifood outcomes now requires a governance shift, from policy proliferation to institutional performance.

Several factors explain the implementation gap. Foremost, policy fragmentation across ministries and sectors creates misaligned incentives. Ministries of agriculture often operate in isolation from those responsible for health, environment, education, or trade. This results in contradictory policies, for example, input subsidies that encourage monocropping, alongside public health campaigns that promote dietary diversity. Another example is when trade policies designed to boost agricultural exports lead to increased imports of less nutritious foods undermining national health initiatives. Institutional incoherence is thus a core obstacle to achieving food systems transformation, as it weakens the capacity to design integrated interventions across production, processing, and consumption (Ulimwengu et al., 2025).

Secondly, many food policies lack mechanisms for adaptive learning and feedback. Although CAADP's Biennial Review introduced a performance-monitoring system with scorecards and indicators, most countries still face challenges in generating high-quality data, conducting policy evaluations, or adjusting policies based on outcomes. To enh ance adaptive learning, mechanisms such as regular stakeholder dialogues, real-time data dashboards, and pilot programs designed for iterative feedback could be more widely adopted. The lack of policy responsiveness to changing conditions, such as market volatility, climate shocks, or emerging health challenges, limits the ability of signals (e.g. subsidies or regulations) to produce sustained behavioral change (Huet et al., 2018).

Thirdly, policy effectiveness is often constrained by limited institutional capacity and accountability. The Kampala Declaration and the CAADP 2026 – 2035 Strategy acknowledges these constraints by emphasizing governance reform, local capacity-building, and mutual accountability mechanisms. They also call for National Agrifood Systems Investment Plans (NAIPs) that are better aligned with regional trade protocols, environmental goals, and gender-inclusive policies. However, the success of these instruments depends on sustained political will, decentralized resource allocation, and participatory policymaking, which remains weak in many countries (Manlosa et al., 2022). This weakness often stems from factors such as insufficient funding for public institutions, a lack of adequately skilled personnel, and political interference that can undermine bureaucratic effectiveness and accountability.

Despite these structural challenges, there are emerging policy innovations. For example, countries like Ethiopia and Nigeria have piloted nutrition-sensitive agricultural policies that link food production with health goals through support for indigenous, nutrient-rich crops (Friesen et al., 2024). South Africa's fiscal policy, particularly its tax on sugar-sweetened beverages, demonstrates how fiscal instruments can shift consumption patterns in the interest of public health (Vermeulen et al., 2020). Kenya and Ghana have adopted digital platforms to extend market

information and input services to smallholders, illustrating the potential of digital governance tools to overcome logistical bottlenecks and improve targeting (Murgatroyd et al., 2025).

INSIGHT

Governance and policy in practice: lessons from country cases

- **High governance quality improves food outcomes:** Countries with effective institutions (e.g., Mauritius, South Africa, Tunisia) consistently report better child nutrition, greater affordability of healthy diets, and lower levels of food insecurity.
- **Local governance strengthens implementation:** Urban governance initiatives in Kenya, Zambia, and Zimbabwe show that subnational planning influences food safety, access, and resilience.
- **Innovative policy instruments yield measurable impact:** Ethiopia and Nigeria's nutrition-sensitive agriculture programs, and South Africa's fiscal tools (e.g., sugar tax), demonstrate how well-aligned policies can link agriculture to public health.
- **Digital tools expand access and accountability:** Kenya and Ghana's use of mobile platforms to deliver inputs and market information exemplifies the role of data systems in improving service delivery and inclusion.
- The enabling factor is not just policy design, but governance effectiveness: Successful examples combine clear mandates, institutional capacity, and responsive leadership across sectors.

Environmental sustainability is also gaining policy traction. The new CAADP Strategy integrates climate-smart agriculture (CSA), soil health, and water resource management. Yet, as Zurek et al. (2022) caution, many CSA policies remain vague or underfunded. There is a need for clearer operational plans, performance indicators, and financing mechanisms, especially climate finance and insurance products tailored to smallholders (Partey et al., 2018).

Trade policy, another critical enabler of food systems transformation, remains underutilized. The African Continental Free Trade Area (AfCFTA) holds potential to reduce import dependency, enhance regional food self-reliance, and boost the intra-African trade of agricultural goods. However, the actual impact of AfCFTA depends on harmonizing sanitary and phytosanitary standards, reducing non-tariff barriers, and upgrading cross-border infrastructure, all of which require coordinated regional investment strategies (AfDB, 2017).

In conclusion, while Africa's food systems policy landscape has matured in both ambition and scope, implementation remains uneven and reactive. The new CAADP Strategy and Kampala Declaration provide a comprehensive framework for integrated, inclusive, and resilient agrifood systems, but their effectiveness will depend on the political and institutional will to turn policy into practice. Achieving transformation requires not just more policies, but better ones, grounded in evidence, coherent across sectors, and responsive to behavioral and structural realities. The coming decade presents a critical opportunity to embed these principles into national strategies and deliver food systems that work for all.

The time for piecemeal reform has passed. Africa's agrifood transformation must be bold, inclusive, and evidence driven. The CAADP Strategy (2026 – 2035), supported by the Kampala Declaration, provides a continental mandate to do just that. With the right policy tools and institutional leadership, Africa can transform its agrifood systems into engines of health, climate resilience, and economic empowerment.

Deepening policy coherence and governance in CAADP (2026–2035)

The CAADP Strategy and Action Plan 2026 – 2035 marks a critical turning point in recognizing governance not as a peripheral concern, but as the fulcrum of effective agrifood systems transformation. It is both a cross-cutting condition that shapes systemic behavior and an operational enabler that determines the effectiveness of policies and reforms. The strategy anchors governance and policy coherence as cross-cutting pillars that must underpin sectoral transformation by drawing lessons from the uneven implementation of past frameworks, most notably the Maputo and Malabo Declarations. The Kampala Declaration is central to this evolution as it calls for an integrated governance architecture that aligns policies across sectors, strengthens institutional

capacity, and promotes mutual accountability at every level.

Empirical evidence substantiates the link between governance quality and food systems outcomes in Africa. Countries scoring low on governance effectiveness, such as South Sudan and Somalia, face alarming levels of food insecurity and child malnutrition, while countries like Mauritius and South Africa, where policy execution and institutional capacity are more robust, report significantly better dietary outcomes and resilience to shocks. These disparities underscore the reality that poor governance is not merely a correlating factor but a systemic bottleneck that distorts incentives, weakens coordination, and undermines trust.

The CAADP 2026 – 2035 framework articulates three mutually reinforcing governance pillars:

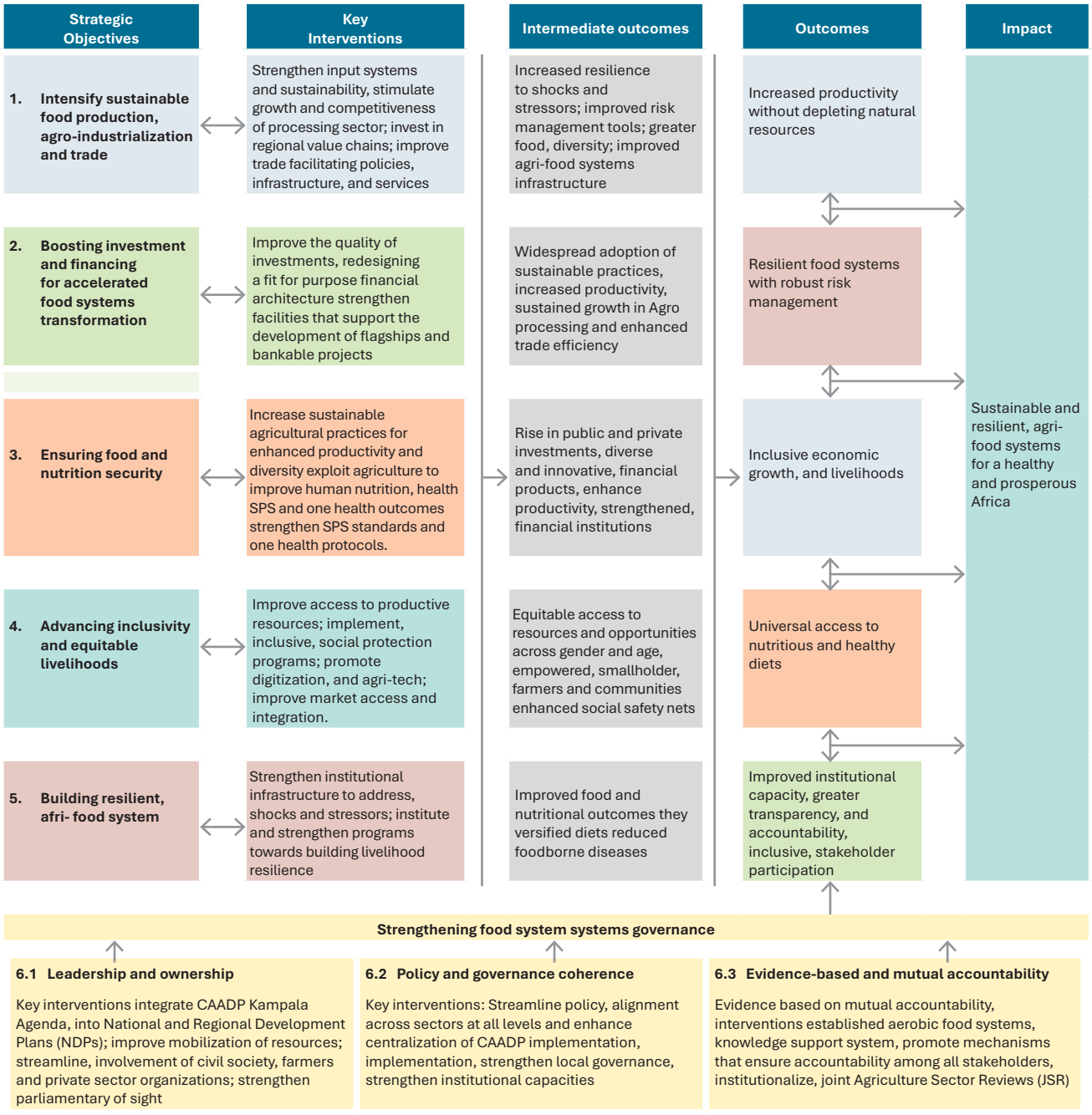
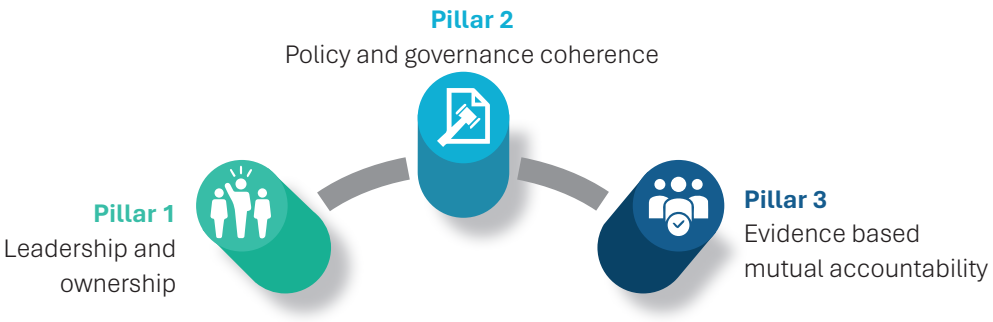


Figure 2.2: CAADP Kampala Declaration pathways to agrifood systems transformation. Source: AU (2025).



Pillar 1: Leadership and ownership: National leadership is to be demonstrated through the domestication of the Kampala Declaration into National Development Plans (NDPs), with particular emphasis on streamlining institutional mandates and aligning public expenditures with transformation priorities. Ministries of agriculture, finance, trade, and planning are expected to work in unison, while civil society and private sector actors, especially youth and women-led enterprises, must be actively engaged in shaping and implementing reform agendas. Importantly, the strategy advocates for devolving power to subnational institutions, recognizing the need to build local capacity and accountability in service delivery.

Pillar 2: Policy and governance coherence: Coherence directly addresses policy fragmentation across ministries and development partners. Agriculture, health, trade, and environment policies often operate in silos, creating contradictory interventions as per previous example on monocropping. The strategy calls for horizontal and vertical policy alignment, including through integrated Agrifood System Investment Plans (AFSIPs) and the harmonization of SPS and trade regulations under AfCFTA.

Pillar 3: Evidence based mutual accountability: To institutionalize accountability, the strategy builds on the Biennial Review mechanism and calls for stronger data systems, performance monitoring frameworks, and open access platforms that enable civil society and stakeholders to track government progress. Digital tools, such as dashboards and mobile apps, are encouraged to enhance transparency and feedback loops. These governance pillars are operationalized through strategic objectives, each linked to policy priorities and reform instruments, as summarized in Table 2.

To achieve these ambitious goals, African nations must strategically deploy a combination of economic, regulatory, and informational policy instruments. These instruments, as discussed in the following section, are crucial levers for influencing behaviors, allocating resources, and shaping systemic outcomes across the agrifood value chain. The strategy outlines a governance roadmap that spans land tenure legislation, food safety regulation, climate adaptation financing, and diaspora bonds. Its success, however, hinges on mitigating policy volatility, strengthening bureaucratic autonomy, and building trust through fiscal transparency and inclusive participation. As the strategy acknowledges, Africa's transformation will not be driven by more policies, but by better governance: integrated, responsive, and rooted in evidence.

These strategic objectives and governance priorities highlight that effective policy implementation depends not only on design but also on the instruments used to realize them. Whether the goal is to promote sustainable food production, enhance nutrition security, or build institutional accountability, governments must deploy the right combination of economic, regulatory, and informational tools.

These instruments serve as the operational levers that translate high-level strategies into tangible action. For example, reforms in input systems and climate-smart agriculture require targeted subsidies and incentives (economic), clear land and environmental regulations (regulatory), and dissemination of best practices through extension services (informational). Likewise, efforts to strengthen agrifood governance must be underpinned by data transparency laws and digital platforms that support accountability.

Table 2.2: Levers for systemic change: How policy tools shape agrifood systems.

Strategic objective	Intervention areas	Outcomes	Policy and governance priorities
1. Intensifying sustainable food production, agro-industrialization, and trade	Strengthening input systems; Promoting sustainable practices; Enabling technologies; Supporting SMEs; Enhancing trade policies	Increased food production; Reduced post-harvest losses; Expanded intra-African trade; Growth in SMEs	Reform input regulations; Promote regional trade policies; Institutionalize SME support; Enact tech-friendly frameworks
2. Boosting investment and financing for accelerated agrifood systems transformation	Improving investment quality; Increasing public expenditure; Developing flagship projects; Enhancing financing access	Greater volume and quality of investment; Improved access to finance; Strengthened private-public partnerships	Legislate agricultural investment quotas; Streamline public-private investment regulations; Institutionalize diaspora bonds
3. Ensuring food and nutrition security	Enhancing nutrition-sensitive production; Strengthening SPS standards; Expanding social protection	Improved dietary diversity; Reduced malnutrition; Safer food systems; Stronger SPS compliance	Institutionalize food safety authorities; Integrate nutrition in agriculture policy; Regulate food environments
4. Advancing inclusivity and equitable livelihoods	Improving rural infrastructure; Facilitating access to land and finance; Promoting inclusive policies and decent work	Reduced poverty and yield gaps; More women and youth in value chains; Expanded social safety nets	Mandate land rights reforms; Integrate gender/youth budgeting; Institutionalize rural social protection schemes
5. Building resilient agrifood systems	Enhancing risk preparedness; Promoting climate-smart agriculture; Strengthening local institutions	Improved shock resilience; Stronger local capacity; Climate mitigation and adaptation adoption	Mandate local resilience plans; Enforce climate-smart agriculture incentives; Strengthen subnational governance
6. Strengthening agrifood systems governance	Fostering evidence-based policymaking; Enhancing mutual accountability; Building coordination platforms	Improved policy coherence; Enhanced stakeholder trust; Transparent governance and M&E	Institutionalize BR process; Enact data transparency laws; Establish inter-ministerial coordination bodies

Source: Authors

The next section 3 delves into these three categories of policy instruments in detail, illustrating how each can be strategically applied, individually and in combination, to realize the goals set forth in the CAADP 2026–2035 Strategy.

Policy and governance as engines for food systems transformation

Governance is not merely a background condition, it actively enables the design, execution, and effectiveness of policy instruments. Whether through transparent budgeting, performance monitoring, or rule enforcement, governance determines how economic, regulatory, and informational tools function in practice. For example, subsidies require accountable financial systems, land

laws demand enforceable regulations, and advisory services depend on open data infrastructure. Without capable institutions and coordination mechanisms, even well-designed policies fail to deliver their intended outcomes. Governance quality therefore underpins both the credibility and effectiveness of instruments used to transform agrifood systems.

Economic, regulatory, and informational policy instruments

Policy instruments must be evaluated not only for their technical design but also for their institutional and political viability. Many tools, such as input subsidies, regulatory reforms, or behavioral nudges, depend on the underlying governance environment for their effectiveness. Trade-offs between affordability, sustainability, and fiscal feasibility must be anticipated and addressed.

Achieving agrifood systems transformation goals, including enhanced productivity, nutrition, environmental responsibility, and intra-African trade, will require an integrated policy architecture that combines economic, regulatory, and informational tools. These instruments are not standalone solutions but interdependent levers that influence behaviors, allocate resources, and shape systemic outcomes. When aligned with national contexts and adaptive governance mechanisms, they can unlock significant transformation across the food systems value chain.

Economic instruments: These instruments have long been central to agricultural policy in Africa. Subsidies for inputs such as fertilizer and seed have been used extensively to raise productivity among smallholder farmers. While these interventions can provide short-term gains, they are often fiscally unsustainable and may distort markets if poorly targeted. Many input subsidy programs have lacked transparency and failed to reach the most vulnerable producers (Ulimwengu et al., 2025). A more transformative approach, aligned with CAADP's vision, is to reconfigure these subsidies to support climate-smart agriculture (CSA) practices, regenerative farming, and diversification. For example, Malawi's Farm Input Subsidy Program (FISP) has gradually shifted from maize-dominant support to include legumes, which both enhance soil fertility and improve nutrition outcomes.

Equally important are market-based incentives such as carbon pricing, payments for ecosystem services, and agricultural risk insurance. These tools can steer farmers towards more sustainable practices by reducing exposure to climate risks and creating financial value for environmental services. Partey et al. (2018) highlight the potential of index-based weather insurance in West Africa to mitigate drought-related losses, enabling smallholders to adopt innovative practices with reduced risk. Similarly, public procurement schemes, especially those linking local producers to institutional buyers such as schools or hospitals, can stimulate demand for diverse, nutritious, and locally sourced food, thereby aligning economic incentives with health and sustainability objectives (Friesen et al., 2024).

Regulatory instruments: These are equally crucial in shaping food system transformation. These policies establish the legal and institutional frameworks for land tenure, environmental protection, food safety, and trade. Secure land rights are foundational for long-term investment in land restoration and CSA. Yet land governance remains weak in many African countries, often excluding women and marginalized communities from formal ownership.

Strengthening and enforcing land tenure laws can enhance both equity and productivity, aligning with CAADP's goals of inclusive rural development and resource sustainability (Manlosa et al., 2022). The effectiveness of these regulations is directly tied to the quality of government effectiveness and accountability, as robust institutions are necessary for consistent enforcement and for building trust among stakeholders regarding land security.

Environmental regulations that limit deforestation, protect water sources, or require soil conservation practices can prevent resource degradation while encouraging agroecological intensification. Enforcement however remains a challenge. Zurek et al.

> ***"A successful intervention might include a drought-tolerant seed subsidy (economic), secure land title (regulatory), and digital advisory support (informational). When combined, these instruments reinforce each other to enable adoption and reduce risk."***

(2022) warn that regulatory frameworks often exist only on paper, lacking the institutional capacity or political backing to be implemented effectively. One solution lies in devolving regulatory authority to local institutions and strengthening community-based natural resource management.

Food safety and phytosanitary regulations are also critical, especially in the context of AfCFTA**.** Harmonized standards can reduce trade barriers and enhance regional value chain integration, while weak regulatory systems increase the risk of unsafe food and export rejection. Regional institutions such as the African Organization for Standardization (ARSO) and the African Union's Inter-African Bureau for Animal Resources (AU-IBAR) are playing an increasing role in developing continent-wide guidelines for food safety and animal health, but capacity remains uneven across countries (Ulimwengu et al., 2025).

Informational policy instruments: These focus on shaping behavior through transparency, awareness, and knowledge dissemination. These include public campaigns, nutritional labeling, mobile advisory services, and open data platforms. Such tools are vital for influencing dietary choices, farming decisions, and investment behaviors. Vermeulen et al. (2020) argue that behavioral nudges, such as front-of-pack labeling or sustainability certification, can meaningfully shift consumer demand toward healthier, lower-emission foods when combined with affordability measures.

In agricultural extension, digital platforms like Esoko (Ghana) and M-Farm (Kenya) are transforming how farmers access market information, weather forecasts, and agronomic advice. These services not only improve productivity but also democratize access to knowledge, particularly for women and youth. Camaréna (2020) emphasizes the potential of Artificial Intelligence (AI) and digital dashboards to personalize information flows and generate real-time feedback loops for policymakers. For instance, if real-time data shows low adoption of drought-resistant seeds in a region facing rainfall deficits, advisory campaigns and targeted subsidies can be recalibrated accordingly.

Integration and interaction of tools: The synergy of economic, regulatory, and informational instruments becomes particularly powerful when they are aligned across the value chain. A subsidy for drought-tolerant seeds (economic) is more effective if farmers also have secure land (regulatory) and access to guidance on how to use the seeds (informational). Conversely, misaligned signals, such as promoting water-intensive crops in drought-prone areas without insurance or training, can exacerbate vulnerability. Therefore, the integration of these policy levers is essential for delivering the systemic change envisioned by CAADP.

The effectiveness of policy instruments in transforming Africa's food systems depends not only on their design but also on how they interact with institutional capacity, social norms, and environmental realities. As the CAADP Strategy 2026 – 2035 moves into

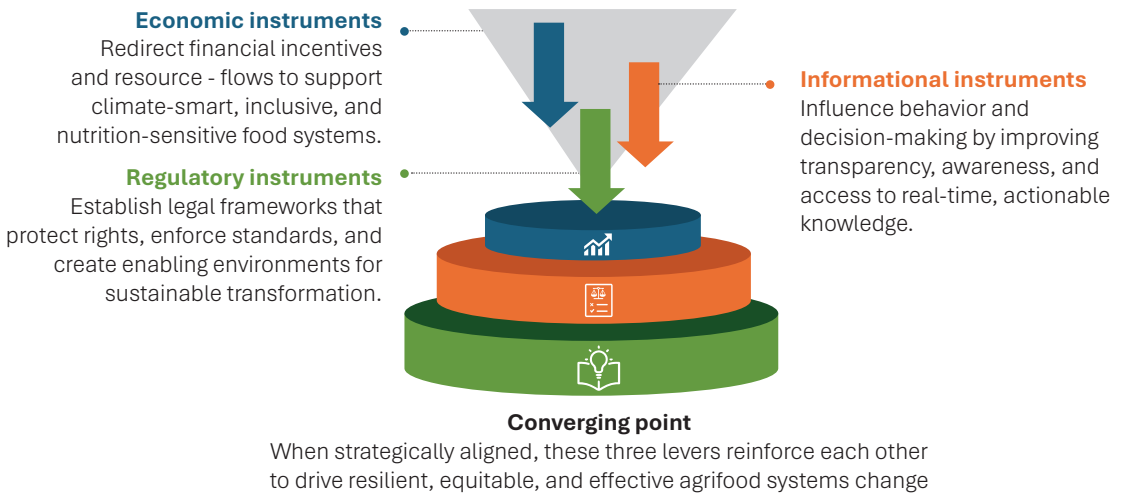


Figure 2.3: Levers for systemic change: How policy tools shape agrifood systems. Source: Authors

implementation, African governments must prioritize the strategic alignment of economic, regulatory, and informational tools. Only then can food systems be reshaped to deliver inclusive prosperity, nutritional security, and climate resilience.

Governance innovations for agrifood systems transformation[5]

This section focuses on how governance innovations, particularly those related to effectiveness and accountability, can enhance policy delivery and systemic reform. Governance lies at the heart of sustainable development, influencing institutional functioning, policy implementation, and citizen–state relations. Two core dimensions of governance that is, government effectiveness and accountability, are particularly crucial for evaluating public trust and institutional performance. The comparative data (Figure 4) between Africa and global trends from 2000 to 2021 provide a valuable window into understanding both progress and persistent challenges facing African nations. These trends have direct implications for agrifood systems reform in Africa, particularly in areas of public investment, transparency, and implementation capacity.

Africa's agrifood transformation is closely linked to its governance landscape, particularly government effectiveness and accountability. Between the early 2000s and 2021, Africa's government effectiveness index declined from -0.65 to nearly -0.80, highlighting persistent challenges in public service delivery, bureaucratic competence, and policy credibility. These deficits erode trust and deter investment. Globally, effectiveness remained around -0.05, emphasizing Africa's comparative governance gap.

Accountability followed a similar pattern. While it improved between 2000 and 2012, rising from 0.27 to 0.46, it declined to 0.36 by 2021, driven by shrinking civic space and political repression. This democratic erosion has had significant consequences for policy stability and institutional resilience.

Governance challenges undermine agrifood system reforms. Short-term political interests often drive subsidies rather than long-term investments like agricultural research (Mogues, 2015; Resnick & Swinnen, 2023). Policy volatility, triggered by elections or reshuffles, deters private and public sector confidence (Fails & Matthew, 2014). Resistance to fiscal reform, shaped by loss aversion and distrust, underscores the need for transparency (Kahneman & Tversky, 1979; Wehner & de Renzio, 2013). Moreover, politicized bureaucracies continue to impede transformative change and poor implementation capacity demands meritocratic hiring, training, and accountability mechanisms (Bersch & Fukuyama, 2023).

Effective governance, particularly in the form of strong government effectiveness and accountability, is the foundation upon which successful policy implementation rests. The deployment of economic, regulatory, and informational instruments depends not merely on policy design, but on the institutional capacity, coordination, and trust that good governance enables.

5 Drafted partially by Danielle Resnick for the CAADP Technical Working Group on Post-Malabo Theory of Change

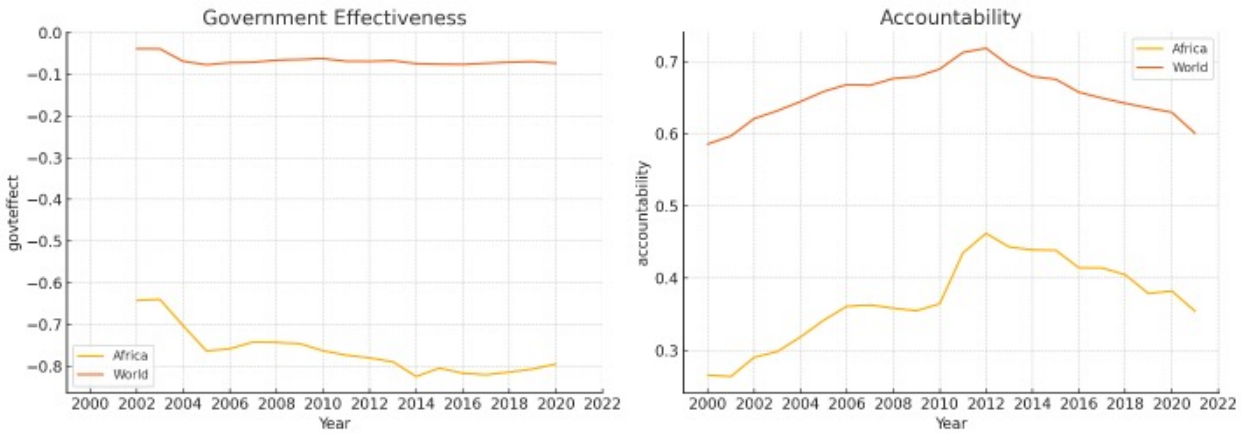


Figure 2.4: Trends in government effectiveness and accountability in Africa and globally (2000–2021). Source: Authors, adapted from foodcountdown.org

INSIGHT

Governance gaps that constrain agrifood reform:

- Policy volatility due to political cycles
- Weak data and monitoring systems
- Limited bureaucratic capacity
- Low fiscal transparency
- Shrinking civic engagement space

For instance, economic instruments such as input subsidies, climate finance, or public procurement schemes require transparent targeting, budget integrity, and efficient service delivery, functions that only capable and accountable institutions can reliably perform. Without well-managed public administration and clear financial oversight, such programs often become inefficient, regressive, or even corrupted.

Similarly, the success of regulatory instruments, from land tenure reforms to food safety standards, relies heavily on the rule of law, predictable enforcement mechanisms, and bureaucratic autonomy. Weak governance leads to laws that are poorly enforced or inconsistently applied, undermining both investor confidence and citizen compliance.

Informational instruments, such as advisory services, labeling policies, and digital dashboards, also demand governance systems that support open data access, technical literacy, and responsive feedback loops. Accountability ensures that information flows are not only accurate but trusted, fostering behavior change and participatory governance.

Sectoral policy coherence

Effective agrifood systems transformation requires more than sector-specific reforms. The interconnected nature of food, health, environment, trade, finance, and education policies means that outcomes in one domain often depend on actions in others. This section explores how sectoral policy coherence enables integrated and mutually reinforcing strategies that address systemic risks and unlock resilience across the agrifood value chain.

Figure 5 visualizes agrifood systems as a highly interconnected network of variables spanning health, environment, governance, production, and economic

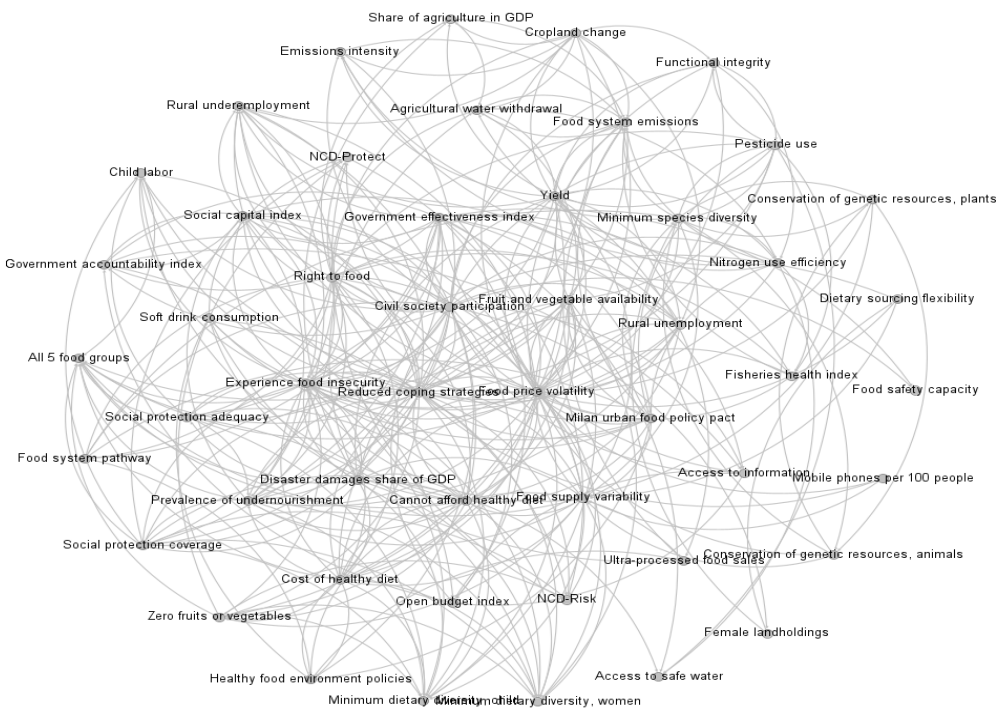


Figure 2.5: Networked variables in African agrifood systems, illustrating governance, nutrition, environmental, and economic interlinkages. Source: Authors, based on foodcountdown.org

access. To assist interpretation, several key nodes act as hubs of interdependence and deserve focused attention. For example, the "Government effectiveness index" and "Government accountability index" are central connectors, linked to outcomes such as food price volatility, social protection coverage, disaster response capacity, and agricultural productivity. This underscores how governance quality shapes system-wide resilience.

Likewise, "Minimum dietary diversity" and "Fruit and vegetable availability" form a tightly connected nutrition-health sub-network, linked to variables like "cost of healthy diet," "soft drink consumption," and "NCD risk." This highlights the intertwined nature of dietary adequacy, affordability, and public health. On the environmental axis, nodes such as "Cropland change," "Food system emissions," and "Nitrogen use efficiency" reveal feedback loops between agricultural intensification, ecological impact, and sustainability.

Together, these clusters illustrate that effective food systems transformation requires coordinated action across agriculture, health, environment, and social policy. Isolating interventions in one domain, without acknowledging their ripple effects, risks producing unintended trade-offs rather than synergistic outcomes.

At the core of this interconnectedness is the recognition that food systems are not linear but dynamic and systemic. Changes in one domain, such as health policy, ripple through to others, such as agricultural practices or environmental outcomes. For instance, dietary guidelines that promote fruit and vegetable intake can shift agricultural priorities toward crop diversification, thereby also enhancing ecosystem biodiversity. Similarly, policies targeting reduced undernutrition also affect food pricing, trade flows, and household income stability. Fanzo et al. (2020) assert that unless sectoral policies are integrated, food systems interventions risk producing trade-offs rather than synergies, such as improved yields at the expense of soil degradation or economic growth that fails to reduce malnutrition.

Food and health policies are deeply interlinked in the agrifood system. Poor diet is now the leading global risk factor for disease, and Africa faces the dual burden of undernutrition and rising Non-Communicable Diseases (NCDs). As Vermeulen et al. (2020) show, policies that promote healthy diets, such as taxes on sugar-sweetened beverages, subsidies for fruits and vegetables, and front-of-pack labeling, can shift consumer choices. These measures are more effective when aligned with agricultural policies that ensure availability and affordability of nutritious foods, especially for low-income households. Network variables like "soft drink consumption," "minimum dietary diversity," "fruit and vegetable availability," and "cost of healthy diet" reinforce the need for cross-sectoral integration between agriculture, health, and economic policy. Fanzo et al. (2020) caution that without such coherence, policies may generate trade-offs, such as improved yields at the cost of environmental degradation or affordability gains that worsen nutrition.

Environmental sustainability remains an urgent dimension of agrifood systems reform. Agriculture's ecological footprint is reflected in network nodes such as "pesticide use," "emissions intensity," "cropland change," and "functional integrity." The CAADP Strategy 2026 – 2035 prioritizes regenerative and climate-smart practices to reduce this footprint. Zurek et al. (2022) emphasize that environmental goals must be embedded directly into agrifood strategies rather than treated as externalities. Yet environmental regulations that fail to consider farmer incentives, enforcement capacity, or market access may hinder rather than help. Policymakers should link climate adaptation subsidies to sustainable land use practices, ensuring ecosystem protection goes hand in hand with productivity improvements.

Trade and regional integration are critical to unlocking food systems potential. Intra-African food trade remains constrained by non-tariff barriers and poor infrastructure. Network variables such as "food price volatility," "access to information," and "disaster damages share of GDP" highlight systemic vulnerability and uneven market access. AfCFTA aims to reduce friction and harmonize food safety and phytosanitary standards, creating opportunities for regional value chains. Ulimwengu et al. (2025) emphasizes the need to align trade policy with public health and sustainability goals, ensuring that tariffs and logistics frameworks incentivize the flow of diverse, nutritious, and low-emission foods rather than ultra-processed or carbon-intensive products.

Education and food literacy underpin behavioral and institutional transformation. Although often underprioritized, education plays a foundational role in shaping dietary choices, agricultural practices, and civic participation. Network elements such as "food literacy," "women's dietary diversity," and "access to mobile phones" underscore how knowledge systems influence outcomes, particularly among women and youth. Integrating food systems education into school curricula, vocational training, and agricultural extension services can empower individuals and communities to make informed, sustainable choices. Manlosa et al. (2022) note that education also builds civil society capacity for policy engagement and accountability, strengthening democratic oversight of agrifood governance.

Finance and investment serve as both enablers and bottlenecks. Limited public spending, weak credit ecosystems, and underdeveloped insurance markets constrain investment in infrastructure, climate adaptation, and social protection. The network's emphasis on nodes like "social protection coverage," "experience of food insecurity," and "cost of healthy diet" highlight the equity challenges. Innovative instruments, such as blended finance, agricultural risk insurance, and climate finance, offer potential solutions but require alignment with broader development goals and well-defined governance frameworks (Partey et al., 2018).

Governance and coordination mechanisms are essential for policy coherence. Experience from the multi-sectoral nutrition sphere shows that coordination may be housed in sector ministries, planning or finance bodies, or executive offices (Hill et al., 2011; Kepple and Segall-Corrêa, 2017; Michaud-Létourneau and Pelletier, 2017). Effective coordination requires clearly defined authority, joint financial structures, transparent disbursements, and regular information exchange (Bakvis and Juillet, 2004). When dedicated coordination bodies are created, they must be institutionally empowered and adequately funded for both operational and programming needs (Bach et al., 2020; Benson, 2007; Kennedy et al., 2015). Existing platforms often provide more sustainable options. In South Africa, the Intergovernmental Relations Act and the South African Local Government Association facilitate vertical policy alignment. In Kenya, the Intergovernmental Relations Act and the Council of Governors serve to synchronize national and county priorities, including through the five-year County Integrated Development Plans (CIDPs). Mayors' associations also play a growing role in aggregating urban food initiatives and aligning them with national strategies (HLPE-FSN, 2024).

Leadership for collaboration, innovation, and implementation: A pillar of agrifood governance

Leadership is a foundational pillar in advancing agrifood systems transformation. In contexts characterized by complex interdependencies, resource constraints, and competing policy priorities, effective leadership enables alignment, fosters innovation, and enhances implementation capacity. This section presents illustrative models of leadership that are facilitating collaboration across sectors and translating commitments into measurable progress.

Across Africa, leadership formation efforts are yielding promising results. Over the past four years, the AGRA-led Centre for African Leaders in Agriculture (CALA) has demonstrated that equipping individuals and institutions with collaborative and systems-oriented leadership capacities significantly enhances implementation outcomes. Through immersive programs and Action-oriented Learning Projects (ALPs), leaders, drawn from public, private and civil society organizations are contributing to tangible outcomes.

In Tanzania, CALA delegates helped reduce poultry mortality from 55% to 3%, while others in Nigeria and Ghana addressed soil degradation and improved export quality standards, aligning with national flagship goals (AGRA, 2024). Fellows from the African Food Fellowship, a program that targets food systems actors at all levels in Kenya and Rwanda are already driving impact on the ground. For example, in Kenya, one of the fellows has partnered with 158 youth and women to produce Black Soldier Fly larvae, generating additional income, reducing reliance on imported feeds, and contributing to waste management and environmental sustainability (African Food Fellowship, 2023).

The Presidential Enabling Business Environment Council (PEBEC) of Nigeria exhibits effective leadership by implementing reforms to improve the business environment, while promoting collaboration and inclusive stakeholder participation. Due to these reforms, Nigeria's Ease of Doing Business index improved by 34 places from 169 out of 192 countries in 2016 to 135 in 2020 resulting into the country emerging among the 10 improved countries in that year (DAI, 2024).

Table 2.3: Examples of leadership innovations for food systems transformation in Africa.

Initiative	Country	Focus Area	Key Result
Centre for African Leaders in Agriculture (CALA)	Ethiopia, Ghana, Kenya, Malawi, Nigeria, Rwanda, Tanzania, and Uganda	Collaborative leadership, agrifood implementation	Reduced poultry mortality from 55% to 3% in Tanzania; improved export quality and soil management in Nigeria and Ghana
African Food Fellowship	Kenya	Sustainable animal feed, youth and women inclusion	Partnered with 158 youth and women to produce Black Soldier Fly larvae, enhancing incomes and sustainability
Presidential Enabling Business Environment Council (PEBEC)	Nigeria	Business environment reform, institutional collaboration	Improved Ease of Doing Business ranking by 34 positions between 2016 and 2020
Food Systems Transformative Integrated Policy (FS-TIP) Policy Labs	Ghana	Nutrition, adaptive policy dialogue	Contributed to undernutrition reduction to 6.5%, below global average
CAADP Youth Network and AU Youth Champions Initiative	Continental	Youth leadership, cross-sector systems thinking	Cultivated a new generation of system-oriented leaders across public and non-state sectors

Source: Authors

In Ghana, the Policy Labs under the Food System Transformative Integrated Policy (FS-TIP) initiative piloted adaptive leadership that leveraged integrative dialogue among public, private, and other non-state actors in addressing systemic challenges such as nutritional disparities. Some of the tangible outcomes was the reduction in undernutrition to 6.5% (below the world average of 8.9%) (Rockefeller Foundation et al., 2021). At the continental level, the African Union's Youth Champions Initiative and the CAADP Youth Network are cultivating the next generation of system-thinking, cross-sector leaders (AU, 2023; CAADP Youth Network, 2023).

These leadership formations reveal key characteristics worth considering; They are supported by strong political leadership, multi-sectoral collaboration, and adaptive institutional strengthening. With public budgets and international aid resources under unprecedented pressure, coupled with confounding headwinds of climate change, pandemics, and geopolitical disruptions, scaling these leadership ecosystems will be a critical lever in the food systems transformation agenda.

Across these diverse cases, several common enablers emerge that underpin effective leadership in food systems transformation. Political support provides the mandate and continuity needed to pursue systemic reforms. Multi-sector coordination allows leaders to navigate institutional silos and align diverse stakeholders toward shared objectives. Experiential learning and adaptive management, as demonstrated in Action Learning Projects and policy labs, equip leaders with the flexibility to respond to dynamic challenges. Community engagement further grounds these initiatives in local realities, fostering trust, ownership, and sustainability of outcomes. These elements together form a leadership ecosystem that is capable of delivering tangible change within complex agrifood systems.

Beyond Malabo, it is imperative that leadership is positioned as a structural underpinning of agrifood governance through three pragmatic shifts:

1. Institutionalizing leadership development in National food systems Investment Plans (NAIPs), with dedicated financing and performance indicators.
2. Establishing tiered leadership pipelines, from youth to executive level, tailored to different implementation roles.
3 Investing in regional leadership ecosystems and communities of practice, promoting mentorship, knowledge exchange, and accountability.

In the next decade food systems leadership must be positioned as critical link that will drive cooperation, nurture innovation, and guarantee optimal implementation of the Kampala CAADP commitments. Without it, history of the Malabo decade may be repeated.

Strategic policy recommendations and practical pathways

Achieving agrifood systems transformation in Africa requires more than sectoral reforms. It depends on the strength of governance systems that coordinate institutions, harmonize policy goals, and enable inclusive participation. The CAADP Strategy and Action Plan (2026 – 2035) underscores governance as a foundational pillar for implementation. This section outlines five strategic policy recommendations that serve as practical pathways to institutionalize resilience, equity, and sustainability in Africa's food systems drawing from the preceding analysis.

First, institutional strengthening and capacity building must be prioritized. Effective governance begins with capable institutions. Investments are needed at all levels, national, subnational, and local, to enhance technical expertise, administrative efficiency, and the ability to implement and enforce policies consistently. This includes professionalizing the civil service, ensuring merit-based recruitment, and providing adequate remuneration to attract and retain skilled personnel. Robust public institutions form the bedrock of policy continuity and citizen trust.

Secondly, the strategy calls for radical policy coherence across sectors. Agriculture, health, trade, environment, and finance ministries often operate in silos, leading to fragmented and at times contradictory interventions. Establishing formal inter-ministerial coordination bodies and mandating integrated AFSIPs can help align sectoral goals and resource allocation. By harmonizing strategies and resolving cross-sector conflicts, such as subsidies that promote monocropping versus dietary diversity campaigns, governments can achieve more synergistic and effective outcomes.

A third pillar is the embedding of accountability and transparency mechanisms. Systems such as the Biennial Review (BR) and Joint Sector Reviews (JSRs) should be fully operationalized and backed by strong, open data infrastructure. Transparent performance monitoring builds public trust and enables informed civil society engagement. Fiscal transparency ensures that public resources are directed efficiently and equitably, and that policy promises are met with measurable results.

Equally vital is the need to invest systematically in leadership development. Transformative change requires visionary, capable, and accountable leaders across all levels of governance. NAIPs should incorporate structured leadership development

Table 2.4: Strategic policy recommendations for agrifood systems governance. Source: Authors

Policy pillar	Institutional strengthening and capacity building	Radical policy coherence	Accountability and transparency	Systematic leadership development	Adaptive governance and learning
Focus area	Public sector performance	Cross-sector integration	Monitoring and public trust	Governance and implementation	Policy responsiveness
Key actions	Professionalize civil service, ensure merit-based recruitment, invest in administrative capacity at national and subnational levels.	Establish formal coordination mechanisms, align AFSIPs, resolve sectoral contradictions (e.g., monocropping vs. dietary campaigns).	Operationalize Biennial Reviews and Joint Sector Reviews, build open data systems, enhance fiscal transparency.	Embed leadership pipelines in NAIPs, support regional ecosystems and peer-learning platforms.	Promote data-driven policy iteration, stakeholder feedback loops, and flexible instruments for emerging challenges.

Source: Authors

pipelines, from youth and emerging professionals to seasoned executives. Promoting regional leadership ecosystems, mentorship networks, and cross-country peer learning platforms will ensure that leadership becomes a scalable and institutionalized asset in food systems governance.

Finally, the strategy emphasizes the importance of enabling adaptive governance and learning. Given the unpredictable nature of global markets, climate volatility, and evolving health risks, policy frameworks must be designed to respond dynamically. Adaptive governance involves the use of real-time data, feedback loops from stakeholders, and agile policy instruments that can evolve through pilot programs, evaluation, and iteration. This approach fosters innovation, minimizes policy inertia, and ensures responsiveness to the lived realities of African food producers and consumers.

These strategic pillars are not isolated interventions but mutually reinforcing. Together, they form the backbone of a governance architecture that can anchor Africa's agrifood transformation. The agenda is no longer about increasing agricultural output alone, but about reshaping the institutions, leadership, and policy frameworks that define the future of food systems.

Conclusion

The transformation of Africa's agrifood systems hinges not only on what countries do in terms of policies , investments, and innovations but also on how effectively these actions are governed. As this chapter has emphasized, governance must no longer be viewed as a secondary or supportive element; It is the critical determinant of whether agrifood system transformation will succeed or falter. The Kampala Declaration signals a profound shift in this regard, elevating governance, especially leadership, policy coherence, and accountability, as central pillars of Africa's transformation agenda.

Three foundational governance shifts stand out in this evolving landscape. First is the imperative of leadership and ownership. Effective transformation requires more than compliance with continental frameworks; It demands their meaningful integration into national strategies and budgetary processes. This form of leadership must extend beyond high-level political commitments to include institutional leadership across ministries, subnational governments, and civil society actors. Ownership should be broad-based, empowering local authorities, youth, women, and producer organizations to shape and deliver transformation from the ground up.

Second is the need for coherence, both horizontal and vertical. Many African countries continue to grapple with policy fragmentation. A coherent policy environment requires deliberate institutional coordination across agriculture, health, education, trade, finance, and environment sectors. It also demands alignment between national objectives and subnational implementation, particularly as decentralization becomes more entrenched in governance structures.

Third is the institutionalization of mutual accountability. Monitoring mechanisms such as the CAADP Biennial Review (BR) have laid the foundation for results-based governance, but these need to be embedded into national M&E systems. Accountability must be transparent, data-driven, and participatory. It should not only measure outputs but enable learning, adjustment, and citizen oversight. Digital platforms and open data systems have a key role to play in making policy performance visible and actionable.

Looking ahead, the chapter proposes six governance priorities to anchor Africa's agrifood transformation over the coming decade:

i. It is essential to define governance more precisely within the agrifood systems context. Disaggregating governance into key actionable dimensions, such as institutional coordination, rule of law in land tenure, regulatory enforcement, and budget transparency, allows for targeted reform efforts and clearer attribution of impact.

ii. Leadership must be institutionalized through structured development programs embedded within national agrifood investment plans, supported by stable financing and metrics for performance. These programs should build cross-sector leadership capacity and cultivate inclusive pipelines for youth and women leaders.

iii. Institutional arrangements that enable multisectoral coordination need to be strengthened. Experiences across the continent suggest that inter-ministerial councils, planning

ministry leadership, and formalized joint budget structures can enhance coherence when backed by political support and adequate resourcing.

iv. The credibility of governance depends heavily on transparency, particularly in fiscal and budgetary processes. Governments must demonstrate how funds are allocated and used, and how reform dividends are reinvested to benefit citizens. Public trust is built not through promises but through verifiable action.

v. There is a pressing need to devolve functional responsibilities to subnational entities while equipping them with the resources and technical capacity required for effective implementation. Agrifood systems are inherently local in their effects, and localized governance is essential to achieving inclusive and equitable outcomes.

vi. Accountability mechanisms must be both institutionalized and modernized. The integration of the Biennial Review into national systems, along with real-time dashboards and feedback loops, can shift governance from retrospective reporting to proactive management.

While this chapter has focused on actionable policy and governance mechanisms, it acknowledges the deeper structural and political economy constraints that often mediate reform outcomes. Issues such as elite capture, rent-seeking behavior, and short-term political incentives cannot be overlooked. The chapter however deliberately confines itself to institutional and policy-level levers that are within reach of current planning and investment processes. These are not silver bullets, but they represent a pragmatic and evidence-based foundation upon which countries can build.

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3 Drivers of sustainable farming and resilience in Africa

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KEY MESSAGES

1. **Sustainable intensification is central to Africa's agricultural future**
   Shifting from land expansion to productivity gains through climate-smart agriculture, regenerative methods, and integrated soil fertility management is critical for long-term food security and resilience.
2. **Digital and data-driven solutions can accelerate transformation**
   Tools such as AI-enabled platforms, mobile advisories, and data-driven digital climate advisories expand access to timely, relevant and localized information, but scaling requires addressing digital access and gender divides.
3. **Nature-based innovations offer multiple co-benefits**
   Practices like agroforestry, farmer-managed natural regeneration, and push–pull technology restore ecosystems, improve yields, and strengthen resilience to climate shocks.
4. **Pluralistic extension systems increase reach and relevance**
   Multi-actor approaches that combine public, private, and community actors can deliver context-specific knowledge and advisories and foster peer-to-peer learning.
5. **Seed systems and input delivery remain a critical bottleneck**
   Timely access to high-quality, climate-resilient seeds and balanced organic and inorganic fertilizer inputs requires coordinated investment, improved regulatory frameworks, and stronger distribution networks.
6. **Resilience depends on integrated risk management**
   Climate information services, early warning systems, and nature-based solutions help buffer smallholders from shocks and enable adaptive responses.
7. **Inclusion is essential for transformation**
   Women, youth, and local communities must be empowered through equitable access to land, finance, and technology, while integrating indigenous knowledge into innovation systems.

Introduction

This chapter provides a comprehensive and evidence – based analysis of the current state and future pathways for sustainable farming and resilience in Africa. It is organised into sections that address critical dimensions of sustainable and resilient agrifood systems.

The opening section establishes the conceptual and contextual foundation, outlining global and regional trends, emerging narratives, and key definitions of sustainability and resilience. This is followed by a detailed assessment of agricultural intensification and extensification in Africa, comparing two time periods (2004 – 2013 and 2014 – 2023). Using empirical data from the FAOSTAT database, the analysis examines trends in crop yields, land area expansion, and productivity for major crop groups including cereals, pulses, vegetables, roots and tubers, oil and fruit crops, as well as meat production.

Subsequent sections analyse the main drivers of sustainable farming and resilience, including climate change, demographic trends, market dynamics,

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technological advancements, and policy reforms. Each driver is considered in terms of its implications for sustainability and adaptation, with country and regional illustrations.

The chapter also highlights innovation drivers transforming African agriculture, such as climate – smart agriculture, regenerative agriculture, digital advisory tools, integrated nutrient management, pluralistic extension systems, and nature – based solutions. Each is discussed with reference to outcomes, examples, and potential for replication.

The final section presents strategic recommendations for scaling up sustainable farming, with emphasis on inclusive policies, targeted investment priorities, engagement of women and youth, and institutional coordination. It concludes with a synthesis of findings and a call for systemic transformation to enhance food security and ecological resilience.

This analysis aligns with the Kampala CAADP Declaration by offering a structured, data – driven roadmap for achieving sustainable, productive, and resilient agrifood systems. Its treatment of agricultural productivity trends directly supports the CAADP goal of increasing output through evidence – based strategies. The focus on climate – smart and regenerative practices, integrated nutrient management, and nature – based solutions reflects the sustainability targets of the 2033 CAADP agenda. The emphasis on resilience addresses climate change impacts, demographic pressures, and market volatility with adaptive, context – specific strategies. The proposed inclusive policies, investment priorities, and institutional mechanisms reinforce CAADP's commitment to increasing agricultural output by 45%, halving postharvest losses, and achieving zero hunger by 2033.

Sustainable farming, global trends, and narratives

Sustainable farming addresses Africa's intertwined challenges of productivity, environment, and resilience. The interplay of unsustainable agricultural practices, rapid population growth, land degradation, and climate variability significantly constrains agricultural productivity and resilience in Africa (Namazzi, 2024; Scholz and Neubert, 2024; Antwi – Agyei and Stringer, 2025; Smith and Doe, 2025). In response, sustainable farming has emerged as a pathway for Africa as it addresses the continent's intertwined challenges of food and nutrition insecurity, land degradation, biodiversity loss, poverty, and climate vulnerability, and it is viewed as a cornerstone for achieving food security, economic resilience, and environmental sustainability.

With over 60% of Africa's population dependent on agriculture for their livelihoods and a rapidly growing population expected to reach 2.5 billion by 2050, increasing productivity without further degrading the environment is essential (Sithole & Olorunfemi, 2024; Smith and Doe, 2025). Sustainable farming in Africa has evolved through the integration of regenerative principles, local knowledge systems, and adaptive innovations aimed at balancing productivity with environmental and social outcomes (Pretty et al., 2018).

Globally, sustainable farming has moved to the forefront of development agenda, driven by concerns over greenhouse gas emissions, biodiversity loss, and food and nutrition insecurity. Concepts such as Climate – Smart Agriculture (CSA), regenerative agriculture, and nature – based solutions now frame many policy and donor initiatives (FAO, 2013; World Bank, 2021). In the African context, these global paradigms are being interpreted through regionally specific strategies. For instance, integrated soil fertility management, farmer – led irrigation, and digital advisory platforms are increasingly employed to improve resource efficiency and resilience (Vanlauwe et al., 2014). Nevertheless, these adaptations are unevenly implemented due to institutional, financial, and technical constraints (Jayne et al., 2019).

In the African context, Sustainable Farming (SF) is not necessarily centered on natural resources. It is about the smallholder farmers, their aspirations, needs, livelihoods, rights, and how these needs interact with the resource base in a sustainable way (Amede et al., 2023). In addition to the established principles, it encompasses household energy, efficient use of mineral fertilizers and water management innovations. It also recognizes that profitable farming and the ecosystem services they rely on are interrelated with one another within a defined agroecological system and, therefore, must be managed in an integrated manner. According to Amede et al., (2023), sustainable farming could facilitate behavioral change through two different incentive mechanisms:

- Potential to maximize profit from producing more per unit of input
- Potential to minimize risk from climatic and market shocks using sustainable practices and technologies

Soil health is central to sustainability but remains neglected. There is an ongoing debate on soil health and the carbon economy in Africa. Soil health remains a fundamental, yet often neglected, pillar of sustainability in African agriculture. Many African soils suffer from low organic matter, nutrient depletion, and high erosion rates due to continuous cultivation and poor soil management practices (Donovan & Casey, 1998; Mesele et al., 2025). As global interest in soil carbon sequestration grows, carbon farming has emerged as a potential co – benefit strategy for climate mitigation and agricultural financing (Zomer et al., 2016).

Proponents argue that African farmers could benefit from payments for ecosystem services through practices like agroforestry, conservation tillage, and organic amendments (Laub et al., 2023). However, concerns persist over the equity, measurability, and transaction costs of carbon offset markets, and market uncertainty particularly for smallholders in data – scarce and institutionally weak environments (Tamba et al., 2021; Mezquita et al., 2023). Therefore, ensuring farmer inclusion and benefit – sharing will be central to any viable carbon strategy in the continent.

The alignment of global sustainable farming paradigms with African – specific applications demonstrates how continental strategies adapt international concepts to local agroecological, socio – economic, and governance contexts. The illustration below summarizes this alignment for Climate – Smart Agriculture, regenerative agriculture, and nature – based solutions.

Sustainability and resilience as drivers of agrifood systems

Sustainability in agrifood systems refers to the ability to deliver sufficient, safe, and nutritious food to present and future generations while maintaining ecological integrity, economic viability, and social equity (FAO, 2021a). This concept emphasizes the long – term viability of agrifood systems by balancing productivity with ecological stewardship and social well – being. In parallel, resilience refers to the system's capacity to anticipate, absorb, adapt to, and recover from shocks, including climatic, economic, and political disturbances (Tendall et al., 2015).

Africa's agrifood systems face multiple, compounding stressors that threaten productivity and stability. They are increasingly exposed to stressors such as:

- Climate change
- Land degradation
- Resource scarcity
- Socio – political instability.

Land degradation, for example, affects an estimated 65% of Africa's agricultural land, with adverse implications for soil fertility and food security (UNCCD, 2020; Montanarella et al., 2016). Climate extremes, including droughts, floods, and heatwaves, are

Climate-Smart Agriculture (CSA)

Adapted through context-specific practices such as drought-tolerant crop varieties in the Sahel, small-scale solar-powered irrigation in East Africa, and mobile-based climate advisory services in Kenya and Tanzania. Implementation often integrates CSA into national agricultural investment plans under CAADP frameworks.

Regenerative agriculture

Applied through conservation agriculture in Zambia and Zimbabwe, intercropping and agroforestry in Malawi and Ethiopia, and farmer-managed natural regeneration in Niger. These practices are often scaled via NGO-led programs and donor-funded initiatives targeting soil health and biodiversity restoration.

Nature-based solutions (NbS)

Deployed through watershed restoration projects in Rwanda, mangrove rehabilitation in coastal West Africa, and wetland protection in Uganda. NbS approaches are linked to climate adaptation plans and often combine local ecosystem knowledge with externally funded environmental programs.

becoming more frequent and intense due to global warming, exacerbating production risks (IPCC, 2022).

Integrated, inclusive approaches are essential to build sustainable and shock – resilient agrifood systems. Therefore, enhancing sustainability and resilience of agrifood systems requires systemic change in the adoption of integrated framing approaches that combine agroecological practices; Diversification; Improved water and soil management; Institutional innovations; And inclusive governance (Tittonell, 2020; Mbow et al., 2019). These practices help buffer against shocks and reduce reliance on external inputs while promoting long – term productivity and equity.

The Kampala CAADP Declaration signals renewed continental commitment to sustainability and resilience by African Union member states to transform agrifood systems through sustainability and resilience (AU, 2025). The declaration emphasizes sustainable farming by promoting climate – smart agriculture, agroecological practices, and responsible land and water management. It also calls for increased investment in agro – industrialization to boost productivity and reduce environmental degradation.

On resilience, the declaration recognizes the growing threats from climate change, economic shocks, and political instability. It advocates for systems that can absorb and recover from these disruptions while maintaining food security. Key strategies include inclusive governance, digital innovation, regional trade integration, and support for vulnerable groups such as women and youth. The Kampala Declaration thus positions sustainability and resilience not as separate goals, but as interconnected pillars essential for long – term agrifood transformation in Africa.

State of agricultural intensification and extensification in Africa

This section analyses trends in crop and livestock productivity and crop area expansion in Africa. It compares changes between the decades 2004 – 2013 and 2014 – 2023.The section compares African performance with global benchmarks and provides detailed regional insights to highlight areas of growth and stagnation and suggests policy recommendations to guide investments and interventions in African agrifood systems.

Improving yields in Africa is seen as a critical step toward enhancing food security and reducing pressure on natural ecosystems. As presented below, modest improvements in crop productivity have been observed across Africa in the last decade (2014 – 2023) compared to the previous one, particularly in vegetables, roots and tubers, and meat production. However, cereals and pulses show relatively slower gains. Fertilizer use has increased but remains significantly below global averages.

Cereals and pulses

Cereal productivity in Africa continues to lag global averages, with yields averaging 1.7 tons per hectare compared to the global 4.2 tons per hectare in 2023. A comparison of cereal productivity growth over the last decade (2014 – 2023) relative to the previous one (2004 – 2013) is presented in Figure 3.1.

The data presented shows a relative increase in cereal productivity by 12% (Central Africa) to 30% (Eastern Africa) among the regions and 13% at continent level while Southern Africa, particularly South Africa, performs closest to global productivity level. Central and West Africa showed the lowest productivity growth in the last decade (12 – 14%) while yield stagnated in North Africa (Fig. 3.1A).

While Central (48%), Western (18%) and Eastern (13%) Africa had expanded the area under cereals in the past decade, Southern and North Africa had stabilized or reduced their cereal area (Fig. 3.1A). These regional disparities in cereal production highlight the need for targeted investment in yield – enhancing sustainable technologies and climate – smart practices.

The productivity of major pulse crops has increased over the years in Africa (Fig. 3.1) but remains at 0.76 tons per hectare in 2023 compared to the global average of 1.0 tons per hectare. Over the past decade, Africa has demonstrated a stronger improvement in pulse yield and area expansion compared to the global average for the previous decade. On average, the yield of pulse crops across Africa increased by 15%, nearly double the global increase of 8%, indicating productivity gains in the continent (Fig. 3.1B).

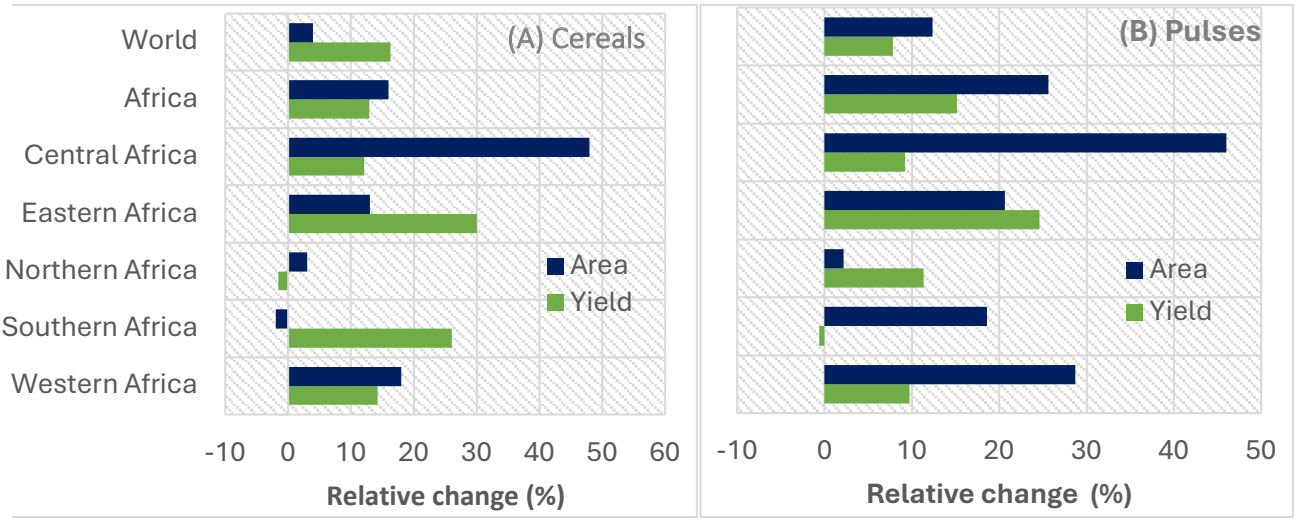

Figure 3.1: Relative changes in yield and area of major cereals (A) and pulse crops (B) in Africa and the World in the recent decade (2014 – 2023) as compared to the previous decade (2014 – 2013). Source: Computed based on FAO data (FAOSAT, 2025)

This continental yield growth was accompanied by a 26% increase in cultivated areas, also more than double the global average of 12%. However, regional disparities are apparent. Eastern Africa led with a 25% increase in yield increase, suggesting strong agronomic gains, while Northern Africa achieved an 11% yield increase with only a 2% expansion in area, highlighting intensified production rather than land expansion (Fig. 3.1B). Conversely, some regions saw less favorable trends.

Southern Africa experienced a 1% decline in yield despite a 19% increase in cultivated area, signaling potential climate and/or agronomic challenges. Central Africa saw the largest increase in area (46%) but only a modest 9% rise in yield, indicating that land expansion played a larger role than productivity improvements over the last decade. Western Africa had moderate yield gains (10%) but expanded area significantly (29%), while Eastern Africa achieved strong results on both fronts (Fig. 3.1B). These variations again underscore the need for region – specific strategies: while some areas may benefit from continued intensification, others may need to address the underlying constraints to improving yield performance.

INSIGHT

Overall, Africa's cereal and pulse yields remain below global averages, reflecting persistent productivity gaps despite notable regional progress. Eastern Africa stands out as the most consistent performer, recording the highest cereal yield growth (30%) and strong pulse productivity gains (25%), driven by adoption of improved varieties and better agronomic practices. Northern Africa achieves near-global efficiency in pulses with minimal area expansion, showing potential for land-sparing strategies. In contrast, Central Africa's sharp area expansion in both cereals (48%) and pulses (46%) has not translated into proportional yield gains, indicating reliance on extensification rather than intensification. Southern Africa's mixed trends, with declining pulse yields and moderate cereal performance, point to climate-related and management challenges. These disparities indicate the need for tailored strategies that combine productivity gains with sustainable land use, ensuring that Africa narrows its performance gap with global benchmarks while safeguarding ecological integrity.

Vegetable and root and tuber crops

In general, the African trend suggests a worrying pattern of extensification, growing more vegetables by using more land rather than improving yields per hectare, raising concerns about land use efficiency, input effectiveness, and climate – related constraints. Vegetable crop yield in Africa averaged 8.6 tons per hectare, below the global average of 19.6 tons over a period of ten years (2014 – 2023), with a declining trend since 2009 (Fig. 3.3). Over the last decade (2014 – 2023), Africa experienced an overall decline of 4% in vegetable crop yields compared to the previous decade baseline, despite a substantial 40% expansion in vegetable production area (Fig. 3.2A). This contrasts sharply with the global trend for the same period, where vegetable yields rose by 9% alongside a modest 11% increase in area, indicating that global productivity gains were achieved through both intensification and area expansion.

As shown in Figure 3.2A below, regional disparities within Africa are significant, with vegetable productivity levels in Northern and Southern Africa closer to or above the global average. In terms of productivity gain over recent years, Eastern Africa stands out with a 26% yield and 29% area increase, reflecting major improvements in vegetable productivity, likely driven by better seeds, agronomic practices, technologies, favorable agroecological conditions and/or market demand.

Northern and Central Africa saw moderate yield gains (8% and 4%, respectively), but in both cases, gains were lower than the global average. In contrast, Western Africa experienced a 6% decline in yield despite a 58% increase in cultivated area, indicating strong reliance on land expansion with little to no productivity improvement, potentially due to limited access to improved inputs, pest/disease pressures, or climate stress. On the other hand, southern Africa increased vegetable crop area by 11% but remained with no productivity gains in the last decade compared to the preceding decade (Fig. 3.2A).

In general, with high economic and nutritional returns, vegetables represent a critical area for targeted intervention. The findings presented above highlight the need for region–specific interventions to boost vegetable productivity in Africa, particularly through investments in research, irrigation, extension services, and climate–resilient and sustainable practices, and especially through input, cold chain, and market development.

Roots and tubers are among Africa's strongest categories, with yields above global standards in some regions (Northern and Southern Africa) and below in the rest of the regions over years (Fig. 3.4). Over the past decade, Africa has seen a 53% increase in the area under root and tuber crops, significantly outpacing the global average of 20% (Fig. 3.2B). However, this

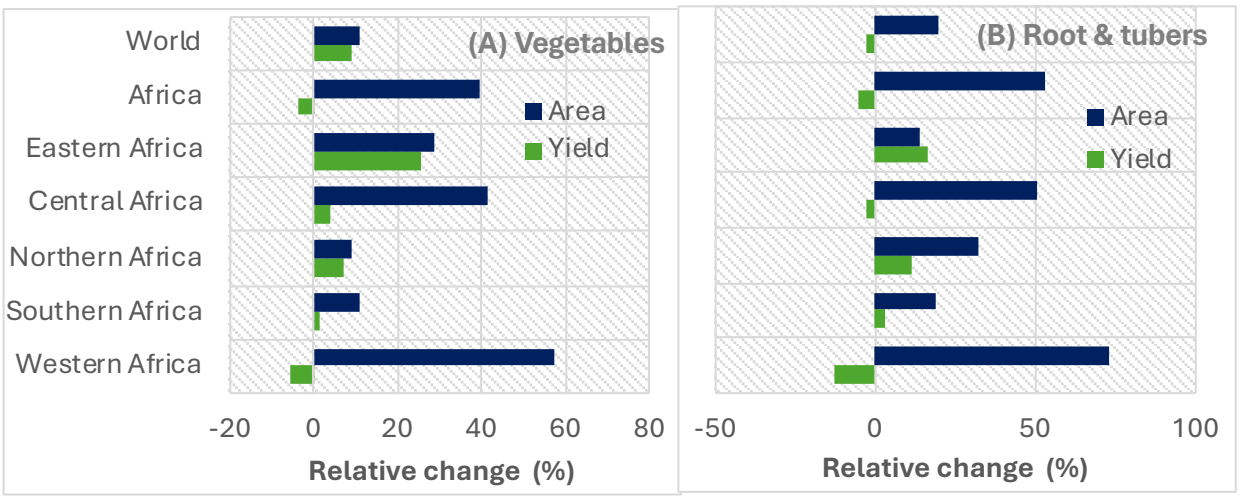

Figure 3.2: Global, continental, and regional changes in yield and area of vegetables (A) and root & tuber crops (B) in the recent decade (2014 – 2023) relative to the previous decade (2014 – 2013). Source: Computed based on FAO data (FAOSAT, 2025).

expansion has not translated into improved productivity as Africa's average yield declined by 5%, compared to a 3% decline globally (Fig. 3.2B). This contrast suggests that while Africa is expanding cultivation more aggressively than the rest of the world, it is doing so with diminishing returns in productivity, highlighting a reliance on extensification rather than intensification.

At the regional level (Fig. 3.2B), Eastern Africa stands out as the most efficient performer, achieving a 16% increase in yield with only a 14% increase in area. This indicates a shift toward productivity–driven growth, likely supported by improved agronomic practices and better access to inputs. Northern Africa also demonstrated positive trends, with a 12% yield increase and a 33% area expansion, reflecting moderate intensification. In contrast, Western Africa expanded its cultivation area by a staggering 73% yet experienced a 13% decline in yield. This suggests a heavy dependence on land expansion to boost production, which may not be sustainable in the long term.

Central Africa followed a similar pattern, with a 50% increase in area in the past decade relative to the previous one but a 2% drop in yield, indicating inefficiencies in land use. Southern Africa showed a more balanced approach, with a 3% increase in yield and a 19% increase in area (Fig. 3.2B), suggesting moderate improvements in both productivity and land use. These regional disparities underscore the need for tailored strategies that promote sustainable intensification, boosting yields through better technologies and practices rather than expanding cultivated land.

Oil and fruit crops

Oil crops in Africa remain underproductive over years (Fig. 3.3), with average yields of 0.32 tons per hectare compared to the global average of 0.74 tons in 2023. Analysis of oil equivalent yield data over the period 2014 - 2023 relative to 2004 – 2013 reveals contrasting productivity trajectories between Africa and the global average. While the global yield increased at an average annual rate of 1.05%, Africa's overall yield grew marginally at 0.13% per year, indicating a stagnation in productivity relative to global trends.

INSIGHT

Overall, Africa's vegetable and root and tuber production shows mixed progress relative to global benchmarks. Eastern Africa demonstrates productivity-led growth for both crop groups, while Northern Africa remains competitive for roots and tubers but less so for vegetables. Western and Central Africa rely heavily on land expansion with limited or negative yield growth, reflecting sustainability risks. Southern Africa maintains moderate performance but needs targeted measures to match leading regions. These patterns suggest that gains in productivity, rather than land expansion, will be essential to meet future food demand without exacerbating environmental pressures.

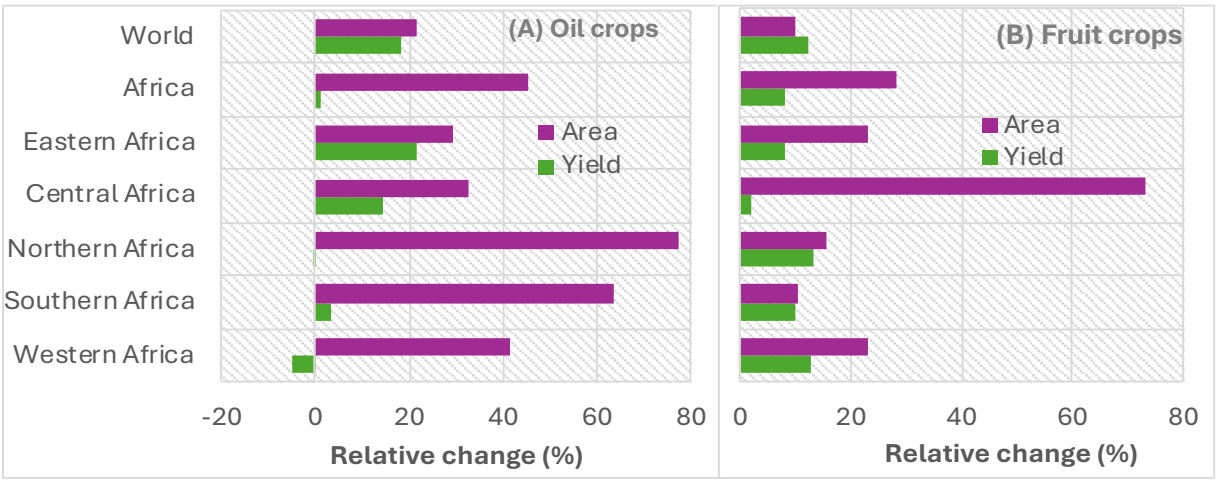

Figure 3.3: Global, continental, and regional changes in yield and area of oil crops (A) and fruits (B) in the last decade (2014 – 2023) relative to the previous one (2014 – 2013). Source: Computed based on FAO data (FAOSAT, 2025).

A comparative analysis of oil crop performance over the past decade reveals a significant divergence between global and African trends in productivity and land use. At the global level, oil crop production has been characterized by a balanced intensification, with an 18% increase in yield increase accompanied by a 21% expansion in cultivated area (Fig. 3.3A), indicating that global production gains have been driven by both improved intensification and moderate extensification. In contrast, Africa's oil crop sector expanded cultivated area by 45%, more than double the global rate, yet achieved only a modest 1% increase in yield. This pattern reflects a reliance on extensive growth strategies, where production increases are primarily achieved through land expansion rather than improvements in productivity. Such a trajectory raises concerns about long–term sustainability, particularly in the context of land scarcity, environmental degradation, and climate change.

At the regional level, Eastern and Central Africa demonstrated the most promising oil crop production trends by balancing intensification and extensification. Eastern Africa achieved a 21% increase in yield with a 29% area expansion, indicating a relatively efficient intensification model. Similarly, Central Africa recorded a 15% yield gain with a 32% increase in area, suggesting some progress in agronomic practices and input use. Southern Africa and Western Africa, however, exhibited less favorable dynamics of intensification. Southern Africa expanded its oil crop area by 64%, the second highest among all regions, but achieved only a 4% increase in yield, pointing to inefficiencies in land use (Fig. 3.3A).

Western Africa presents a more concerning scenario, with a 5% decline in yield despite a 42% increase in area, indicating declining productivity and potential expansion to marginal areas and/or crop replacement. Northern Africa experienced the highest area expansion (78%) but saw a slight decline in yield (0.5%), highlighting a critical imbalance between land use and productivity. This may reflect environmental constraints such as water scarcity, limited access to smart climate technologies, or suboptimal management practices.

The findings presented underscore the urgent need for a strategic shift in Africa's oil crop sector, from land–based expansion to yield–based sustainable intensification. Enhancing productivity through investment in research, improved seed systems, irrigation infrastructure, and farmer training in oil crop management will be essential to ensure sustainable growth and resilience in the face of mounting environmental and economic pressures.

When it comes to major fruit crops which are essential components of Africa's food system, yields continued to rise steadily over the years, with an average annual growth rate of 0.95% during the last decade period, reflecting ongoing improvements in agricultural efficiency, technology adoption, and market integration. In comparison, Africa's fruit yield grew at a slower pace of 0.47% per year over the past decade, indicating modest gains and a persistent productivity gap relative to global standards.

Over the past two decades, fruit production trends have varied markedly across regions, with global data showing a 12% increase in fruit yield and a 10% increase in area cultivated between the last decade compared to the previous one (Fig. 3.3B). These figures suggest a global improvement in fruit productivity, with yield gains slightly outpacing land expansion. In contrast, Africa as a continent experienced a more modest 8% increase in yield, alongside a substantial 28% expansion in cultivated area (Fig. 3.3B). This indicates that much of Africa's growth in fruit production has been driven by extensification rather than significant improvements in productivity, which may reflect constraints in access to improved varieties, irrigation, agronomic inputs, pest and disease control, and socio–economic conditions.

Regional differences within Africa are stark. Northern and Western Africa performed relatively well, with yield increases of 13% each, comparable to or exceeding global trends. Southern and Eastern Africa also posted yield gains of 10% and 8%, respectively, although more modest. Central Africa, however, experienced only a 2% increase in yield despite a dramatic 73% increase in area under fruit cultivation (Fig. 3.3B), highlighting significant inefficiencies in production and possible constraints such as low–input farming, poor infrastructure, and/or environmental degradation. These findings underline the need for targeted interventions that focus on yield–enhancing technologies, improved fruit varieties, better disease and pest management and post–harvest handling systems in regions lagging, particularly in Central Africa, while sustaining productivity growth in more

productive zones and regions.

INSIGHT

Overall, Africa's oil and fruit crop sectors continue to lag global productivity trends, with production growth largely driven by land expansion rather than yield gains. Eastern and Central Africa show signs of more balanced growth in oil crops, while Northern and Western Africa lead in fruit yield gains. However, Central Africa's fruit sector and Western Africa's oil crop sector exemplify the inefficiencies of expansion without intensification. These trends highlight the urgency of transitioning toward sustainable intensification models across all regions, prioritizing yield improvements to safeguard environmental resources while meeting rising demand.

Meat production

Livestock plays a vital role in Africa's economy and food systems, contributing significantly to livelihoods, nutrition, and agricultural GDP with its own environmental footprint. Analyzing decade-long shifts in meat production reveals important insights into the continent's evolving agricultural landscape.

From 2014 to 2023, global meat production increased from approximately 321 million metric tons to 370 million metric tons, marking a growth of about 21% compared to the previous decade. This reflects steady growth driven by rising demand, population growth, and intensification in major producing regions. In contrast, Africa's total meat production rose from 19 million metric tons to 23 million metric tons, reflecting a higher growth rate of 32% over the same period. This indicates a more dynamic expansion in meat production relative to the global average (Fig. 4). This suggests that African countries are increasingly investing in livestock systems, responding to both domestic demand and broader development goals. However, this continental average masks substantial regional disparities in growth performance.

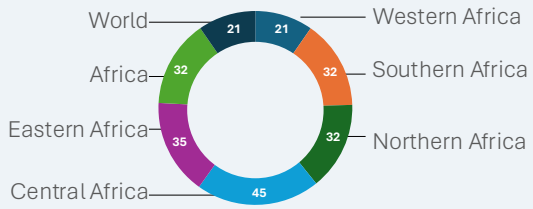

Figure 3.4: Global, continental, and regional changes in meat production over the recent decade (2014 – 2023) relative to the previous one (2014 – 2013). Source: Computed based on FAO data (FAOSAT, 2025).

Among African regions, Central Africa recorded the most dramatic increase, with meat production rising by 45%. This surge may reflect improvements in local livestock management, recovery from conflict–related disruptions, or increased investment in the sector. Eastern Africa and Southern Africa also showed robust growth, at 35% and 32%, respectively (Fig. 4), likely driven by emerging commercial production, improved pastoral systems and growing urban markets. Northern Africa followed closely with a 32% increase, potentially benefiting from more intensive production systems and policy support. In contrast, Western Africa exhibited the lowest growth among African regions, at 21%, aligning with the global average. This relatively modest increase may point to structural constraints such as limited access to inputs, land pressures, or slower adoption of improved livestock technologies.

Overall, the data underscores Africa's growing contribution to global meat production, while also highlighting the need for region–specific strategies to address disparities and unlock the full potential and contribution of the livestock sector to Africa's food system.

INSIGHT

Compared to the global average growth rate of 21%, Africa's 32% expansion in meat production over the past decade signals a faster-than-average growth trajectory. Yet, much of this increase is driven by herd expansion rather than substantial productivity improvements, raising questions about the sector's resilience to climate variability, feed resource constraints, and biosecurity risks.

Relative contributions of yield improvement and land expansion to production gains

As presented in the section above, crop productivity and crop area have both increased in Africa over the recent decade, but with varying contributions to overall production growth. Relative to the preceding decade (2004 – 2013), much of Africa's crop production growth in the last decade was attributed to the expansion of cultivated area, while a relatively lower growth resulted from improvements in crop productivity (yields per hectare). FAO data indicate that, over the past decade, yield gains contributed less than one-third of Africa's crop production growth, compared to over 80% globally, underscoring the continent's heavy reliance on extensification. This contrasts with global trends, where yield improvements account for most of the production growth. This continued dependence on area expansion rather than productivity gains raises sustainability concerns, particularly considering land degradation, climate change, and the limited availability of suitable arable land.

Despite regional and crop differences, the interplay of several factors contributes to the slow productivity growth in Africa. Low access to productive inputs and services remains a major limitation to sustainable agriculture in Africa. For example, fertilizer application rates average below 20 kg/ha in sub – Saharan Africa, compared to over 100 kg/ha in Asia and 135 k/ha globally (AGRA, 2024a; World Bank, 2025). The use of improved seed varieties is increasing, but is often concentrated in a few staple crops, excluding traditional, climate–resilient crops such as millet and sorghum (Abate et al., 2017).

Additionally, less than 6% of cultivated land is under irrigation, and mechanization rates are among the lowest in Africa (FAO, 2021). Public agricultural extension systems are under–resourced and fragmented in many countries, limiting the dissemination of sustainable practices (Mkenda et al., 2021; Kamau & Nyangena, 2023; Okafor & Eze, 2024). As presented in the sections below, however, recent sustainable farming innovations including bundled services, combining organic and inorganic inputs, insurance, finance, and digital advisories, are emerging to bridge service gaps and promote resilience (Berkhout et al., 2021). These integrated service models offer promise for transforming African farming systems into more inclusive, productive, sustainable, and climate – resilient enterprises.

The persistent reliance on land expansion rather than yield intensification places Africa at odds with the global shift toward productivity-driven growth. Without significant investments in soil fertility, irrigation infrastructure, and mechanization, the continent risks facing diminishing returns from land expansion, coupled with heightened environmental and socio-economic pressures.

Drivers of change to sustainable and resilient agrifood systems

African agrifood systems are being transformed by an array of interconnected drivers, including environmental, demographic, technological, economic, and institutional forces. These drivers not only pose challenges but also present opportunities for shifting toward more sustainable and resilient farming practices. Understanding these dynamics is crucial for designing interventions that can steer Africa's agrifood systems toward productivity, inclusivity, sustainability, and resilience (Reardon et al., 2019; Rockström et al., 2017).

Climate change and environmental pressures

Climate change continues to exert a defining influence on agricultural productivity and system resilience in Africa (IPCC, 2023). Moreover, climate variability remains the most significant constraint to sustainable farming in Africa. The continent is experiencing more frequent and intense extreme weather events, including droughts, floods, and heatwaves. In 2024, Eastern Africa experienced excessive rainfall linked to a strong El Niño event, causing widespread flooding in Kenya, Somalia, and Ethiopia. The flooding displaced over 600,000 people and inundated over 200,000 hectares of farmland (OCHA, 2024; UNICIEF, 2024). Conversely, Southern Africa was gripped by one of the worst droughts in decades, severely affecting Zambia, Zimbabwe, and Malawi. The Zambezi River reached record–low levels, leading to water and energy shortages across Zambia and reducing hydroelectric output by over 40% (ZESCO, 2024).

Surface and subsurface water shortages in Southern Africa were particularly acute, with fast groundwater depletion rates over historical baselines (Matlala, 2022). These water stress conditions undermined irrigation and production of livestock, particularly in

semi–arid zones. These contrasting climate shocks between regions illustrate the dual challenge facing African agrifood systems: managing highly localised climate extremes while building continent-wide adaptive capacity.

Long–term climate data shows that average temperatures in Africa have increased by 1.2°C since the 1980s, with projections indicating a further 2.0 – 2.5°C rise by 2050 if current emission trajectories continue (IPCC, 2023). These changes are reducing growing seasons, increasing evapotranspiration, and shifting pest and disease dynamics.

Rising temperatures, erratic rainfall, and extreme weather events are increasingly affecting crop yields, water availability, and soil health, compelling farmers, researchers, and policymakers to adopt climate–resilient and sustainable farming practices. These include agroecology (Romero Antonio et al., 2025), climate–smart agriculture (CSA) (Zizinga et al., 2022; Mkonda et al., 2023), and integrated soil–water–nutrient management (e.g., Ndegwa et al., 2023), all of which have shown to improve productivity, enhance system resilience, and reduce vulnerability to climate variability.

Environmental degradation, including declining soil fertility and water scarcity, is also a powerful push factor for sustainable intensification and ecosystem restoration approaches. The urgency to reverse land degradation is increasingly leading to investments in nature–based solutions, such as agroforestry and regenerative agriculture (Sher et al., 2024; Pretty et al., 2018). Compared to global averages, Africa's agricultural systems face disproportionately higher exposure and sensitivity to climate shocks, while having lower adaptive capacity due to structural, financial, and institutional constraints. This reinforces the need for climate resilience to be a central pillar in agrifood system transformation strategies.

Demographic shifts and urbanization

Africa's rapidly growing and urbanizing population is reshaping food demand and labor availability. Urban consumers are increasingly demanding nutritious, sustainably produced food, which creates market incentives for sustainable farming practices such as regenerative agriculture and low–emission production systems (de Hass et al., 2025; De Vos et al., 2024; Moodley et al., 2024). Africa's population is projected to reach 2.5 billion by 2050, with urban dwellers accounting for nearly 60% of the total, up from 43% in 2023 (UN DESA, 2024).

At the same time, youth bulges in rural areas are creating pressure and opportunity for sustainable farming models that appeal to younger generations, particularly those that leverage innovation, entrepreneurship, and technology. Therefore, empowering youth through agripreneurship programs can accelerate the uptake of sustainable farming practices (Ouko et al., 2022; Adeyanju et al., 2023).

Market dynamics and trade integration

Emerging market trends, such as the rise of green consumerism, certification schemes, and environmental standards, are influencing farmers' production decisions. Access to export markets increasingly depends on compliance with sustainability standards like organic production and certifications like Fairtrade and Rainforest Alliance as well as European Union Degradation Regulation (EUDR) (Meemken et al., 2021; Bager et al., 2021).

The African Continental Free Trade Area (AfCFTA) also presents an opportunity to harmonize sustainability standards and encourage intra–African trade in sustainably produced agricultural goods (Echandi et al., 2022). This harmonisation could lower transaction costs, expand market reach for African farmers, and support regional value chain development. However, smallholders require technical and institutional support to meet such standards and participate equitably in these markets.

Technological advancements

Technological innovations are both drivers and enablers of sustainable farming. Digital tools provide timely climate advisories, early warning systems, precision input recommendations, and remote monitoring, facilitating resource–efficient farming and reducing environmental impacts (Aker & Mbiti, 2010; Tsan et al., 2019).

Technologies such as solar–powered irrigation, biodegradable inputs, and digital certification platforms are helping smallholders implement sustainable practices while improving productivity and income (Baumüller, 2018). However, technology access in Africa remains unequal, emphasizing the need for inclusive digital strategies (Ehimuan et al., 2024).

Policy reforms, institutional governance, and development agenda

Policy incentives, such as input subsidies for inorganic fertilizers, land tenure reform, and payments for ecosystem services, are critical for driving adoption of sustainable practices (Ryan et al., 2022; AGRA, 2024b). National strategies aligned with global and continental frameworks such as the SDGs and CAADP are increasingly promoting agroecological transitions and climate–resilient agriculture (Biovision Foundation, 2024; Erezi et al., 2023; Romy, 2024). In addition, decentralized governance, and participatory approaches, including community–based natural resource management and farmer-led innovation systems, have been effective in scaling sustainable practices (Roka, 2019; van Noordwijk, M. 2019; Otieno, 2024).

Sustainable farming in Africa is further propelled by international and regional commitments. These include the SDGs – notably SDG 2 (Zero Hunger); SDG 13 (Climate Action); and SDG 15 (Life on Land); As well as the Paris Climate Agreement; Agenda 2063; CAADP; and the UN Decade on Ecosystem Restoration. These frameworks have stimulated donor interest, private sector investment, and multilateral partnerships focused on climate–smart agriculture, landscape restoration, and sustainable food systems (FAO, 2024; Zougmore et al., 2018; UNEP & FAO, 2020). However, translating these commitments into local action remains weak as it requires capacity building, financial support, and governance reforms.

Socio–cultural norms and farmer knowledge systems

Social norms, traditional knowledge, and cultural practices play a vital role in shaping the adoption of sustainable practices. Indigenous farming systems, such as Zai Pits in the Sahel or terrace farming in East Africa, demonstrate long–standing ecological responsibility that can inform modern sustainability efforts (Dabre et al., 2024; Hamadani et al., 2021; Antonelli, 2023). Integrating local knowledge with scientific research through participatory approaches has shown success in enhancing ecological outcomes and farmer ownership (de Vente et al., 2016). Together with market, technological, and policy drivers, socio–cultural norms form an essential part of the enabling environment that shapes the uptake of sustainable farming practices across Africa.

Drivers of innovation for sustainability and resilience

The need for confronting current farming challenges is driving innovations that are central to transforming Africa's agrifood system towards productivity, sustainability, and resilience. Innovations spanning technology and digital agriculture, indigenous practices, and agroecological approaches are enabling African farmers to address sustainability and resilience challenges. The challenges include:

- Soil degradation and soil fertility loss
- Climate risks
- Water scarcity
- Inadequate access to finance and inputs
- Market inefficiencies
- Demographic pressure
- Youth unemployment

These challenges create both the necessity and opportunity for innovation, driving the development of context–specific solutions that address multiple constraints simultaneously.

These innovation efforts are strongly aligned with the commitments made under the Kampala CAADP Declaration, where African Union member states reaffirmed their dedication to transforming agriculture through science, technology, and inclusive innovation. The declaration emphasizes the need for climate–resilient, market–oriented, and youth–driven agricultural systems, providing a continental policy framework that supports the innovations discussed in this section. This section presents key innovation drivers for enhancing sustainable farming and resilience, assesses their uptake, and highlights progress made in recent years (up to 2024).

Climate–Smart Agriculture (CSA)

CSA is gaining momentum as an integrated approach to sustainably increase productivity, enhance resilience, and reduce greenhouse gas emissions. Recent reports indicated that CSA innovations contributed to a 15–25% yield increase. This variation reflects differences in local agroecological conditions, adoption intensity, and the extent to which CSA practices are integrated with complementary measures such as irrigation and input optimization. This is however dependent on crop, region, and specific CSA

technologies used in some countries despite variable rainfall and dry spell challenges (WFP, 2024; IFAD, 2023). The Kampala CAADP Declaration reinforces the importance of CSA as a strategic pillar for achieving food security and resilience in Africa. It calls for the scaling of CSA practices and principles as discussed below. These include investment in climate–resilient technologies and the integration of climate risk management into national agricultural strategies.

Climate smart seed systems

Seed systems in Africa have greatly improved thanks to the contributions made by the public and private sector, and development partners to develop a range of varieties of different crops some of them are climate-smart, nutrient-dense and pest- and disease-resistant. Governments have put in place favorable policies to encourage the private sector to play various roles in seed production, distribution, and advisory services thus making seeds readily available to farmers even in far remote areas. Previously, improved seeds were primarily available for maize and a limited range of other crops. However, seeds of sorghum, millet, legumes, and lentils including the highly nutritious *Dolichos lablab* and *Mucuna*, which are important in supporting sustainable agriculture practices, are also available. These crops are either used in rotation or intercropped. Their residue is also used as mulch to improve soil health.

Importance of plant breeding and emerging technologies: As the world faces the impacts of climate change, the role of plant breeders in creating robust crop varieties will become increasingly important. Improved crop varieties. Through plant breeding, research has developed and rapidly commercialized drought tolerant maize, rust resistant wheat, flood tolerant rice, micronutrient rich varieties such as high iron beans, vitamin A maize, and high oleic groundnuts.

Emerging technologies such as gene editing, synthetic biology and machine learning hold promise for further enhancing crop resilience. Additionally, international collaboration among researchers, governments, and farmers is vital for sharing knowledge and resources to tackle global food security challenges.

The future of sustainable farming relies on continuous innovation in breeding and seed systems. Innovations in digital tools that support seed systems, capacity building and training models, seed labelling and tracking, data and knowledge resources have proven to rapidly advance seed systems. Knowledge sharing, technology transfer, and coordinated efforts can lead to the development and dissemination of improved seed varieties. Collaborative initiatives with One CGIAR and regional seed networks play a vital role in promoting sustainable farming through robust seed systems.

The Seed System Performance Index (SSPI): The Seed Sector Performance Index (SSPI) provides a measure of the performance of national seed sectors in Africa. The study was commissioned by AGRA, and the African Union Commission's African Seed and Biotechnology Program (ASBP). SSPI is a new analytical tool that aims to provide a single score measurement of the health of seed systems across Africa. The SSPI was established to provide a comprehensive overview and a single score measurement of the performance of seed

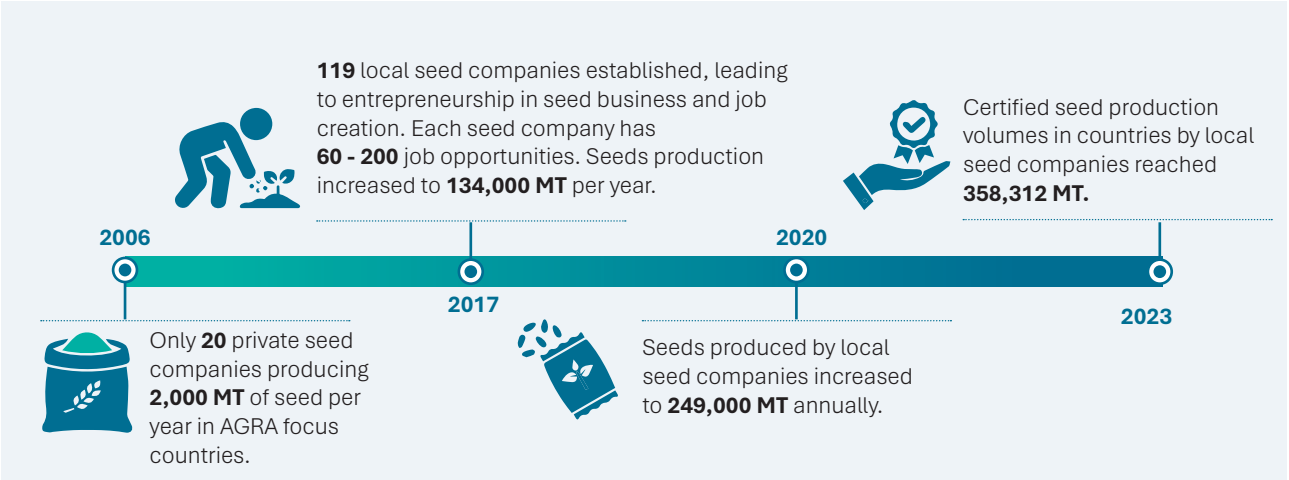

Figure 3.5: Evolution of improved seed production and supply. Source: Authors

systems in various African countries. This analytical tool evaluates multiple aspects of seed sector health, including the availability, quality, and accessibility of seeds, as well as the effectiveness of seed policies and the infrastructure supporting seed distribution. With a total of 17 indicators, the performance by country is summarized in Figure 3.6.

The SSPI score has been approved by African governments as the standardized measurement of seed system performance across countries and enhanced data collection and analysis. It has supported policy and investment and promoted collaboration and partnerships thus empowering farmers. Some of the successes coming out of the SSPI post report release are in Kenya, Malawi, Uganda, Ethiopia, and Nigeria.

Prospects and challenges of seed systems in Africa: While seed systems offer significant benefits for sustainable farming, several challenges need to be addressed to maximize their potential. Some of the challenges include effective regulatory and policy frameworks that are necessary to ensure the quality and safety of seeds, climate change and adaptation, farmer education and training. Educating and training farmers on the importance of using high–quality seeds and adopting sustainable farming practices is crucial for the success of seed systems. Extension services, farmer field schools, and knowledge–sharing platforms can provide farmers with the necessary skills and information to make informed decisions about seed selection and crop management.

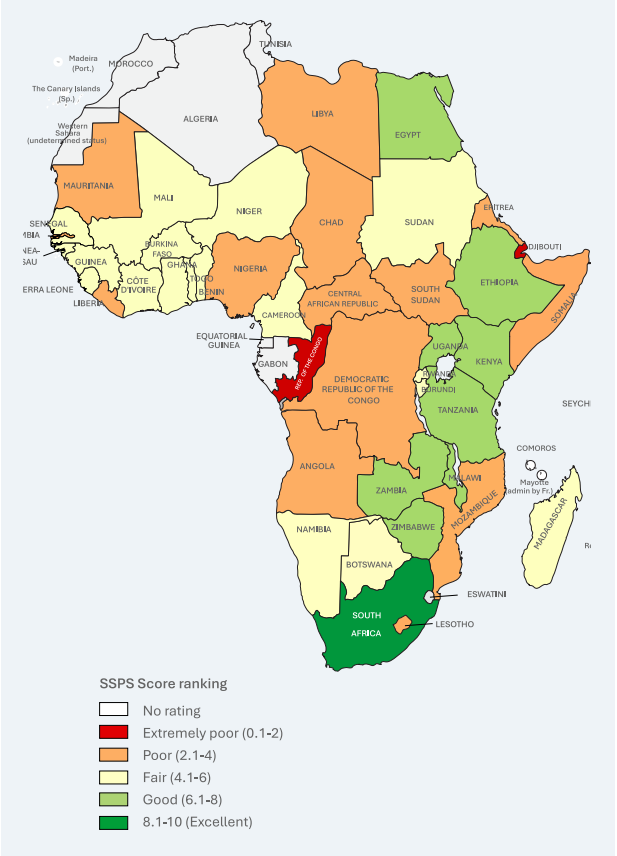

Figure 3.6: The seed system performance index score in Africa. Source: AGRA (2024c).

As the SSPI continues to evolve, there are prospects for expanding its coverage to more countries and regions within Africa. Broader coverage will provide a more comprehensive understanding of seed system health across the continent. One of the challenges facing the SSPI is addressing data gaps and variability. Ensuring consistent and accurate data collection across diverse environments requires ongoing efforts and collaboration. Incorporating technological innovations into the SSPI framework will further enhance its effectiveness which include the leveraging digital tools, remote sensing, and data analytics can provide more precise measurements and real–time insights, driving informed decision–making and continuous improvement.

Examples of SSPI successes

Kenya
The implementation of SSPI-guided policies has led to significant improvements in seed quality and accessibility. Strategic investments in seed testing laboratories and distribution networks have ensured that farmers receive high-quality seeds promptly.

Malawi
Malawi's adoption of SSPI recommendations has resulted in strengthened seed policies and regulations. Enhanced regulatory frameworks ensure that only certified seeds reach the market, protecting farmers from substandard products.

Uganda
Uganda's focus on building infrastructure for seed distribution, driven by SSPI insights, has created a more efficient and reliable seed delivery system.

African countries can ensure that seed system improvements directly contribute to broader agricultural transformation and climate-resilience goals by aligning SSPI-driven reforms with frameworks such as CAADP, the SDGs, and the African Union's Agenda 2063.

Regenerative agriculture

Recent trends in regenerative agriculture across African countries such as Zambia, Zimbabwe, Kenya, and Malawi demonstrate a significant shift towards sustainable farming practices, including minimum tillage, crop rotation, mulching, microdosing, and manure application (Ngoma et al., 2021). These practices contribute to improved soil health, enhanced water retention, and reduced dependency on chemical inputs, thereby promoting environmental sustainability.

A survey conducted in eastern Kenya revealed that over 90% of farmers adopted regenerative practices consistently over two consecutive seasons (2023 – 2024), reflecting strong community-level adoption (Fig. 3.7). This widespread adoption enhances agricultural resilience by mitigating climate–related risks, stabilizing yields, and reducing production costs, ultimately supporting food and nutrition security and rural livelihoods. These findings highlight the importance of supportive policies and extension services to scale regenerative agriculture as a climate–smart solution across the region.

Scaling regenerative agriculture will require integration into national agricultural strategies and alignment with continental frameworks such as the CAADP. Strengthening extension systems, promoting farmer-to-farmer learning, and ensuring access to affordable inputs can accelerate adoption rates and sustain long-term benefits.

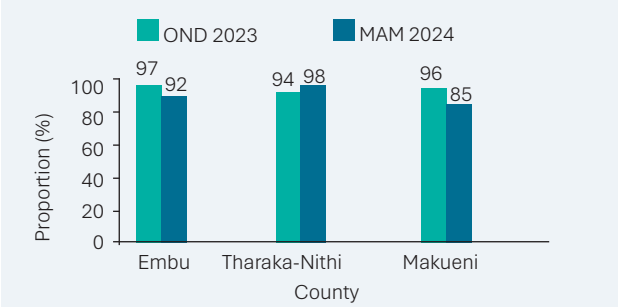

Figure 3.7: Proportion of farmers participating in regenerative agricultural practices in four counties in eastern Kenya over a period of two seasons; October to December (OND) and March to May (MAM). Source: STRAK project survey with 1,037 farmers.

Climate advisory services

Climate services are critical for enhancing the adaptive capacity and resilience of smallholder farmers in Africa, who are disproportionately affected by climate variability and change. These services provide timely, location–specific information, such as seasonal forecasts, early warning systems, and agro–advisories, that enable farmers to make informed decisions about planting, harvesting, and resource management.

Studies have shown that access to climate information significantly improves agricultural productivity and reduces vulnerability to climate shocks (Lamichhane et al., 2022). For example, farmers who receive seasonal forecasts are more likely to adopt adaptive practices such as adjusting planting dates or switching to drought–tolerant crops, which can lead to yield increases of up to 30% in some regions (Lipper et al., 2018; FAO, 2021).

Moreover, climate services support long–term resilience by promoting CSA practices, including soil conservation, soil health, nutrient and water management, and crop diversification. These practices not only mitigate the impacts of climate change but also enhance food security and livelihoods in rain–fed agricultural systems, which dominate sub–Saharan Africa (Legide et al., 2024; Porteous et al., 2024). Therefore, scaling up inclusive, accessible, and context–specific climate services is essential for building resilient agricultural systems and achieving sustainable development goals across the continent.

Accordingly, initiatives like Africa's Weather and Climate Information Services for Farmers (WISER) and national climate services for agriculture program (e.g., Kenya) have improved decision–making for millions of smallholders (KALRO, 2021; Alliance for Science, 2023; KAOP, 2024). For example, as of December 2024, the AICCRA (Accelerating Impacts of CGIAR Climate Research for Africa) program has reached over seven million farmers across Ethiopia, Ghana, Kenya, Mali, Senegal, and Zambia with enhanced climate services and technologies (World Bank, 2024). This is expected to scale faster and reach several million smallholders in the next few years with fast evolution in digital tools.

When integrated with other CSA interventions such as improved seed systems, regenerative agriculture, and access to financial services, climate advisory services can significantly amplify resilience outcomes.

Digital services

Digital innovations are transforming how African farmers access information, manage inputs, and interact with markets. The following subsections highlight recent developments and their contributions to sustainable agricultural transformation in Africa.

Mobile–based extension platforms

Mobile–based extension platforms are revolutionizing agricultural information dissemination across Africa, overcoming the limitations of traditional extension services through the continent's widespread mobile phone usage. These platforms deliver vital agricultural knowledge, encompassing optimal farming techniques, pest and disease control, market prices, and weather updates, directly to farmers via SMS, voice messages, and mobile applications (Fabregas and Kremer, 2024). Research in Kenya and Rwanda, involving over 128,000 farmers, underscores the cost–effectiveness of SMS–based extension in influencing agricultural practices, achieving significant benefit–cost ratios (Fabregas and Kremer, 2024; Fabregas et al., 2025). Services like iShamba, WeFarm, LERSHA, and Agri–Wallet are reaching millions of users continent–wide. The scale and low marginal cost of these platforms make them particularly suited for reaching dispersed rural populations, addressing gender gaps in information access, and supporting timely adoption of climate-smart practices.

Data–driven digital fertilizer advisories

Data–driven fertilizer advisories are crucial for enhancing smallholder productivity in Africa in a sustainable manner. Unlike traditional blanket fertilizer recommendations, which often ignore local soil and climatic conditions, data–driven approaches use site–specific information, such as soil nutrient profiles, crop type, and weather data, to tailor nutrient applications to individual farm needs (Abera et al., 2022). This precision significantly improves input efficiency and crop yields.

For instance, a recent study in Ethiopia demonstrated that site–specific fertilizer recommendations through increased wheat yields by 16 – 25%, improved nitrogen use efficiency by 30%, and boosted water use efficiency by 33%. This resulted in profit gains of up to $580 per hectare per season (Liben et al., 2023). Digital platforms like AgWise, FarmStack, and SMS–based advisories now deliver these fertilizer recommendations directly to farmers via mobile phones, even in low–connectivity areas.

These systems not only enhance productivity but also reduce environmental degradation by minimizing overuse of fertilizers. As digital tools and AI become more accessible, integrating them into advisory services can empower millions of smallholders with actionable insights, fostering both food security and ecological resilience across the continent (Abera et al., 2022; Digital Green, 2023).

Precision irrigation and drone applications

Precision irrigation and drone technologies are transforming agricultural practices by optimizing water and nutrient use in Morocco, South Africa, and Tunisia. Digital soil sensors provide real–time data on soil moisture and nutrient levels, enabling farmers to apply targeted irrigation and reduce water waste. Meanwhile, agricultural drones are being used for aerial imaging, crop monitoring, and precision spraying, ensuring that fertilizers and pesticides are applied only where needed, minimizing environmental impact. Studies indicate that these innovations have led to a 40% reduction in input waste, significantly improving resource efficiency and crop yields (Guebsi et al., 2024; Nhamo et al., 2020).

AI–driven decision tools

AI is increasingly applied in African agriculture to optimize pest management, soil health, and mechanization coordination, offering enhanced decision-making capabilities that support sustainability (GSMA, 2024a). Two notable AI–driven platforms, PlantVillage Nuru and Hello Tractor AI, have demonstrated significant impacts on smallholder farming in Africa by leveraging machine learning algorithms and predictive analytics.

While platforms such as PlantVillage Nuru and Hello Tractor AI illustrate how machine learning and predictive analytics can improve pest diagnostics, soil health assessment, and equipment scheduling,

AI–powered pest diagnostics: The case of PlantVillage Nuru

Developed by Penn State University, PlantVillage Nuru utilizes deep learning models to analyze crop images and diagnose plant diseases with high accuracy. By employing Convolutional Neural Networks (CNNs), the tool effectively identifies cassava viral infections such as Cassava Mosaic Disease (CMD) and Cassava Brown Streak Disease (CBSD) in field settings. According to Mrisho et al. (2020), PlantVillage Nuru achieves a diagnostic accuracy ranging from 65% to 88%, outperforming traditional extension services in identifying crop infections. The widespread adoption of this AI–driven tool has enabled farmers to take early disease prevention measures, thereby reducing yield losses and improving food and nutrition security.

Mechanization optimization via AI: The case of Hello Tractor AI

Hello Tractor is an agricultural technology platform advancing access to affordable and reliable mechanization across Africa. Hello Tractor AI facilitates efficient mechanization coordination by providing real – time fleet management, predictive maintenance, demand forecasting for tractors and remote booking. The platform applies machine learning algorithms to optimize tractor deployment based on soil conditions, crop type, and seasonal demand. By leveraging remote sensing, field – level data, and AI, Hello Tractor addresses labor shortages and enhances land preparation efficiency for smallholder farmers, particularly in underserved markets like Kenya and Nigeria, while creating a viable commercial model for scaling mechanization in Africa (Anderson et al., 2024).

adoption is constrained by limited rural mobile internet access, estimated at only 25 – 30% in sub-Saharan Africa, and persistent digital gender divides that reduce participation among women farmers (GSMA, 2024b). Addressing these barriers requires investments in rural connectivity, targeted digital literacy programs, and gender-sensitive outreach strategies to ensure equitable access to AI-enabled agricultural services.

Balancing of organic and inorganic inputs (soil health)

The combined application of organic and inorganic inputs is central to sustaining soil fertility and productivity in African farming systems. With soil degradation affecting approximately 65% of Africa's agricultural land (Kihara et al., 2023), the integration of multiple soil fertility approaches, rather than sole reliance on chemical fertilizers or organic amendments, is essential to maintaining long–term productivity and ecological stability.

Organic amendments such as compost and manure increase soil organic matter, enhance water retention, and support beneficial microbial activity, but are often insufficient to meet nutrient requirements at scale. Inorganic fertilizers supply nutrients in readily available forms, yet their overuse can cause nutrient leaching, soil acidification, and other environmental impacts (Mugwe et al., 2019). Integrated Soil Fertility Management (ISFM) addresses these limitations by combining organic amendments with optimized mineral fertilizers, improving yields by 30–60% and increasing soil carbon stocks by 15–30% in smallholder systems (Kihara et al., 2020; Kihara et al., 2021; Chivenge et al., 2021).

Building on these results, AGRA has promoted ISFM adoption in Ethiopia, Kenya, Malawi, and Mozambique (AGRA, 2021; Laub et al., 2024), while long-term trials in Mali, Uganda, and Zambia have shown soil organic carbon gains of 15–20% over five to seven years when compost or manure is combined with nitrogen and phosphorus fertilizers (FAO, 2024; Sileshi et al., 2025).

National policy frameworks are increasingly recognizing the need for balanced fertilization strategies. Some example cases include the following:

- **Rwanda** has integrated ISFM principles into its Fertilizer Policy Reform, with goals to raise fertilizer use to 75 kg/ha by 2024, while promoting agroecological practices that incorporate organic inputs (RMoA, 2018).
- **Uganda**'s organic agriculture is expanding under national strategies emphasizing the dual use of organic amendments and selective inorganic inputs, especially in horticulture and coffee farming systems (UMoAAIF, 2019).

- **Nigeria** is supporting integrated nutrient management through policy shifts that encourage farmer-led composting and training in ISFM, in part to mitigate nutrient imbalances and cost barriers associated with imported chemical fertilizers (FMoARD, 2020).

Adoption of ISFM remains constrained by labor-intensive organic matter preparation, competing uses of crop residues, limited availability of quality organic materials, inadequate technical knowledge among farmers and extension agents, and inconsistent enforcement of fertilizer quality regulations (Stewart et al., 2020; Dimpka et al., 2023; Lehe et al., 2025). With average fertilizer use in sub-Saharan Africa still below 20 kg/ha compared to the global average of about 135 kg/ha (World Bank, 2023), integrated approaches are needed to address both productivity and soil health deficits.

Pluralistic extension innovations

Pluralistic extension systems in Africa engage diverse actors to deliver context-specific agricultural knowledge, offering a more inclusive alternative to traditional state-led models (Snapp et al., 2024). Pluralistic extension systems address the varied needs of smallholders across agroecological zones by engaging public agencies, private agribusinesses, NGOs, farmer cooperatives, and digital platforms. Countries such as Kenya, Ghana, Malawi, and Rwanda have advanced these models through public–private partnerships that scale climate-smart, market-oriented farming practices (Davis et al., 2020; World Bank, 2021). The integration of digital tools, such as mobile–based advisory services and e–extension platforms, has further enhanced the reach and adaptability of these systems, enabling real–time decision support and improved farmer engagement.

AGRA has integrated pluralistic approaches into country-level strategies, aligning extension innovations with climate resilience and market integration goals. It has played a catalytic role in advancing pluralistic extension innovations across Africa by fostering multi–stakeholder collaboration and investing in institutional capacity. Through its country–level strategies, AGRA has supported the development of inclusive extension models that integrate public and private service providers, particularly in countries like Ethiopia, Nigeria, Malawi, and Mozambique.

A notable innovation championed by AGRA is the Village–Based Advisor (VBA) model, which recruits and trains local farmers to serve as trusted intermediaries between formal extension systems, private sector, and farming communities. VBAs deliver peer-to-peer training, distribute inputs, aggregate outputs and offer locally tailored agronomic advice. Over 46,000 VBAs have been trained, reaching about 9 million farmers across eight countries with improved varieties, fertilizer blends, and agronomic practices (Table 1) through AGRA's support.

An impact evaluation found that VBA – supported farmers demonstrated improved adoption of recommended practices, increased resilience to shocks, and better food security outcomes compared to non–beneficiaries (AGRA, 2023b). For example, adoption study findings in Kenya show the

Country	2017	2018	2019	2020	2021	2022	2023
Nigéria		552	5,586	9.869	10,330	11,784	12,957
Tanzania	340	4,750	6,344	6,344	6,344	6,344	10,140
Ghana		150	1,152	3,003	4,719	5,270	5,987
Mali		1,596	4,142	4,642	4,642	4,642	4,642
Burkina Faso		1,138	3,658	4,293	4,293	4,530	5,232
Kenya			510	2,651	3,643	4,286	4,945
Mozambique		1,009	1,311	2,023	2,288	2,288	2,288
Malawi		145	806	806	806	806	806
Total	340	9,340	23,509	33,631	37,065	39,950	46,997

Table 1: Increasing deployment of village–based advisors by country and year. Source: AGRA database.

effectiveness of the VBA model in promoting and scaling of regenerative agricultural practices using three different adoption models which provided same level of adoption pattern (Fig. 3.8). The VBA model enhanced peer–to–peer learning, increased practice bundling, and improved farmer confidence in sustainable practices.

AGRA also emphasizes the importance of a "learning agenda" within extension systems, encouraging iterative feedback, local adaptation, and farmer participation in technology development and dissemination (Snapp et al., 2024). The organization contributes to building resilient, knowledge–driven food systems that are better equipped to meet the challenges of climate change, soil degradation, and food and nutrition insecurity by promoting pluralistic and participatory extension ecosystems, including innovations like the VBA model.

The AGRA VBA model also ensures involvement of women as VBAs reflecting efforts toward gender inclusion while highlighting persistent disparities in women's participation in agricultural extension roles. Despite cultural and structural barriers for full gender parity, the model aims to empower female VBAs to better reach women smallholder farmers (AGRA, 2023a). Scaling pluralistic extension systems will require sustained multi-stakeholder coordination, investment in local capacity, and gender-responsive policies to ensure equitable access and long-term adoption of sustainable farming practices.

Nature–based innovations

Nature–based farming innovations offer long-term sustainability benefits for African smallholders by enhancing soil fertility, sequestering carbon, and improving productivity and resilience to heat and drought. In line with the Kampala CAADP Declaration's emphasis on sustainable land management and agroecological transformation, nature–based innovations such as agroforestry, farmer–managed natural regeneration, and biological nitrogen fixation are being prioritized across the continent. These approaches not only restore degraded ecosystems but also contribute to the declaration's goals of enhancing productivity, resilience, and environmental stewardship. The nature–based sustainable farming innovations that are being scaled–up in different countries are presented below.

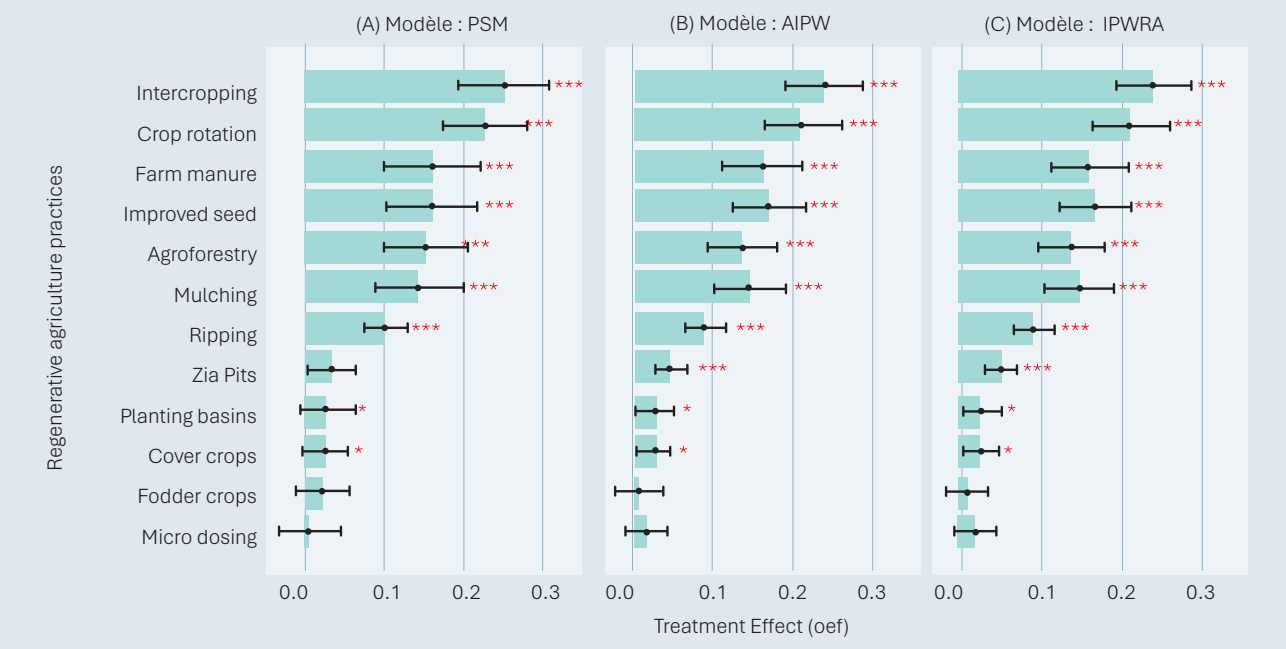

Figure 3.8: Average treatment effect (ATE) of regenerative agriculture (RA) program participation on the adoption of various practices based on three adoption models: (A) PSM, (B) AIPW, and (C) IPWRA models. PSM= Propensity Score Matching; IPWRA= Inverse Probability Weighted Regression Adjustment; AIPW = Augmented Inverse Propensity Weighted estimator. Source AGRA Survey Analysis by *Ermias Aynekulu (unpublished).*

i. **Agroforestry systems:** Agroforestry systems incorporating *Faidherbia albida* intercropping are being promoted in the Sahel region as part of the Great Green Wall initiative. Research suggests that maize and sorghum productivity increased by 150% and 73%, respectively, under the canopy of *Faidherbia albida* trees, while soil organic carbon levels improved significantly (Sileshi et al., 2021; ICRISAT, 1991).

ii. **Farmer–Managed Natural Regeneration (FMNR)**: Burkina Faso, Niger, and Ethiopia reported a resurgence of FMNR, restoring over 7 million hectares of degraded land. Studies highlight that FMNR enhances soil fertility, biodiversity, and agricultural productivity, making it a cost–effective land restoration strategy in Africa (Binam et al., 2017; Chomba et al., 2020).

iii. **Push–pull technology**: Research from the International Centre of Insect Physiology and Ecology (ICIPE) highlights that Push–Pull technology, which integrates Desmodium and Napier grass, has been widely adopted in East Africa, significantly improving maize yields, and reducing pesticide use. Studies indicate that maize yields increased from below one ton per hectare to 3.5 tons per hectare under this system (ICIPE, 2024).

iv. **Biological nitrogen fixation**: Over one million smallholders in Eastern and Southern Africa now use rhizobia inoculants in legume farming, enhancing nitrogen fixation, reducing reliance on synthetic fertilizers, and improving yields. Adoption has been accelerated by regional partnerships, funding initiatives, and targeted promotion (Karanja & Woomer, 1998; Mungai & Karubiu, 2017). Research from South Africa underscores the value of selecting efficient indigenous rhizobia strains, which significantly enhance tropical legume productivity and nitrogen fixation efficiency (Epule et al., 2022).These examples underline the growing role of biological nitrogen fixation in sustainable agriculture, improving soil health, crop yields, and environmental resilience among African smallholder farmers.

Scaling nature-based innovations will require coordinated policy support, investment in research on locally adapted species and practices, and integration into extension systems to ensure adoption at scale.

Pathways for scaling sustainable farming and resilience in Africa

The future of sustainable farming in Africa depends on removing systemic barriers and mobilizing coordinated global and regional support. The following evidence-based strategies can accelerate the transformation of African agrifood systems.

i. **Promote sustainable intensification through technology and innovation:** Investments should prioritize sustainable intensification practices that boost yields while preserving ecological integrity, including scaling climate-smart agriculture (CSA), regenerative practices, and nature-based solutions. Strengthen plant breeding and seed systems to deliver climate-resilient, nutrient-dense, and pest-resistant crop varieties, supported by public–private partnerships.

ii. **Strengthen seed systems and input delivery:** Improved seed systems are central to scaling sustainable agriculture. Use the SSPI to benchmark progress and guide investments. Expand access to high-quality seeds for both improved and traditional climate-resilient crops, enhance regulatory frameworks, and strengthen partnerships among governments, private actors, and farmer cooperatives to improve last-mile input delivery.

iii. **Scale integrated soil fertility and water management:** ISFM combining organic and inorganic inputs can improve soil health, raise productivity, and reduce environmental impacts. Investments should focus on composting, agroecological training, and efficient irrigation technologies, including solar-powered and precision systems, to boost water-use efficiency and drought resilience.

iv. **Expand inclusive digital and advisory services:** Digital platforms are transforming agricultural extension by offering bundled services that include advisories, market prices, input recommendations, and insurance. Models such as VBAs and mobile advisories reach millions of smallholders, but scaling them requires bridging digital access gaps, particularly for women and youth. Thus, efforts must address digital access disparities and extension services. Targeted

digital literacy programs, localized content, and affordable connectivity packages will be essential to close gender and age-related access gaps.

v. **Strengthen resilience through climate risk management:** Climate–resilient farming systems require integrated risk management strategies, including climate information services, weather–index insurance, and early warning systems. Investments in nature–based solutions such as agroforestry and landscape restoration can buffer farms from climate shocks and contribute to long–term ecological stability and resilience.

vi. **Deepen policy alignment and institutional coordination:** Effective policy implementation demands alignment with global and continental frameworks such as the SDGs, the CAADP Post–Malabo Agenda, and Agenda 2063. This requires stronger coordination among government, research institutions, and farmer organizations to ensure coherent action, effective resource mobilization, and efficient use of funds.

vii. **Empower women, youth, and local communities:** Sustainable farming and resilience efforts must be inclusive. Women and youth face persistent barriers to land, finance, and technology, which must be addressed through gender–responsive and youth–focused programs. Indigenous knowledge and community–based approaches should also be integrated into policy and extension systems.

viii. **Mobilize sustainable finance and investments:** Scaling sustainable farming requires blended finance mechanisms, climate adaptation funds, and ecosystem payment schemes to incentivize sustainable practices. Support is needed to strengthen the financial capacity of farmers and cooperatives and to facilitate access to markets and insurance.

Coordinated action across these pathways will enable African agriculture to achieve higher productivity, resilience, and environmental sustainability while meeting continental and global development targets.

Conclusion

Evidence shows that while Africa's agricultural output has grown, most gains stem from land expansion rather than yield improvements. This land-intensive model is unsustainable under pressures from land degradation, climate change, and rapid population growth. Sustainable farming and resilience–building must, therefore, become central to current and future agrifood system strategies.

Productivity in cereals, pulses, vegetables, and oil crops varies sharply across regions, requiring interventions tailored to local ecological and socio-economic contexts. Climate-smart agriculture, regenerative methods, integrated soil fertility management, and digital decision-support systems are improving productivity, resilience, and profitability. Scaling these requires enabling policies, inclusive extension, and greater access to finance, inputs, and markets.

Institutional models such as VBAs and SSPI highlight the value of localized knowledge delivery and accountability. Nature-based innovations including agroforestry, push–pull systems, and biological nitrogen fixation deliver scalable benefits for both farmers and ecosystems.

Transforming Africa's agrifood systems into sustainable, resilient growth engines is both feasible and urgent. Success depends on political commitment, scientific innovation, grassroots engagement, and coordinated action across sectors and levels.

Scaling sustainable farming and resilience in Africa requires a multi-pronged approach that includes agroecological transitions, expanded digital and climate services, improved access to quality inputs and markets, and greater participation of women and youth in agricultural innovation. The Kampala CAADP Declaration (2025), the Africa Fertilizer and Soil Health Summit Declaration (2024), the Africa Climate Summit Declaration (2023), and Agenda 2063 provide a strong policy foundation for these transformations. Realizing their goals will require stronger national ownership, greater private sector engagement, and effective international partnerships. Aligning these policy commitments with targeted investments and inclusive implementation frameworks will be critical to achieving lasting agricultural resilience across the continent.

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4 Food baskets and corridors in Africa: from production zones to engines for agri-food systems transformation

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KEY MESSAGES

1 Expanding but uneven trade
Intra-African agri-food trade has tripled since 2003, with processed foods now dominating flows, but progress is uneven. Persistent barriers, concentrated imports, and reliance on raw exports constrain integration, while diversified exports create resilience and new market opportunities.

2 Food baskets and corridors as transformation drivers
Strategically developed food baskets and corridors can connect surplus and deficit areas, unlock regional staple crop supply, and advance AfCFTA's vision of an integrated agri-food market. Weak infrastructure, climate risks, and limited agro-processing remain key bottlenecks.

3 Innovation, urbanization, and governance reshaping systems
Climate-smart innovations, irrigation, and water management are expanding under environmental stress. Rapid urban demand for processed, higher-value foods, growing 2–4 times faster than rural demand, requires investment in cold chains, agro-processing, and policy harmonization through strong institutions and corridor authorities.

4 Targeted investments for inclusive, resilient growth
Priority investments in infrastructure, agricultural inputs, market systems, governance, and finance can unlock inclusive growth. Blended finance and inclusive models expand access for SMEs, women, and youth, while harmonized policies and empowered institutions drive sustainable and climate-resilient development.

Introduction

Africa's agricultural sector underpins rural livelihoods and economic development, yet its potential is constrained by low productivity, weak market integration, and chronic under-investment in research and development, infrastructure, irrigation, extension, and finance (Khan et al., 2024). These constraints blunt inclusive growth and food security. This chapter examines the state of intra-African agri-food trade and the evolution of food baskets and corridors as emerging drivers of regional integration and food systems transformation. Although intra-African trade has expanded over the past two decades, particularly in processed foods, it remains uneven and concentrated, with many countries still dependent on raw commodity exports and exposed to external shocks. Food baskets and corridors are increasingly recognized as strategic vehicles to bridge these gaps by linking high-potential production zones to regional and continental markets through stronger infrastructure, market systems, and policy alignment.

Positioning food baskets and corridors within the broader food systems transformation agenda, the chapter underscores their role in advancing food security, building climate resilience, and fostering inclusive economic growth. These spatial approaches offer pathways to strengthen value addition, reduce dependence on extra-continental imports, and advance the AfCFTA vision of an integrated agri-food market. At the same time, persistent challenges, including weak infrastructure, fragmented standards, and limited institutional coordination, continue to constrain their potential impact.

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The chapter pursues four main objectives. First, it establishes the current status and performance of intra-Africa food trade. Second, it provides a description of food baskets and corridors in Africa. Third, it traces the key drivers of change shaping their development, including innovation, urbanization, governance, and environmental pressures. Fourth, it identifies the strategic investments and policy actions needed to scale their impact, unlock trade opportunities, and drive inclusive, sustainable, and resilient agri-food systems. Taken together, these elements provide a framework for understanding how food baskets and corridors can move from concept to engine, accelerating Africa's agricultural transformation and strengthening the continent's role in global food systems.

The status of intra-African agri-food trade

Intra-African food trade has more than doubled since 2003, driven by rising demand, better trade facilitation, and initiatives like the AfCFTA. Despite growth in both raw and processed products, trade remains uneven and below potential due to infrastructure gaps, non-tariff barriers, and fragmented standards. A few countries, South Africa, Egypt, and Kenya, account for a large share of exports, while many others remain more reliant on extra-African markets. This section tracks three themes: the balance between raw and processed goods, product diversification, and the role of non-tariff measures.

Raw vs processed foods

Intra-African agricultural trade remains weighted toward primary commodities, notably cereals, oilseeds, and unprocessed animal products, reflecting historical patterns and structural constraints. UNCTAD (2023) finds exports are still skewed to primary products, with limited diversification and weak intra-regional production linkages. The result is low domestic value addition and heightened exposure to global price swings and external supply-chain shocks.

Nonetheless, the share of processed products in intra-African trade has risen. Processed foods, refined oils, packaged goods, beverages, now account for over two-thirds of Africa's food exports (AfDB, 2024). South Africa, Egypt, and Kenya lead this shift, leveraging deeper agro-processing and better logistics (Badiane, 2024). This trend signals a modest but important move towards greater value addition and industrialization within the continent's agri-food systems.

The figures above show that since 2003, processed exports, both within and beyond Africa, have risen steadily, now exceeding two-thirds of total food exports, while total intra-African agri-food trade has more than doubled to roughly US$14 billion by 2022 (Badiane, 2024). Growth has been concentrated in stimulants/tobacco, oils and oilseeds, and animal products; gains in cereals, vegetables, and beverages are more modest.

A dual reality persists: smallholders operate in fragmented markets across 54 countries, and inconsistent trade/competition policies, customs delays, varying standards, licensing hurdles, suppress cross-border flows (AfDB, 2022). Finance remains a binding constraint: 55–75% of needs go unmet and borrowing costs of 10–30% far exceed the 2–5% typical in advanced economies (European Investment Bank, 2022).

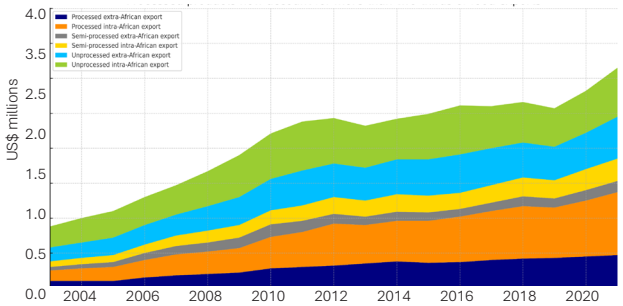

Figure 4.1: Africa's food export composition, 2003–2021, processed and semi-processed products now exceed two-thirds of total food exports. Source: Badiane (2024).

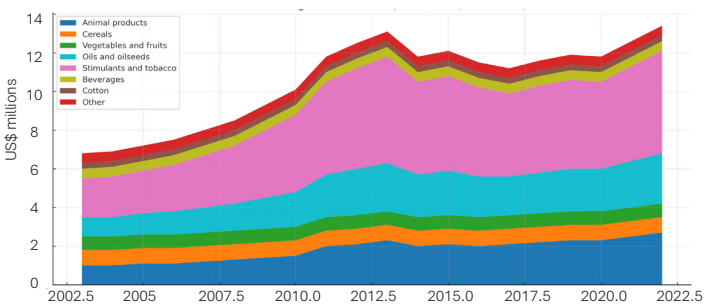

Figure 4.2: Intra-African agricultural trade by category, 2003–2022 (estimated), trade more than doubled, led by stimulants/tobacco, oils/oilseeds, and animal products. Source: Badiane (2024).

Infrastructure gaps compound these frictions. Sparse road density limits connectivity from production zones to markets (AfDB, 2022); only ~5% of cropland is irrigated (Japan International Cooperation Agency [JICA] & African Center for Economic Transformation [ACET], n.d.); and ~43% of Africans lack electricity, constraining processing, and cold chains (International Energy Agency [IEA], 2022). Persistent under-investment in agri-infrastructure further slows structural transformation (FAO, 2021; AVCA, 2022; Pitchbook & Preqin, 2020–2022).

In short, Africa's food trade still skews toward raw commodities because of limited processing capacity, high logistics costs, and fragmented domestic markets (FAO, 2024). The rising processed share and emerging regional value chains, however, point to a pragmatic pathway forward, conditional on policy alignment, reduced non-tariff frictions, targeted transport/energy investments, and expanded access to affordable finance.

Intra-African import flows

Intra-African agricultural trade is asymmetrical, with imports concentrated among a few supplier countries. Most intra-African imports come from a small group of exporters, reflecting limited diversification across key food categories (AATM, 2024). High Herfindahl-Hirschman Index (HHI) values confirm reliance on few trading partners, creating strategic dominance for key suppliers and exposing the agrifood trade system to supply risks.

The intra-African agri-food import landscape reveals a clear pattern of supplier concentration, with South Africa emerging as the dominant source across most product categories. South Africa leads in seven of the ten key agri-food categories (Badiane, 2024; AATM, 2024), with notable shares in beverages, spirits, and vinegar (55.7%), cereals (47.6%), fruits and nuts (39.3%), and cereal-based preparations (38.6%). This dominance reflects South Africa's advanced agro-processing sector, strong logistics, and extensive regional trade linkages, positioning it as a hub for processed and semi-processed food products in Africa.

Other countries also play significant but more product-specific roles. Kenya leads in coffee, tea, mate, and spices (40.3%), supported by its globally recognized tea industry and strong regional trade networks. Ethiopia dominates in vegetables and certain roots and tubers (32.2%) due to diverse agro-ecological zones and proximity to East African markets. Eswatini supplies most sugar and sugar confectionery

Table 4.1: Intra-African agri-food imports, selected products. Source: Badiane, 2024; AATM, 2024.

Product	Country	Market share (%)	Number of intra-African sources with market share >1%	HHI of intra-African import source diversification
Animal or vegetable fats and oils	South Africa	23.0	17	0.105
Sugars and sugar confectionery	Eswatini	24.3	14	0.124
Beverages, spirits, and vinegar	South Africa	55.7	14	0.327
Cereals	South Africa	47.6	10	0.290
Miscellaneous edible preparations	South Africa	38.1	10	0.203
Tobacco and manufactured tobacco substitutes	South Africa	15.5	12	0.107
Vegetables and certain roots and tubers	Ethiopia	32.2	11	0.179
Coffee, tea, mate, and spices	Kenya	40.3	16	0.202
Preparations of cereals, flour, starch or milk	South Africa	38.6	15	0.186
Fruits and nuts, edible	South Africa	39.3	13	0.193

(24.3%), reflecting long-standing specialization in sugar production. However, while several countries contribute to intra-African food trade, their influence is often limited to niche product segments, reinforcing the region's asymmetrical trade structure.

HHI offers a quantitative measure of import source concentration and highlights limited diversification in many product categories. Beverages (0.327) and cereals (0.290) have the highest HHI values, indicating heavy reliance on few suppliers, particularly South Africa. Animal or vegetable oils (0.105) and tobacco (0.107) show more diversified sourcing. Even where multiple suppliers hold market shares above 1%, imports remain concentrated, creating vulnerability to supply shocks and underscoring the need to expand regional sourcing. Strengthening agri-food trade diversification could improve food security and build resilience within Africa's internal markets.

The degree of export diversification

Export diversification in intra-African agricultural trade is relatively balanced and resilient, in contrast to the more concentrated import flows. Key food products are exported to a wide range of African countries, up to 30 in some categories, with consistently low Herfindahl-Hirschman Index (HHI) values (all below 0.15), indicating broad market distribution. This diversification mitigates the risk of market-specific shocks and reflects the development of specialized regional trade corridors for certain commodities.

The data underscores the role of North and Southern Africa as primary regional markets, while also pointing to a high degree of intra-African export diversification. Ten major agri-food product categories are identified, each with a leading exporter and a wide base of destinations. For example, Egypt leads in coffee, tea, mate, and spices exports (31.5%), Somalia dominates vegetables and tubers (23.7%), and South Africa is prominent in sugars and sugar confectionery (22.9%). Other active exporters include Zimbabwe, Botswana, Mozambique, and Morocco, reflecting multiple regional trade corridors.

Export distribution patterns differ from import flows due to the wide reach across destinations. Many products are shipped to more than 20 African countries with market shares exceeding 1%, including miscellaneous

Table 4.2: North and Southern Africa are key markets but exhibit a high degree of export diversification. Source: Badiane, 2024; AATM 2024 database.

Product	Country	Market share (%)	Number of intra-African destinations with market share > 1%	HHI of intra-African export destination diversification
Animal or vegetable fats and oils	Zimbabwe	11.3	25	0.049
Sugars and sugar confectionery	South Africa	22.9	22	0.089
Beverages, spirits, and vinegar	Botswana	12.2	22	0.062
Cereals	Zimbabwe	16.8	15	0.091
Miscellaneous edible preparations	Mozambique	7.1	30	0.035
Tobacco and manufactured tobacco substitutes	Egypt	8.3	25	0.040
Vegetables and certain roots and tubers	Somalia	23.7	23	0.084
Coffee, tea, mate, and spices	Egypt	31.5	17	0.138
Preparations of cereals, flour, starch or milk	Botswana	8.6	29	0.037
Fruits and nuts, edible	Morocco	17.8	22	0.078

edible preparations (30 destinations), preparations of cereals, flour, starch or milk (29), and tobacco (25). Low HHI values, all below 0.15, confirm minimal dependence on any single market. Even coffee, tea, and spices, the most concentrated category, record a HHI of 0.138, showing that while key exporters exist, they do not dominate the market entirely.

Such diversification strengthens resilience and inclusiveness in intra-African agri-food trade. It lowers vulnerability to market-specific disruptions and demonstrates the potential for inclusive growth, even for smaller or landlocked economies such as Botswana and Zimbabwe. Policy coherence, infrastructure development, and trade facilitation remain critical to sustaining these gains. This dispersed export structure aligns with AfCFTA's goal of balanced regional integration (AATM, 2024).

Non-tariff measures in intra-African trade

Non-Tariff Measures (NTMs) continue to impose significant constraints on intra-African trade, as reflected by three key indicators: frequency index, coverage ratio, and prevalence score. Algeria, Morocco, and Cabo Verde record the highest frequency indices (70–76%), meaning most of their product categories face NTMs. Tunisia's coverage ratio is about 71%, indicating a substantial share of its import value is affected.

In the chart above, the blue bars represent the NTM Frequency Index (percentage of products affected), orange bars the NTM Coverage Ratio (percentage of imports subject to NTMs), and grey bars the NTM Prevalence Score (average number of NTMs per product). Guinea, Morocco, and Algeria have some of the highest prevalence scores, with 68, 45, and 42 NTMs per product category respectively. These measures include technical regulations, sanitary and phytosanitary standards, licensing, and other administrative procedures that differ widely across countries. The widespread nature of NTMs reveals the extent of regulatory fragmentation in Africa's trade environment.

As AfCFTA continues to advance, this evidence makes clear that eliminating tariffs alone will not deliver the full promise of regional integration. The persistence of complex and divergent regulatory requirements remains a major obstacle to the smooth flow of goods across borders. For meaningful progress, trade policy reform must prioritize the harmonization of product standards, the streamlining of customs procedures, and the reduction of regulatory complexity. Addressing these behind-the-border barriers is essential not only for enhancing trade competitiveness but also for ensuring that small and medium enterprises, who often lack the capacity to navigate such hurdles, can fully participate in the continental market.

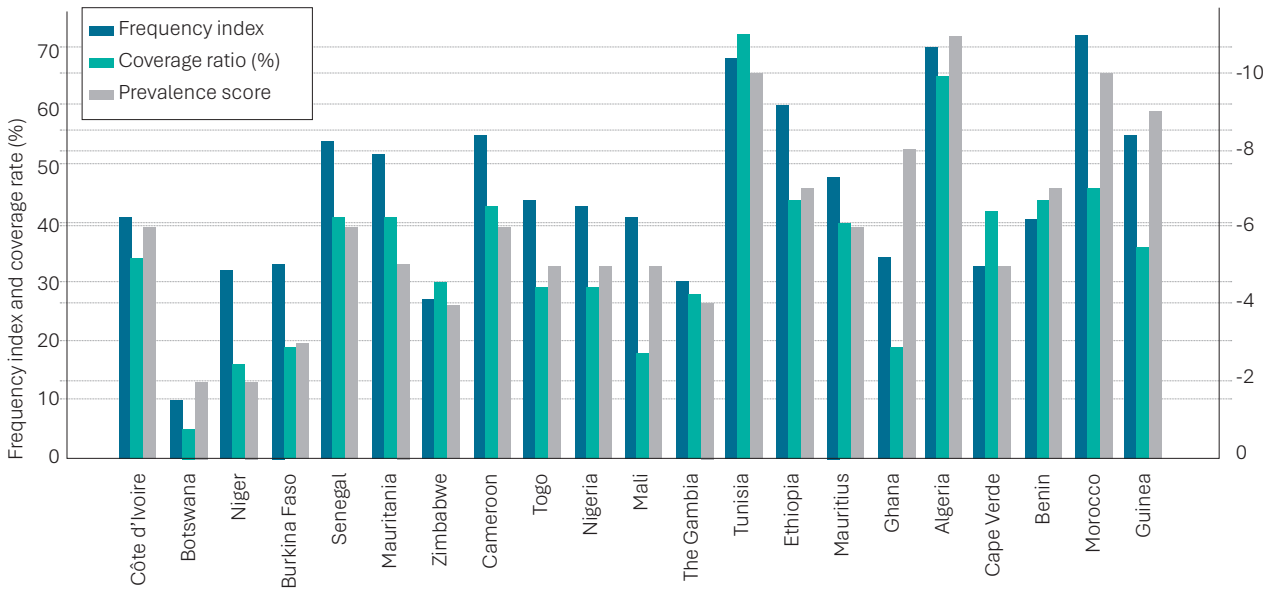

Figure 4.3: Non-tariff barriers as the driver of intra Africa trade obstacles. Source: (Badiane, 2024)

Propelling intra-African agri-food trade

The Kampala Declaration sets a target to triple intra-African agricultural trade by 2035. It positions trade as a driver of food security, job creation, and rural transformation (African Union Commission, 2023). Achieving this vision requires more than political will, it calls for coordinated and sustained investments in productive capacity, market-enabling infrastructure, and regulatory reform. CAADP provides a strategic framework to advance this agenda. SO1 targets market access through tariff and non-tariff barrier removal and standards harmonization. SO2 promotes competitive, inclusive regional value chains, supported by SO4's focus on transport, energy, and trade logistics to connect production zones with demand hubs.

The AfCFTA Secretariat, in collaboration with AGRA, is formulating a continental Agri-Trade Action Plan building on this strategic foundation. The plan addresses trade barriers, boosts agro-processing and value addition, and supports agro-industrialization inclusive of smallholders, women, and youth-led enterprises (AfCFTA, Secretariat; AGRA, 2024). The Action Plan will promote value chain-specific interventions that enhance inclusive trade and target the participation of youth and women-led enterprises aligned with AfCFTA's broader goal of a unified and competitive agri-food market.

By aligning the Kampala Declaration's bold targets with the CAADP strategy and AfCFTA implementation, Africa has a unique opportunity to reconfigure its agri-food trade systems towards greater resilience, equity, and sustainability.

However, many African economies continue to face significant logistical and regulatory constraints. Customs delays, fragmented standards, and high transaction costs persist across regions. For example, the World Bank (2025) highlights that despite localized production gains, food insecurity persists across the continent due to poor distribution systems and inefficient regional trade flows. These systemic bottlenecks limit the ability of surplus-producing areas to supply food to deficit regions, undermining the promise of continental trade integration.

These inefficiencies are evident in weak links between rural production zones and urban consumption centers, driven by inadequate corridors, cold chains, and transport infrastructure. While some progress has been made, such as regional trade corridors in East and Southern Africa, many regions remain disconnected, especially in West and Central Africa (Badiane et al., 2024; AATM, 2024). As a result, agricultural surpluses frequently rot at the farm gate, even as neighboring countries face acute food shortages. Bridging these gaps requires not only harmonized trade policy but also heavy investment in physical infrastructure, especially roads, storage, border facilities, and energy access.

In light of this, the food basket and corridor approach emerges as a practical and transformative framework to operationalize the AfCFTA's agri-food vision. Africa can connect surplus areas to urban and regional demand centers more efficiently by identifying and investing in high-potential production zones (food baskets) and linking them to strategic trade and logistics routes (corridors). This approach also lays the foundation for building regional value chains, facilitating inclusive trade, and enhancing resilience to climate and market shocks, making it essential to Africa's broader agricultural transformation agenda.

The notion and status of food baskets and corridors in Africa

The concept emerged in the 1990s to enhance food security by leveraging Africa's agroecological diversity. CAADP formalized the approach, emphasizing investment in high-potential areas and improved connectivity. PIDA and regional trade frameworks expanded the corridor model to strengthen intra-African trade. Recent forums, including Dakar II, have reinforced baskets and corridors as central to Africa's agricultural transformation, though implementation remains uneven across regions.

The evolution of food baskets and corridors

Over the past two decades, Africa's food baskets and corridors have evolved from fragmented agricultural zones into integrated systems aimed at enhancing food security and economic resilience. Food baskets, meaning high-potential agricultural regions in terms of agro-ecological potential, were historically limited by poor infrastructure and market access (FAO, 2017; World Bank, 2011). The development of food

corridors has partially addressed these constraints by linking production areas to processing hubs and markets through strategic transport and trade infrastructure (UNECA, 2019; AfDB, 2020). This shift has been supported by policy reforms, investment in agro-industrialization, and regional initiatives such as AfCFTA, that promotes intra-African trade and value chain integration (Tralac, 2021). Institutions like AGRA, FAO, and the World Bank have further advanced this transformation through advocacy for sustainable agriculture and infrastructure development (AGRA, 2022; FAO, 2021).

This evolution has been marked by greater private sector engagement, technological innovation, and adoption of climate-smart practices. Governments and development partners have prioritized agro-processing clusters, storage infrastructure, and digital platforms to reduce post-harvest losses and streamline supply chains (OECD-FAO, 2016; World Bank, 2020). These interventions have shifted agriculture from subsistence to market-oriented models capable of meeting rising urban food demand. However, challenges such as inconsistent policy implementation, limited financing, and weak access to services persist (FAO, 2017; UNECA, 2019). Realizing the full potential of food baskets and corridors will require sustained collaboration among governments, private investors, and farmer organizations to build inclusive, resilient, and competitive food systems.

Food baskets and corridors: definition, concept, and rationale

Africa's recent exposure to external shocks, most notably the COVID-19 pandemic and the Russia–Ukraine war, has highlighted the continent's urgent need for more resilient, self-sufficient food systems. These global crises disrupted supply chains, escalated the costs of food, fertilizer, and fuel, and exacerbated food insecurity across many African countries (AGRA, 2025). In response, governments and regional institutions are shifting focus towards strategies that prioritize local agricultural production, strengthen intra-African trade, and build long-term economic resilience.

A food basket refers to a high-potential agricultural zone, often spanning borders, characterized by strong productivity, reliable water availability, and relatively robust infrastructure for transport and market access (FAO, 2024). These zones are strategically identified to optimize agricultural output and support efficient distribution to meet rising demand. Complementing these zones are agricultural corridors. These are the enabling infrastructure and logistics systems, including roads, railways, energy grids, and storage facilities, that connect production areas to urban and regional markets (World Bank, 2023). Together, food baskets and corridors form integrated agro-food ecosystems that support production, processing, trade, and inclusive value chain development.

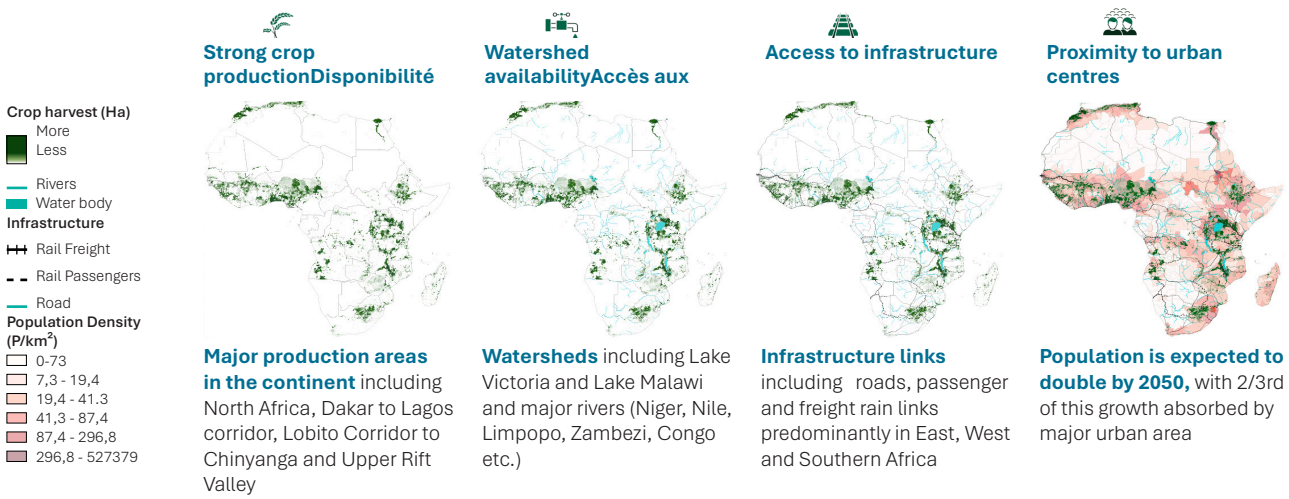

Figure 4.4: Highlight of Africa's main food baskets. Source: IFPRI's SPAM crop disaggregated production, FAT AQUASTAT rivers and water bodies, European commission Africa Knowledge platform – trade corridors, WorldPop population density; AfDB: Cross-border road corridors (2019).

This approach is central to Africa's broader agricultural transformation agenda. AUC and AUDA-NEPAD have integrated the concept of food baskets and corridors into frameworks such as the Africa Food Security Plan, CAADP, and the Kampala Declaration. These strategies emphasize sustainable intensification, regional value chain development, and corridor-based trade, particularly under AfCFTA (AGRA, 2025). Realizing this vision depends on improving productivity, building climate resilience, enhancing trade connectivity, and mobilizing coordinated public and private investment (UNECA, 2024).

Leading institutions such as the AfDB and AGRA view food baskets and corridors as a strategic shift from fragmented smallholder systems to integrated, business-oriented agricultural value chains that can drive rural transformation and continental competitiveness (AfDB, 2023; AGRA, 2025). Despite Africa's agro-ecological diversity, many high-potential food baskets are still underdeveloped due to chronic underinvestment, weak infrastructure, and limited agro-industrial capacity (World Bank, 2019). Unlocking their potential requires a paradigm shift from exporting raw commodities to building integrated agro-food systems that add value, create jobs, and reduce import dependency. Strategically strengthening these systems through corridor investments and policy alignment is not only a developmental priority, but also key to achieving sustainable food security and economic sovereignty across the continent.

In this context, the conversation around food baskets and corridors has never been more urgent or relevant. Climate shocks, global supply chain disruptions, and rising food import bills have exposed the vulnerability of Africa's food systems and underscored the need for regional self-reliance. Investing in food baskets, geographically concentrated zones of high agricultural potential, and linking them to well-developed corridors can drastically improve the flow of goods, inputs, and services across borders. This approach not only boosts local productivity and intra-African trade but also helps reduce post-harvest losses, stabilize food prices, and build regional buffers against external shocks. As Africa seeks to operationalize AfCFTA and implement the goals of the Malabo Declaration and CAADP, food baskets and corridors provide a concrete framework to translate continental ambitions into local realities connecting smallholders to markets, transforming rural economies, and laying the foundation for a more resilient and inclusive agri-food system.

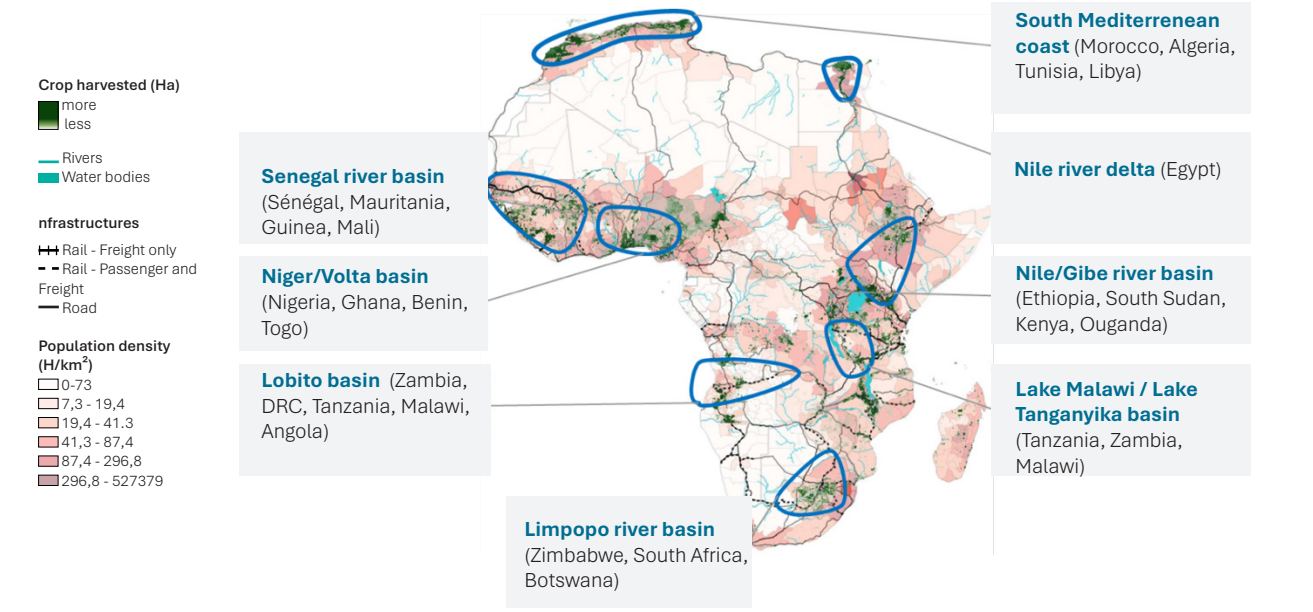

Figure 4.5: Key food baskets and agricultural trade corridors in Africa, highlighting major river basins and coastal zones. Source: IFPRI's SPAM crop disaggregated production, FAT AQUASTAT rivers and water bodies, European commission Africa Knowledge platform – trade corridors, WorldPop population density; AfDB: Cross-border road corridors (2019)

The status of Africa's food baskets and corridors

Africa's food baskets and corridors underpin the continent's agricultural economy but perform unevenly due to infrastructure gaps, limited storage, and climate vulnerability (FAO, 2017; World Bank, 2020). Some regions have improved productivity and market access through better infrastructure and technology, yet many remain constrained by poor connectivity and fragmented policies, reducing their contribution to food security and rural livelihoods (UNECA, 2019; OECD-FAO, 2016). AfCFTA has improved intra-African trade, but food insecurity persists, particularly in West and Central Africa, where over 50 million people face hunger due to conflict, economic instability, and climate extremes (Tralac, 2021; FAO, 2023). Addressing these challenges requires coordinated investment in infrastructure, adoption of climate-smart agriculture, and harmonized policies (AGRA, 2022; AfDB, 2020). This section reviews key food baskets and corridors shaping Africa's agri-food transformation.

The Southern Mediterranean Coast

The Southern Mediterranean Coast, comprising Morocco, Algeria, Tunisia, and Libya, is a vital North African food basket, with fertile coastal plains, developed irrigation systems, and proximity to Mediterranean export markets. Over the past 15 years, agricultural intensification has increased cereal, fruit, and olive production, enhancing both domestic supply and exports (FAO, 2023). Morocco leads in addressing water scarcity and salinization through widespread drip irrigation adoption and expanding value-added processing, diversifying exports into higher-value products like olive oil and fruit preserves. Algeria and Tunisia have increased greenhouse vegetable production to meet growing urban demand. Nonetheless, recurrent droughts, urbanization, and declining freshwater resources constrain arable land and limit further production and processing growth (World Bank, 2022).

Agriculture has historically supported rural livelihoods and food security across the region, anchored by diversified farming and strong local markets. However, rising climate variability, land degradation, and water stress now intensify pressures on productivity. Increasing input costs, limited irrigation coverage, and fragmented value chains restrict competitiveness and sector growth (OECD, 2021; 2023). Governments promote modernization and climate-smart agriculture, but progress is uneven, while informal trade continues to dominate regional food exchanges.

These regional experiences offer lessons for Africa's broader agricultural corridors, particularly in market access, standards alignment, and value chain modernization. Morocco's expansion of citrus and vegetable exports has been driven by aligning national standards with EU sanitary and phytosanitary requirements and investing in traceability systems (OECD-FAO, 2023). Tunisia and Libya face market access challenges due to weak certification and underdeveloped marketing platforms (ANIMA, 2023; FoodChain ID, 2023). Algeria's export potential is hindered by inconsistent standards and logistical issues despite growing domestic demand (FreshPlaza, 2023; Maouche, 2024). Internationally, Turkey's efficient logistics and trade agreements have boosted processed fruit and vegetable exports (Yilmaz & Altunisik, 2023). Vietnam's investments in export packaging and contract farming have strengthened its global rice presence (USDA FAS, 2023).

Nile River Delta

The Nile River Delta is Egypt's most critical agricultural zone, producing a large share of the country's wheat, rice, and horticultural crops (FAO, 2020; World Bank, 2022). However, its productivity is increasingly threatened by soil salinization, nutrient depletion, and poor drainage due to decades of intensive farming (UNEP, 2023). Rapid urbanization and population growth are reducing available farmland, while upstream water management tensions, particularly surrounding Ethiopia's GERD dam, are creating uncertainty around future water availability and stressing irrigation systems (World Bank, 2022; IFPRI, 2022).

The region's agricultural trade remains heavily weighted towards unprocessed staples, limiting value addition and rural employment opportunities (UNEP, 2023; OECD-FAO, 2023). Although recent government efforts have focused on expanding rice milling and vegetable packaging to modernize agro-processing, these initiatives face setbacks from fragmented supply chains, infrastructure deficits, and ongoing environmental degradation (FAO, 2023; World Bank, 2022). Climate-smart agriculture and water reuse

practices are being introduced, but their impact is constrained by persistent land degradation, salinity, and the growing threat of sea-level rise (IPCC, 2023). Overall, the Nile Delta's future hinges on integrated strategies that balance agricultural productivity with ecological and water resource sustainability.

Positioning the Nile Delta within broader food basket and corridor initiatives presents a powerful opportunity to transform the region into both a key driver of national food security and a competitive hub for regional agricultural trade. As one of Africa's most intensively cultivated areas, the Delta has the agroecological capacity, workforce, and geographic positioning adjacent to key Mediterranean and African trade routes to become a cornerstone of regional agri-food value chains. However, to realize this vision, interventions must go beyond isolated productivity gains. A corridor approach can integrate investments in transport and logistics infrastructure, such as cold chain systems and road-to-port networks, with policy reforms that reduce trade costs and align quality standards with regional markets.

Nile/Gibe River Basin

The Nile/Gibe River Basin, which spans Ethiopia, South Sudan, Kenya, and Uganda, is a vital agricultural region supporting both rain-fed and irrigated farming systems. It produces a diverse mix of staples such as maize, teff, and beans, as well as a growing array of horticultural crops. While parts of the basin, particularly in Uganda and Kenya have made notable progress in expanding coffee and horticultural exports, these gains are largely attributed to targeted investments in extension services, infrastructure, and cold chain systems that reduce post-harvest losses and improve access to domestic and regional markets (FAO, 2024). However, other areas, especially in Ethiopia and South Sudan, continue to face mounting climate pressures, including erratic rainfall and recurrent flooding, which undermine production stability and food security (World Bank, 2023).

Despite signs of transformation, the basin is burdened by significant environmental and governance challenges. Widespread deforestation and soil erosion have led to declining land productivity and growing ecosystem fragility (UNEP, 2023). At the same time, upstream water infrastructure, such as Ethiopia's dam projects, have raised concerns about equitable water distribution and the health of downstream ecosystems. These developments have increased tensions among riparian countries and placed additional stress on farming communities in South Sudan and Uganda, who rely heavily on predictable water flows for crop and livestock production (World Bank, 2023; IFPRI, 2024). Furthermore, while export revenues from coffee and horticulture are rising, the basin's staple crops are still primarily traded in unprocessed form, offering limited economic returns to smallholder producers (FAO, 2024).

To fully harness the basin's potential, a coordinated, cross-border food basket and corridor strategy is essential. Such an approach would enable countries to collectively invest in climate-resilient infrastructure, harmonize trade and water management policies, and scale agro-processing capacity that adds value closer to the source of production. Integrating smallholders into these value chains, particularly in fragile areas of Ethiopia and South Sudan, will improve livelihoods while enhancing regional food system resilience. The Nile/Gibe Basin's agroecological capacity, workforce, and strategic location position it as a cornerstone of regional agri-food value chains. Realizing this potential will require integrated investments in cold chain, road-to-port networks, and quality standards alignment to reduce trade costs and enhance competitiveness.

Lake Malawi / Lake Tanganyika Basin

The Lake Malawi and Lake Tanganyika Basin, which spans parts of Tanzania, Zambia, and Malawi, plays a crucial role in supporting rural livelihoods through rain-fed agriculture. Key crops cultivated in the region include maize, cassava, rice, and legumes, which depend on the health of surrounding freshwater ecosystems. These ecosystems not only provide water for irrigation but also support fisheries and biodiversity. Although the region benefits from moderate rainfall and fertile valleys, increasing population density and land use pressure have led to widespread deforestation and soil degradation, undermining the long-term sustainability of agricultural production (IFPRI, 2023; UNEP, 2024).

In response to these environmental challenges, governments and development partners have promoted sustainable farming practices such as conservation agriculture and small-scale irrigation. Initiatives like Malawi's Agriculture Commercialization

Project and Tanzania's Southern Agricultural Growth Corridor (SAGCOT) have shown potential in improving crop yields and enhancing resilience to climate variability. However, the adoption of these practices remains inconsistent across the basin. Many smallholder farmers face barriers such as limited access to inputs, technical knowledge, and financial services, which hinder broader uptake (AGRA, 2022; World Bank, 2023).

Despite some progress, agricultural production in the basin remains largely informal and low in value. Most farmers sell their produce, particularly cassava and maize, without any form of processing, missing out on opportunities to increase income through value addition. This is especially significant given the rising demand for processed and packaged foods in urban centers like Dar es Salaam and Lusaka. The lack of agro-processing facilities and limited market linkages further constrain the ability of rural producers to benefit from these growing urban markets (AGRA, 2022).

Infrastructure deficits, including poor rural roads, inadequate cold storage, and fragmented transport networks, reduce profitability for farmers and discourage private investment in agribusiness and rural infrastructure. Targeted investment in transport, storage, and agro-processing could enable the basin to capture urban market opportunities while improving rural incomes (FAO, 2023; World Bank, 2023).

Limpopo River Basin

The Limpopo River Basin spanning South Africa, Zimbabwe, and Botswana is a critical agricultural zone in Southern Africa's semi-arid region. It supports the cultivation of key crops such as maize, sorghum, and various horticultural products. However, over the past decade, the basin has experienced increasingly severe climate variability. Frequent El Niño-driven droughts and rising temperatures have significantly reduced water availability, placing immense stress on rain-fed agricultural systems, particularly in Zimbabwe and Botswana (FAO, 2024; WMO, 2023).

South Africa has managed to maintain relatively stable agricultural production in the face of these climatic challenges. This resilience is largely attributed to sustained investments in irrigation infrastructure, mechanization, and improved crop management practices. As a result, the country continues to export processed fruits, vegetables, and wines, even during dry years. These agro-industrial capabilities have positioned South Africa as a regional leader in agricultural exports and value addition (DAFF South Africa, 2023; OECD-FAO, 2023).

In contrast, smallholder farmers in Zambia, Malawi, Mozambique, Zimbabwe and Botswana remain highly vulnerable to climatic shocks. Limited access to quality inputs, irrigation technologies, and market infrastructure has constrained their ability to adapt and maintain consistent yields. Additionally, land degradation and declining soil fertility have further reduced productivity. Most cereals and horticultural crops in these countries are sold in raw form through informal markets, limiting income potential and economic resilience (IFPRI, 2023; AGRA, 2022).

The Limpopo Basin thus reflects stark contrasts in agricultural systems and market orientation. South Africa's well-developed agro-industrial sector contrasts sharply with Zimbabwe and Botswana's reliance on subsistence farming and informal trade. Addressing these disparities will require targeted investments in climate-resilient infrastructure, input supply chains, and market development to support inclusive growth across the basin (World Bank, 2023; SADC, 2022).

Lobito Corridor

The Lobito Corridor stretches across diverse agroecological zones, encompassing Zambia's highland maize-producing areas, Angola's cassava-dominated lowlands, and Tanzania's horticultural belts and in DRC. This diversity offers significant agricultural potential, particularly in Angola and the Democratic Republic of Congo (DRC). However, progress has been uneven across the basin due to chronic underinvestment, inadequate infrastructure, and weak institutional support. In DRC, decades of political instability have severely disrupted agricultural extension services and market connectivity, limiting farmers' access to inputs, knowledge, and buyers (World Bank, 2023; FAO, 2024).

In contrast, Zambia and Tanzania have made moderate strides in agricultural development, supported by donor-funded programs that promote improved seed systems, irrigation, and smallholder-friendly agro-processing. These efforts have been particularly effective in boosting yields and adding value in crops

such as maize, soybeans, and sunflower. Despite these gains, limited regional coordination has prevented benefits from reaching all parts of the basin. The lack of harmonized policies and infrastructure continues to hinder cross-border trade and investment (AGRA, 2023; IFAD, 2022).

Compared to more integrated trade corridors like East Africa's Northern Corridor, the Lobito Corridor remains fragmented and underdeveloped. Value chains are poorly connected, and logistical inefficiencies persist. However, recent infrastructure initiatives offer hope. Angola's National Transport Master Plan (2023) includes major port and road rehabilitation projects, while Zambia's Agriculture Marketing and Logistics Strategy (2024) aims to streamline supply chains. These efforts are inspired by successful models such as India's Mega Food Parks and Morocco's Agropolis clusters, which integrate production, processing, and logistics in centralized hubs.

Looking ahead, strategic investments in post-harvest infrastructure such as drying, milling, and packaging facilities could transform the Lobito Corridor into a competitive regional trade artery. This is especially true for high-potential crops like cassava, maize, and soy. Realizing this vision will however require more than infrastructure. Reforms in transport regulation, access to finance, and land tenure systems are essential to attract private investment and ensure inclusive growth. The Lobito Corridor could emerge as a key driver of agricultural transformation in Central and Southern Africa with coordinated action (AfDB, 2023; UNECA, 2024). If infrastructure upgrades are matched with policy harmonization and investment reforms, the Lobito Basin could serve as a strategic link between Central and Southern Africa's agricultural markets.

Niger and Volta Basin

The Niger and Volta River basins spanning Nigeria, Ghana, Burkina Faso, Mali, and Benin are central to West Africa's agricultural output, particularly for staple crops like maize, yam, cassava, and rice. Ghana and Nigeria have emerged as regional leaders in agro-processing and input system development. Ghana's Planting for Food and Jobs initiative significantly boosted maize yields by 67% between 2017 and 2021, reaching over two million farmers with subsidized seeds and fertilizers (MoFA, 2022). Similarly, Nigeria's fertilizer blending program has expanded national supply, though disparities in access persist across regions (IFDC, 2022).

These production gains, however, remain vulnerable to climatic and structural constraints. These policy efforts have contributed to the growth of semi-processed food markets, especially for cassava flour and parboiled rice, which are increasingly traded in peri-urban areas. However, agro-processing remains heavily concentrated in urban centers, limiting the economic benefits that could otherwise extend to rural communities. Urban concentration of processing facilities limits rural growth and job creation (World Bank, 2022).

Environmental and structural challenges further complicate agricultural development in the basins. Erratic rainfall patterns, prolonged dry spells, and frequent flooding, particularly in northern Nigeria and Burkina Faso, disrupt planting cycles and reduce crop reliability (IFPRI, 2023). Insecurity, including farmer-pastoralist conflicts, has displaced rural populations and destabilized food systems. With irrigation covering less than 5% of cultivated land, most farmers remain highly vulnerable to climate shocks (FAO, 2024).

Infrastructure deficits also contribute to high post-harvest losses, especially for perishable crops. Poor rural roads and limited cold storage facilities result in losses of up to 30%, undermining food security and farmer incomes (AGRA, 2023). In response, some regions such as Burkina Faso have revived traditional soil and water conservation techniques like Zai Pits and half-moons to improve dryland farming. Broader adoption of these practices however remains limited and without coordinated, basin-wide strategies and investment in climate-resilient infrastructure (UNECA, 2024; AfDB, 2023). Coordinated investment in irrigation, rural infrastructure, and climate adaptation could position the Niger and Volta basins as hubs for resilient, inclusive agricultural growth in West Africa.

Senegal River Basin

The Senegal River Basin shared by Senegal, Mauritania, Mali, and Guinea is a cornerstone of food production and regional integration in West Africa. Its fertile floodplains support a mix of rain-fed and irrigated agriculture, including rice, millet, sorghum, and vegetables. Investments in irrigation, transport, and trade facilitation in Saint-Louis (Senegal) and Kayes

(Mali) have stabilized production and reduced rice import dependence (AfDB, 2022; IFPRI, 2023). These gains have been supported by the *Organisation pour la Mise en Valeur du fleuve Sénégal* (OMVS), a regional body that coordinates transboundary water and infrastructure management.

OMVS has played a key role in fostering cooperation among the basin countries, helping to manage shared water resources and prevent conflict. Through joint infrastructure projects and coordinated water releases, the organization has enabled more predictable irrigation schedules and improved flood control. This collaborative model has been widely recognized as a success in transboundary water governance, offering lessons for other river basins in Africa and beyond (World Bank, 2021).

Despite these achievements, the basin faces mounting environmental and structural challenges. Climate variability manifested in erratic rainfall, prolonged droughts, and occasional flooding, continues to threaten agricultural stability. Soil degradation and rising upstream water withdrawals in Mali and Guinea are straining downstream supply in Senegal and Mauritania (FAO, 2023). Upland cereal and off-season vegetable yields remain particularly vulnerable, with limited irrigation coverage exacerbating the risks.

Agro-processing capacity across the basin remains underdeveloped, and most agricultural trade consists of raw staples. This limits value addition and rural income generation. Structural barriers such as inadequate access to finance, unreliable energy supply, and weak logistics systems further constrain the development of competitive value chains (USAID, 2022; CILSS, 2023). While OMVS provides a strong institutional foundation, uneven national capacities and delays in project implementation continue to hinder basin-wide progress. Addressing these gaps will be essential to unlocking the full potential of the Senegal River Basin for inclusive and climate-resilient agricultural growth. Strengthening climate adaptation measures, expanding irrigation coverage, and upgrading value chains could position the Senegal River Basin as a model for integrated, climate-resilient agriculture in West Africa.

Key drivers of change in Africa's food baskets and corridors

As countries strive to meet growing food demand, boost trade, and adapt to climate and demographic pressures, several transformational forces are driving change across regions. These forces interact in complex ways, influencing production systems, market flows, and resilience. This section explores five interconnected forces reshaping Africa's agri-food landscape, with concrete examples from key food baskets and corridors.

Environmental stress as a catalyst for innovation

Water scarcity, prolonged droughts, flooding, and soil salinization are undermining traditional agriculture across Africa. These environmental stressors, while presenting significant risks to food security and livelihoods, have also become powerful catalysts for adaptation and innovation. Farmers, researchers, and policymakers are compelled to rethink conventional approaches and adopt more resilient methods. For example, in Tunisia and Libya, escalating salinity levels and diminishing water availability have driven a shift towards advanced irrigation technologies, such as drip and sprinkler systems, alongside the introduction of drought-tolerant crop varieties that better withstand harsh conditions (FAO, 2023).

Similarly, the Limpopo River Basin, which spans parts of South Africa, Zimbabwe, and Botswana, has faced repeated El Niño-induced drought events, accelerating the uptake of water-efficient technologies like conservation agriculture and rainwater harvesting. These innovations have been complemented by proactive policy measures aimed at sustainable water management and drought mitigation. In the Nile Delta, rising sea levels and ongoing land degradation pose critical threats to agricultural productivity. In response, Egypt has begun experimenting with treated wastewater for irrigation and integrating climate-resilient cropping systems that reduce vulnerability to saline intrusion and water shortages (UNEP, 2023). These cases show how environmental stress is accelerating technological and policy shifts towards resilient agricultural systems.

Beyond North Africa and the Limpopo Basin, other major food baskets across the continent are similarly responding to environmental challenges with innovative approaches. In the Lake Victoria Basin, recurrent floods and variable rainfall patterns have prompted investments in flood-resilient infrastructure and climate-smart agriculture, including the use of improved seed varieties and integrated pest management practices in Kenya, Uganda, and Tanzania (World Bank, 2022). The Senegal River Valley has witnessed a rise in agroforestry and soil conservation techniques to combat desertification and enhance soil fertility, helping to sustain cereal and horticultural production under increasingly erratic weather conditions (FAO, 2021). Meanwhile, the Ethiopian Highlands, vulnerable to both drought and land degradation, have embraced terracing, reforestation, and community-based watershed management programs that improve water retention and soil health while boosting crop yields (IFAD, 2023). These diverse responses across Africa's food baskets highlight the continent's growing capacity to innovate and adapt in the face of escalating environmental pressures.

These local and regional shifts occur within a global context of accelerating climate impacts on food systems. Climate change is reshaping global food systems through rising temperatures, altered rainfall, and more frequent extreme weather, threatening agricultural productivity, especially in vulnerable regions. Climate shocks already push 26 million people into poverty annually, with projections reaching up to 130 million by 2030 if no action is taken (World Bank, 2025a). Developing countries face billions in annual losses due to reduced productivity, infrastructure damage, and health impacts (World Bank, 2025b). In response, IFPRI (2025a) calls for climate-resilient, nutrition-sensitive, and inclusive food systems. Key innovations include climate-smart seeds, precision farming, and digital advisory tools to support smallholders (IFPRI, 2025a). Additionally, the BMGF/IFPRI Atlas highlights climate–food insecurity hotspots, urging targeted adaptation investments (IFPRI, 2025b).

Together, these findings point to a critical opportunity to redesign food systems for greater sustainability and resilience making Africa's adaptation strategies a central test case for building resilient food systems globally.

Shifting demand and the urban food transition

Rapid urbanization and middle-class growth are reshaping food consumption patterns in Africa. Urban consumers are increasingly demanding diverse, high-quality, and processed foods, prompting a shift in production and trade strategies within major food baskets. As of 2023, Africa's urban population was growing at an unprecedented rate, with projections indicating that nearly 60% of the continent's population set to reside in urban areas by 2050, up from 43% in 2020 (United Nations, 2023). Rural-to-urban migration accounts for over 40% of urban growth (UN-Habitat, 2014). Simultaneously, Sub-Saharan Africa's population continues to grow at an annual rate of 2.5%, with countries like Niger and DRC experiencing rates above 3% (World Bank, 2023a).

This demographic shift is intensifying food demand. The World Bank reports that food demand in Africa is projected to more than double by 2050, driven by population growth, urbanization, and dietary shifts towards higher-value foods such as meat, dairy, and processed products (World Bank, 2025). In North Africa, Morocco has effectively leveraged this trend by expanding exports of value-added products such as premium olive oil and citrus fruits tailored to European and regional markets (World Bank, 2022). Similarly, Algeria and Tunisia have responded to rising urban demand for fresh vegetables by investing in greenhouse farming and integrated logistics systems, improving year-round supply to urban centers. Egypt's Nile Delta, despite facing challenges like land fragmentation and salinization, has implemented policy-driven efforts to modernize irrigation and expand rice milling and vegetable packaging to meet urban and export market needs (UNEP, 2023).

> ***"Agro-processing can add up to 20-30% value to agricultural commodities, yet Africa's processing capacity remains below 10% of total agricultural output compared to over 60% in developed regions."***
>
> The African Development Bank

By contrast, other inland and southern African food baskets face challenges in meeting growing urban demand for processed foods. For example, the Lake Malawi and Lake Tanganyika Basin regions struggle with limited agro-processing capacity and weak market linkages, which constrain their ability to supply expanding urban markets (AGRA, 2022). In the Niger and Volta Basins, Nigeria and Ghana have made progress in producing packaged rice and cassava flour, yet persistent rural infrastructure deficits and high post-harvest losses undermine the consistency of supply (World Bank, 2022). The Limpopo River Basin in South Africa benefits from relatively advanced retail and cold chain systems that support processed horticultural products, but neighboring countries such as Zimbabwe and Botswana remain heavily reliant on unprocessed staples due to underinvestment in agro-processing and logistics networks (OECD-FAO, 2023).

Addressing disparities in agro-processing, cold chain infrastructure, and urban–rural market integration is critical. Studies show that agro-processing can add up to 20-30% value to agricultural commodities, yet Africa's processing capacity remains below 10% of total agricultural output compared to over 60% in developed regions (AfDB, 2023). For instance, in East Africa, only 15% of fruits and vegetables are processed post-harvest, leading to significant losses and missed market opportunities (World Bank, 2022). Cold chain deficiencies contribute to post-harvest losses estimated at 30-40% for perishables across sub-Saharan Africa, constraining supply of fresh and processed products to urban centers (FAO, 2023). Furthermore, poor rural infrastructure, such as inadequate roads and storage facilities, limits farmers' access to urban markets, reducing their ability to meet demand reliably (UNCTAD, 2023). Successful examples from Kenya's horticulture export sector, which combines robust cold chains with contract farming and digital logistics platforms, demonstrate how coordinated investments can transform Africa's capacity to meet the demands of its expanding urban population and international markets (IFC, 2022).

Infrastructure and connectivity as drivers of scale

Strategic investments in infrastructure such as roads, cold chains, storage, energy, and processing facilities are critical to scaling Africa's food baskets and improving competitiveness. Aligning infrastructure with production zones accelerates agricultural transformation. In the Nile/Gibe River Basin, for example, Uganda and Kenya have expanded exports of high-value crops like coffee and avocados by improving road networks, electrifying agro-parks, and investing in cold chains (World Bank, 2023). Similar gains have been made in the Niger/Volta Basin, where Ghana's feeder roads and rice mills support packaged rice exports, and Nigeria's road upgrades improve market access for cassava and yam producers (World Bank, 2022).

Despite these advances, Africa still faces some of the world's highest transport costs, up to 75% above global averages, undermining competitiveness, and regional market integration (AfDB, 2025). The continent's energy gap is another major constraint, with nearly 600 million people lacking access to electricity (World Bank, 2025). This limits opportunities for value addition, cold storage, and agro-processing. To address this, the World Bank and AfDB have launched "Mission 300," aiming to connect 300 million Africans to electricity by 2030. These efforts, along with AfDB's "Feed Africa" strategy, position energy access as a cornerstone of agricultural transformation, rural industrialization, and inclusive growth (AfDB, 2016; World Bank, 2025).

Investments in feeder roads and rice milling in Ghana's Niger/Volta Basin, alongside Nigeria's road rehabilitation efforts, have accelerated commercialization by connecting producers to markets more efficiently, stimulating private sector engagement and encouraging adoption of modern processing technologies (World Bank, 2022). Conversely, persistent infrastructure deficits in several corridors are driving innovation out of necessity by simultaneously limiting broader systemic change. In the Lobito Corridor spanning Angola and DRC, inadequate transport, storage, and unreliable energy access have led producers and traders to create informal logistics and decentralized storage, often at higher cost and risk, underscoring the critical role infrastructure plays in formalizing markets and scaling innovations (FAO, 2024).

In the Lake Malawi and Lake Tanganyika Basins, poor road conditions and a lack of cold storage infrastructure have pushed farmers and local entrepreneurs to experiment with mobile cooling units and cooperative aggregation models, though they remain fragmented and inadequate for growing urban demand (AGRA, 2022). In the Senegal River Basin, limited cross-border

logistics and weak agro-processing capacity constrain value addition, but ongoing small-scale irrigation improvements have sparked innovations in water use and cropping patterns, demonstrating how partial infrastructure investments can still drive adaptive responses (AfDB, 2022). Infrastructure can serve as a powerful catalyst for agricultural transformation when strategically aligned with production and market needs, yet its absence or inefficiency often constrains scale, competitiveness, and inclusivity in Africa's food systems.

Institutions and governance as system shapers

The impact of infrastructure investments described in the previous section ultimately depends on the strength and inclusiveness of the institutions that govern land, water, markets, and cross-border trade. Strong institutions and effective governance are critical to the development of Africa's food baskets, influencing access to land, water, inputs, and markets. In the Senegal River Basin, OMVS has facilitated transboundary water cooperation among Senegal, Mauritania, Mali, and Guinea, enabling shared infrastructure and irrigation (FAO, 2023). However, implementation remains uneven, with challenges in water allocation and enforcement. In the Niger/Volta Basin, insecure land tenure and fragmented input systems continue to constrain smallholder investment, despite efforts in Nigeria and Ghana to expand agro-processing zones and subsidy programs (IFPRI, 2023). These governance gaps hinder productivity growth and limit farmers' access to high-value markets, perpetuating inequality. These constraints often have a disproportionate impact on women, youth, and marginalized groups, reducing their ability to participate fully in emerging value chains.

AUC has made governance a central pillar of its agricultural transformation agenda. CAADP prioritizes stronger institutions, improved land and water management, and cross-sectoral coordination to build resilient food systems. The Kampala Declaration, launched alongside the new strategy, calls for $100 billion in investments to boost agricultural production by 45%, reducing post-harvest losses through infrastructure and boosting agro-industrialization, and triple intra-African trade, all anchored in inclusive and accountable governance (AUC, 2023). Intervention areas such as 1.5 (removing trade barriers), 1.6 (investing in regional value chains), and 2.1 (stimulating private sector investment) in CAADP Declaration are all deeply relevant for food baskets and corridor development. This approach recognizes that transforming agriculture requires not just better yields, but robust systems for distribution, trade, and equitable access.

Governance challenges manifest differently across Africa's regions, affecting food system outcomes. In the Nile/Gibe River Basin, large-scale upstream infrastructure projects such as Ethiopia's Grand Ethiopian Renaissance Dam (GERD) have raised geopolitical tensions by altering water flows and affecting downstream agricultural productivity in Sudan and Egypt (World Bank, 2023). Meanwhile, weak cross-border institutional coordination in the Lake Malawi/Lake Tanganyika Basin undermines cooperative management of shared fisheries and irrigation systems, despite the ecological interdependence of these transboundary watersheds (AGRA, 2022). In contrast, Kenya's horticultural sector illustrates how robust institutional frameworks can drive sector growth; Strong public-private coordination through entities like the Horticultural Crops Directorate and the Kenya Plant Health Inspectorate Service (KEPHIS) has supported export expansion by enforcing quality standards, facilitating certification, and improving market access (OECD-FAO, 2023). Effective and accountable governance determines whether infrastructure, market systems, and resource management translate into equitable, scalable, and resilient food systems across Africa.

Market forces and trade incentives

Strong governance frameworks and resilient infrastructure, as discussed in previous sections, determine whether market and trade incentives translate into inclusive and competitive agricultural value chains. Shifting trade volumes, price incentives, and efforts to deepen regional market integration are reshaping agricultural production and trade patterns across Africa. Countries such as Nigeria and Ghana have expanded their share of processed cassava, maize, and rice products in regional markets, supported by targeted subsidies, industrial policies, and investments in agro-processing zones (World Bank, 2022). Morocco presents another example, where strong alignment between trade policy and infrastructure has enabled dominance in both regional and European markets for processed horticultural

goods like citrus, tomatoes, and olive oil (OECD-FAO, 2023). These developments signal a move away from reliance on raw commodity exports towards higher domestic value addition.

However, many food baskets still depend heavily on unprocessed exports due to limited processing capacity and weak connections to trade corridors. In the Lake Malawi/Lake Tanganyika Basin, for example, maize, cassava, and legumes are mostly consumed locally or traded in raw form, even as urban demand for processed foods rises in cities like Dar es Salaam and Lusaka (AGRA, 2022). Likewise, in the Senegal River Basin, production of rice and vegetables has increased, but insufficient cold storage, packaging, and harmonized cross-border trade policies continue to constrain value-added exports (FAO, 2023). Even in more promising corridors such as Lobito, where Zambia and Tanzania are improving processing infrastructure, Angola and the Democratic Republic of Congo still struggle with poor logistics and market access.

AfCFTA is working to close these gaps by promoting integrated regional markets. Since its inception, intra-African agricultural trade has grown from $6 billion in 2003 to over $20 billion in 2023. This has been supported by tariff reductions, harmonized standards, and the Guided Trade Initiative (AfCFTA Secretariat, 2024). AfCFTA's private sector strategy focuses on agro-processing and regional value chains in key sectors such as fish, poultry, coffee, and animal feed. Regional Economic Communities (RECs) such as ECOWAS and COMESA also play a crucial role in aligning policies and facilitating trade across borders.

In parallel, institutions like the African Development Bank (AfDB) and Afreximbank are investing in enabling infrastructure and digital trade systems. The AfDB's Agropoles Initiative promotes integrated agro-industrial zones that drive value addition, job creation, and rural transformation. For example, Senegal's Agropole Nord aims to boost exports and entrepreneurship by connecting farmers to processing and market hubs (AfDB, 2025). Afreximbank's Africa Trade Gateway complements these efforts with platforms such as the Africa Trade Exchange (ATEX) and the Pan-African Payment and Settlement System (PAPSS), which streamline cross-border transactions in local currencies (Afreximbank, 2024). Together, these innovations signal a structural shift from fragmented, raw commodity trade to value-driven, integrated agricultural markets.

In summary, Africa's food systems are undergoing a profound transformation, driven by a convergence of region-specific pressures and opportunities. Environmental stresses such as climate change, water scarcity, and land degradation are forcing innovation and adaptation across the continent. Countries like Egypt and Tunisia are investing in wastewater reuse and advanced irrigation, while South Africa is scaling up water-saving technologies in drought-prone areas. These responses signal a shift towards more resilient and sustainable production systems, turning environmental challenges into drivers of change.

At the same time, rapid urbanization and rising incomes are reshaping food demand, fueling the growth of processed, diverse, and higher-quality food markets. Morocco and Kenya have capitalized on this shift by investing in cold chains, agro-processing, and export infrastructure, enabling them to compete in both regional and global markets. These examples highlight the importance of aligning infrastructure, trade policy, and institutional capacity with emerging consumption trends. To unlock the full potential of Africa's food baskets, countries must pursue inclusive, regionally tailored investments that integrate smallholders, women, and youth, while building resilient supply chains and fostering cross-border collaboration. Harnessing market forces and aligning trade incentives with regional integration efforts can shift Africa's agricultural economy from fragmented raw commodity exports to competitive, value-added trade systems.

Strategic investments to scale up food baskets and corridors in Africa

Scaling Africa's food baskets and trade corridors demands coordinated investment across five key domains (AfDB, 2024; FAO, 2024; World Bank, 2023). These are listed below:

These areas are interdependent; Progress in one often unlocks value in others. For example, better seed systems and irrigation boost yields, but without storage or market access, gains are lost. Similarly, access to finance enables climate-smart practices, but only alongside strong infrastructure and market systems. These investments aim not only to raise productivity but to build resilient, inclusive, and competitive agri-food systems. McKinsey (2024) projects Africa could triple its agricultural output by 2030 with targeted investments in productivity, infrastructure, and institutional reform.

These investments, however, must reflect local realities. While countries like Morocco and Egypt lead in irrigation and export logistics, regions such as the Lobito Corridor and Lake Tanganyika Basin face basic infrastructure gaps. In West Africa, Nigeria and Ghana are advancing agro-processing, but parts of the Sahel and Central Africa still struggle with fragmented input systems and weak institutions. BCG (2024) notes that private capital increasingly targets regions with clear governance and scalable infrastructure, reinforcing the need to align public investment with investor confidence. A regionally tailored approach anchored in local conditions and coordinated reform is critical. The following sections outline investment priorities across Africa's major food-producing regions, spotlighting both progress and persistent challenges.

Improving infrastructure and connectivity

Robust infrastructure is a pillar of competitive and inclusive agri-food systems. Strategic investments in transport, cold chains, storage, and energy access are essential to reduce post-harvest losses, improve market connectivity, and unlock the full potential of food baskets and agricultural corridors across Africa.

Developing transport and logistics infrastructure is foundational to unlocking the productivity and competitiveness of Africa's food baskets. Poor rural road networks, limited rail connectivity, and inefficient port access continue to isolate producers from markets, inflate transaction costs, and exacerbate post-harvest losses. For instance, in many parts of Sub-Saharan Africa, transport costs can account for up to 50% of the total value of agricultural goods (World Bank, 2023). Morocco offers a compelling example of how targeted infrastructure investment can transform agri-food systems. The country's $3 billion investment in agropoles, logistics hubs, and export corridors has significantly reduced spoilage and improved compliance with export standards, particularly for high-value crops like citrus and olive oil (World Bank, 2022). Morocco's experience shows the importance of aligning infrastructure development with production zones and trade corridors to enhance market access and reduce inefficiencies.

Cold chain and storage infrastructure are equally critical, especially for perishable commodities. In regions such as the Nile Delta and the Dakar-Lagos Corridor, post-harvest losses for fruits and vegetables can reach up to 40% due to inadequate cold storage and poor handling practices (FAO, 2023). Energy-efficient cold storage systems, warehouse receipt programs, and aggregation centers can dramatically reduce these losses while improving food safety and shelf life. Innovations such as solar-powered cold rooms like those piloted by ColdHubs in Nigeria have demonstrated the potential to cut spoilage by over 50% for smallholder farmers (IFC, 2022). However, scaling such solutions requires coordinated investment, supportive policy frameworks, and integration with broader logistics systems.

Energy access is a cross-sectoral enabler of agricultural transformation, particularly for irrigation, processing, and storage. Yet, nearly half of Africa's population, about 600 million people, still lacks access to electricity, with rural areas disproportionately affected (AfDB, 2024). This energy gap severely limits the ability of farmers and agribusinesses to adopt modern technologies and participate in value-added markets. Corridors such as Lobito and regions like the Sahel remain particularly constrained. Recognizing this, initiatives like "Mission 300" lay a strong emphasis on powering agriculture and rural economies (World Bank, 2025). Expanding renewable energy solutions, such as mini-grids and solar irrigation, will be essential to bridge the infrastructure gap and catalyze inclusive growth across Africa's food systems. Integrating transport, cold chain, storage, and energy investments within regional development strategies is essential to fully realize the potential of Africa's food baskets and corridors.

Scaling agricultural inputs and climate adaptation

Improving access to quality agricultural inputs and climate-smart technologies is essential for raising productivity and building resilience in Africa's food baskets and trade corridors. Despite the continent's vast agro-ecological potential, persistent gaps in seed systems, soil health management, and input distribution networks continue to constrain yields, especially in climate-vulnerable regions. These challenges are particularly acute in key food baskets such as the Sahel, Lake Chad Basin, and parts of the Southern Highlands, where smallholders operate with limited access to improved inputs and services.

Empirical evidence demonstrates that investments in input systems can lead to substantial productivity

gains. In Ethiopia's irrigated wheat zones and Zambia's Conservation Agriculture Scaling-Up (CASU) program, the use of improved seed varieties, combined with integrated soil fertility and water management, led to yield increases of 30–50% (FAO, 2023). Scaling such interventions within corridors where agriculture is concentrated near transport and trade infrastructure can amplify impact by reducing input delivery costs and improving market access. However, adoption remains fragmented, requiring systemic improvements in seed certification, supply chain logistics, and localized extension services.

Climate resilience is equally critical. Africa's major food-producing zones are increasingly exposed to droughts, floods, and unpredictable weather patterns, necessitating a shift towards climate-smart agricultural practices. Technologies such as drought-tolerant crop varieties, precision irrigation, and conservation agriculture are proving effective in adapting to these conditions. Morocco's national irrigation program, which has promoted widespread adoption of drip irrigation, has significantly enhanced water-use efficiency in high-value crops like citrus and olives (OECD, 2024). Similarly, drought-resilient crops in Burkina Faso and Niger have stabilized yields despite erratic rainfall, providing scalable models for other corridor-based food baskets exposed to climatic volatility.

Effective extension systems are vital for bridging the gap between agricultural innovation and adoption, particularly in Africa's food baskets and trade corridors where intensification is underway. Timely, tailored information from platforms such as Kenya's digital e-extension services and Ethiopia's decentralized farmer training centers can accelerate climate-smart technology adoption. When integrated with input distribution and financial services, these systems foster a virtuous cycle of productivity, resilience, and regional competitiveness. To be truly transformative, extension models must be gender-sensitive, digitally enabled, and embedded within broader agro-economic planning, making them both a productivity imperative and a foundation for long-term food system sustainability. Coordinating these input and adaptation strategies with infrastructure, finance, and governance reforms will be critical to achieving transformative impact in Africa's agricultural corridors.

Enhancing market development and trade facilitation

Expanding market access and reducing trade barriers are essential to realizing the full potential of Africa's food baskets and agricultural corridors. In many regions, weak market linkages and fragmented trade systems limit commercialization and access to regional and global value chains. Agro-processing zones and trade corridor development offer strategic entry points for transforming agricultural outputs into value-added goods. In Nigeria and Ghana, Special Agro-Industrial Processing Zones (SAPZs) combine infrastructure investment, financial incentives, and policy coordination to attract private sector participation (AfDB, 2023). These zones have enabled scale-up in key food baskets, particularly for cassava, maize, and rice, facilitating rural industrialization and reducing reliance on raw commodity exports.

Despite these advances, limited infrastructure, high logistics costs, and institutional fragmentation continue to constrain market development across many corridor regions. For example, in the Senegal River Basin and Lake Malawi corridors, the lack of cold storage, packaging, and processing facilities limits producers' ability to meet urban demand for processed and perishable goods. Targeted investments in rural logistics, power supply, and storage are needed to strengthen backward and forward linkages in value chains. Integrating agro-processing facilities into corridor planning, as in the Lobito and Dakar–Lagos corridors, can amplify production-zone growth while reducing spoilage and quality losses in high-potential food baskets.

Trade facilitation is another critical component of corridor development. Non-tariff barriers, customs delays, and inconsistent Sanitary and Phytosanitary (SPS) standards can increase transaction costs by up to 30% in some regions (World Bank, 2023). Harmonizing trade procedures and investing in One-Stop Border Posts (OSBPs), digital customs systems, and cargo tracking can significantly enhance the competitiveness of African agri-food products. The Northern Corridor linking Kenya, Uganda, and Rwanda shows how coordinated infrastructure and regulatory reforms reduce clearance times and improve agricultural goods flow (COMESA, 2022). Replicating such models in other corridors will require close coordination between national governments, regional bodies, and private stakeholders.

AfCFTA and RECs such as ECOWAS, COMESA, and SADC are playing a catalytic role in integrating agricultural markets across the continent. AfCFTA's private sector strategy prioritizes sectors such as poultry, coffee, and horticulture: key crops in several food baskets and promotes investment in processing and logistics. Financial platforms like ATEX and PAPSS further support trade by enabling real-time, local currency transactions (Afreximbank, 2023). These initiatives, when aligned with corridor-specific development strategies, could transform Africa's fragmented agricultural markets into integrated, competitive, and inclusive growth engines.

Strengthening governance and institutional coordination

Effective governance and institutional coordination are critical to scaling agricultural transformation across Africa's food baskets and trade corridors. As countries advance corridor-based development, aligning NAIPs with regional strategies ensures coherent and efficient resource use. Integrated planning reduces fragmentation and strengthens the impact of both public and private investments. Morocco's Green Generation 2020–2030 strategy exemplifies how national agricultural policy can align with corridor development goals, fostering private sector engagement, technology adoption, and regional market access (OECD, 2024). Similarly, Ethiopia's Agricultural Transformation Agency (ATA) has demonstrated how central coordination of input systems, market intelligence, and policy implementation can enhance performance within key production zones (ATA, 2023).

In decentralized governance contexts, strengthening subnational institutions and empowering local actors in high-potential food baskets is essential. Local governments, farmer cooperatives, and water user associations are best placed to ensure that corridor investments respond to community needs and agro-ecological realities. For example, Kenya's county-level extension systems and Malawi's community-based resilience platforms have improved accountability and local service delivery in staple crop areas (World Bank, 2023). However, across many food baskets, including those in the Niger/Volta and Lake Malawi/Lake Tanganyika basins, weak institutional capacity, limited fiscal autonomy, and overlapping mandates hinder inclusive and climate-smart development. Addressing these bottlenecks is essential for managing natural resources and scaling sustainable intensification.

At the regional level, corridor governance structures are increasingly recognized as critical system shapers. Establishing dedicated corridor authorities can enhance cross-border coordination in infrastructure development, trade facilitation, and environmental management. The Lamu Port–South Sudan–Ethiopia Transport (LAPSSET) Corridor Authority illustrates how intergovernmental collaboration aligns investment priorities and regulatory frameworks across borders (UNECA, 2022). In the context of food baskets, similar authorities could be established for corridors such as Lobito (linking Angola, Zambia, and DRC), Dakar–Lagos, and the Sahel, where market connectivity and natural resource management are shared priorities.

RECs play a critical role in institutionalizing these governance mechanisms. Anchoring corridor authorities within REC frameworks can enhance policy coherence, strengthen accountability, and harmonize standards, logistics, and investment incentives. These governance innovations are key to making Africa's food baskets engines of inclusive growth and sustainable agri-food systems.

Mobilizing finance for food baskets transformation

Mobilizing finance is central to agricultural transformation, particularly in capital-intensive investments such as irrigation, processing, and logistics. Blended finance and risk-sharing instruments are increasingly used to attract private capital by reducing perceived risks. Notable examples include Ghana's Incentive-Based Risk-Sharing System for Agricultural Lending (GIRSAL) and Nigeria's NIRSAL, which together have de-risked over $200 million in loans, enabling commercial banks to finance previously excluded agribusinesses (World Bank, 2023). These models illustrate how concessional lending, credit guarantees, and diaspora bonds can effectively crowd in private investment and scale climate-smart agriculture across food baskets and corridors.

Inclusive finance models targeting SMEs, women, and youth are essential for equitable growth. Zambia's Citizens Economic Empowerment Commission (CEEC) and Kenya's mobile-based agri-finance platforms have expanded finance access through grants, low-

interest loans, and tailored digital services (AfDB, 2024). Despite progress, access remains uneven, with many rural agribusinesses limited by high collateral requirements and low financial literacy. Expanding inclusive finance will require integrated strategies that combine financial services with input delivery, training, and market access.

Development finance institutions (DFIs) such as AfDB, the West African Development Bank (BOAD), and Afreximbank play a catalytic role in bridging the continent's agricultural financing gap. These institutions increasingly align investment portfolios with corridor-based strategies. For instance, AfDB's SAPZs are channeling concessional finance and technical support into high-potential areas to drive value chain development (AfDB, 2023). Similarly, Afreximbank's ATEX and PAPSS are easing cross-border trade through digital payment solutions, lowering transaction costs and improving liquidity (Afreximbank, 2023).

Aligning DFI investments with national and regional priorities will be essential to scale resilient, inclusive, and competitive food systems across Africa. Strategic use of public capital to de-risk private investment, combined with targeted support for marginalized groups, can unlock the potential of Africa's food basket economy despite climate, market, and infrastructure challenges.

Conclusion and recommendations

Africa's food baskets and agricultural corridors hold the key to transforming the continent's agri-food systems into engines of inclusive growth, sustainability, and global competitiveness. From the fertile expanses of the Nile Delta to the trade-dense Dakar–Lagos route and the resource-rich Lobito Corridor, these strategic zones offer both geographic advantage and catalytic potential for socio-economic renewal. If leveraged wisely, they can drive rural development, enhance food sovereignty, deepen regional integration, and reinforce resilience against climate and market shocks.

Yet the journey towards this transformation remains challenged by structural bottlenecks. Despite notable progress in specific areas such as pilot initiatives in irrigation, agricultural finance, and cold chain logistics, many regions still suffer from inadequate rural infrastructure, low levels of mechanization, underdeveloped market institutions, and fragmented governance. These challenges are not simply technical but deeply institutional and political. They call for a shift from piecemeal interventions to integrated, corridor-wide strategies rooted in agro-ecological and socio-economic realities.

Experience from comparable global contexts reinforces this imperative. Brazil's Cerrado transformation, India's horticultural corridors, and Morocco's export-focused agricultural logistics all demonstrate that strategic planning, coordinated investment, and inclusive public–private partnerships are central to success. For Africa, this means moving beyond fragmented efforts to embrace a continent-wide approach anchored in visionary leadership and accountable governance.

To unlock the full promise of food baskets and agricultural corridors, five strategic actions are paramount:

1. **Invest in corridor-specific infrastructure:** Prioritize development and upgrading of transport, irrigation, energy, and cold chain systems tailored to local needs. Such investments reduce logistical losses and improve the competitiveness of regional food systems.

2. **Strengthen input systems and promote agri-tech innovation:** Enhance access to certified seeds, climate-smart fertilizers, mechanization services, and digital advisory platforms, especially in underserved regions. Regional harmonization of standards and collaborative platforms can help scale innovations and increase productivity across diverse agro-ecological zones.

3. **Develop inclusive markets and trade ecosystems:** Build structured trade platforms, food aggregation hubs, and traceability systems that comply with AfCFTA provisions. Such efforts can better link smallholder producers to high-value urban and international markets.

4. **Expand climate-smart and blended financing mechanisms:** Mobilize blended finance instruments, de-risking facilities, and concessional capital to attract private investment in agri-infrastructure and agribusiness enterprise development.

5. **Harmonize policies and strengthen corridor governance:** Simplify and align cross-border regulations on agricultural inputs, trade, and quality standards through RECs. Institutionalize empowered, performance-oriented corridor governance authorities to ensure coordinated execution and accountability.

In summary, the transformation of Africa's food systems through food baskets and is not merely a development aspiration but a strategic imperative. It demands a new paradigm of integrated planning, resilient financing, and inclusive governance. With bold policy choices, continental solidarity, and long-term commitment, Africa can reposition its agricultural heartlands as drivers of prosperity and contributors to global food security.

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5 Revolutionizing Africa's food system through finance and investment

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KEY MESSAGES

1. **Transformative agricultural finance requires a full instrument toolbox**
   Finance must extend beyond traditional credit-first approaches to include equity, guarantees, blended finance, receivables and warehouse-receipt lending, and digital technologies tailored to value-chain realities from inputs to off-take.

2. **Inclusivity and sustainability must be embedded in every deal**
   Targeted financial products are needed for different value-chain actors, such as grants, concessional loans, or insurance. Aligning instruments to specific roles improves efficiency, resilience, and long-term system transformation.

3. **Coordination and policy reform are essential to unlock investment**
   Without enabling policies, secure land tenure, risk-sharing mechanisms, and strategic public spending, capital will remain constrained. Stronger institutional reform, regulatory coherence, and coordinated pipeline development are necessary to attract both domestic and foreign investment.

4. **Public finance must serve as strategic and catalytic capital**
   Governments should shift resources from input-heavy subsidies to high-impact, productivity-enhancing investments such as irrigation, infrastructure, and digital public goods. Achieving the Kampala Declaration's $100 billion agrifood investment goal for 2035 depends on converting pledges into measurable outcomes through effective execution frameworks, transparency, structured pipelines, national coordination units, and alignment between public and private capital.

5. **The changing financial landscape demands resilience and innovation**
   Declining development assistance from major donors is widening investment gaps, requiring accelerated adoption of innovative financing mechanisms, blended public–private partnerships with a stronger role for PDBs, and diversified domestic resource mobilization to sustain food system transformation.

Introduction

This chapter examines the scope of innovative financial and investment instruments and their linkages with value chain development as pathways to foster inclusive food systems transformation in Africa. The analysis draws on secondary data, diagrams, and resource maps to illustrate emerging trends and structural dynamics.

Many African countries are grappling with escalating food insecurity, driven by entrenched structural and systemic failures. In 2023, 298.4 million people (over 20% of the continent's population) were undernourished, highlighting the scale of the crisis. By 2030, projections indicate that Africa will surpass Asia as the region with the largest number of undernourished individuals (FAO et al., 2024). This persistent food insecurity is further intensified by climate shocks, conflict, insecurity, chronic poverty, and disruptions in food supply chains.

Africa's agrifood systems face deep-rooted constraints. These include fragmented land tenure arrangements, underdeveloped infrastructure, limited access to high-quality inputs and financial services, poor market links, and accelerating environmental degradation.

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Smallholder farmers, who form the backbone of food production, often rely on outdated technologies, face severe credit constraints, and operate in environments marked by policy ambiguity and incoherence.

Additionally, climate variability and regional conflicts further undermine productivity and market access, leaving more than 52 million people in West and Central Africa in crisis-level food insecurity (WFP, 2023). Despite its socio-economic importance, agriculture receives less than 5% of commercial bank lending in Africa (AfDB, 2022). The sector is perceived as high-risk and low-return, with expected returns typically 3–5% lower than in other sectors of the economy due to weather risks and market inefficiencies (ISF Advisors, 2020). In addition to the mismatch between financiers' risk-return appetite and the limited bankability of agri-SMEs, policy and regulatory frameworks often discourage investment in agriculture, particularly in primary production. Public investment remains inadequate, averaging USD 8 per rural inhabitant.

On CAADP Commitment 2 (Enhancing Investment Financing in Agriculture), the 2024 Biennial Review found that no member state was on track, compared with four in 2021. Official Development Assistance (ODA) has also not been sufficiently directed to address the drivers of food insecurity. Between 2017 and 2021, while ODA for food security and nutrition averaged USD 76 billion annually worldwide, only 34% of this support directly addressed the key drivers of food insecurity and malnutrition. The role of the private sector, which contributed an estimated USD 95 billion annually through philanthropy and Foreign Direct Investment (FDI) between 2017 and 2022, remains underleveraged. These flows are often fragmented and lack transparency, making it difficult to measure their actual impact on Africa's food systems.

Finance is more than a transactional input; it is a foundational lever for food systems transformation. Innovative instruments such as blended finance, agricultural insurance, digital credit, and grants can unlock private sector participation, improve resilience, and foster inclusive growth (FAO & Rabobank, 2020). Development Finance Institutions (DFIs), Public Development Banks, and Public-Private Partnerships (PPPs) have a crucial role to play in expanding the agricultural investment landscape.

Despite these challenges, Africa's growing urban population and shifting dietary preferences present significant market opportunities that could drive the sector's transformation and resilience. Innovations in digital agriculture, sustainable financing, and climate-smart practices are enabling actors across the agrifood value chain to increase productivity and competitiveness. Digital platforms and fintech are also improving access to finance for underserved rural populations and smallholder farmers across Africa.

For inclusive, resilient, and sustainable growth to achieve SDG 2.1 (end hunger) and 2.2 (end all forms of malnutrition), transforming Africa's agrifood systems is essential. This transformation requires robust public and private investment, smart policy reform and consistency in policy implementation. Transparency in financial flows, the repurposing of subsidies, and inclusive, innovative finance models are critical to ensuring no one is left behind in the agrifood systems transformation process.

This chapter provides a comprehensive analysis of existing financing trends, identifies key structural and policy-related constraints, and examines innovations in financial product design and delivery mechanisms. Special emphasis is placed on the role of blended finance, and climate-aligned investment models in creating scalable and sustainable impact. The chapter pursues four key objectives:

1. It assesses the landscape of agricultural finance and investment in Africa, examining trends, key actors, and financial instruments.
2. It identifies systemic gaps and constraints that hinder effective capital deployment across agrifood value chains.
3. It highlights promising innovations and case studies that illustrate the transformative role of finance in advancing agricultural and food systems.
4. It offers evidence-based policy and programmatic recommendations aimed at fostering an inclusive, resilient, scalable, and investible food system across the continent.

Through this lens, the chapter underscores the need for coordinated action among governments, financial institutions, development partners, and private investors to unlock the catalytic role of finance in achieving Africa's agrifood transformation goals.

Conceptual framework

Understanding Africa's agrifood systems

Africa's agrifood system is a multifaceted network that extends beyond farm-level production to encompass aggregation, processing, distribution, and consumption. At its core lies an interlinked agricultural value chain whose complexity must be understood to inform he design of finance instruments, the assessment of investment needs, and the definition of sound strategies.

- Production, including crop cultivation, livestock rearing, and aquaculture, largely by smallholder farmers, is constrained by low input use, limited mechanization, inadequate irrigation, and vulnerability to climate shocks, all of which hinder productivity (FAO, 2021).
- Aggregation, which links producers to markets through collection and bulking, is often undermined by poor rural infrastructure and limited working capital for traders and SMEs (AGRA, 2022).
- Processing, which adds value by transforming agricultural products into food and non-food items, is undertaken by SMEs and large agro-processors. It plays a key role in extending shelf life, reducing post-harvest losses, and generating rural employment (OECD/FAO, 2021).
- Distribution includes logistics, storage, cold chains, and transportation systems that connect surplus-producing areas with food-deficit regions. In landlocked countries, these gaps underscore the need for investment in efficient and resilient rural infrastructure (World Bank, 2023).
- Consumption marks the downstream end of the value chain and reflects changing dietary preferences, especially in urban areas where demand is growing for processed, nutritious, and convenience foods (Reardon et al., 2019).

Food waste management is increasingly important across the value chain due to its environmental impacts, such as greenhouse gas emissions and resource depletion, and its socioeconomic consequences for food security, hunger, and financial costs to businesses and consumers. Each segment of this value chain presents distinct investment needs, priorities, and opportunities, reinforcing the importance of tailored financing strategies and instruments to transform Africa's agrifood systems.

Finance and investment linkages

The transformation of Africa's food systems requires financial flows, instruments, and investment opportunities that are properly tailored and linked to value chain needs. Yet, access to and the effectiveness of finance vary significantly across the agrifood value chain. Financial needs evolve in terms of scale, duration, and risk profile as one moves from production to consumption. The financial landscape of agriculture in Africa is diverse, involving both formal and informal players:

- Development Finance Institutions (DFIs) provide long-term, concessional financing and risk mitigation instruments. DFIs such as the AfDB, IFAD, and IFC play a catalytic role in market building and de-risking private capital, making them central to Africa's agrifood systems transformation (Attridge & Engen, 2019).
- Private Equity and Venture Capital Funds invest primarily in growth-stage agribusinesses and tech-enabled service providers. They focus on scalability and returns but are constrained by limited exit options and weak pipeline quality (GIIN, 2022).
- Commercial Banks and Microfinance Institutions are the most widespread formal lenders, though typically conservative. High collateral requirements, short loan tenors, and risk aversion limit their outreach to smallholder farmers and SMEs (Beaman et al., 2020).
- Fintech and Digital Finance Providers use alternative data and AI-driven models to extend microloans, input credit, and insurance to underserved segments. Examples include Apollo Agriculture, M-Kopa, and Pula (CTA & Dalberg, 2019).
- Public Development Banks (PDBs) are increasingly playing a critical role in agricultural finance by stepping into areas where commercial banks will not, particularly through credit provision, equity investment, and risk-sharing mechanisms tailored to underserved farmers and rural enterprises. Despite

this progress, African PDBs account for only 0.9% of global PDB assets (FiCS, 2024). This is striking given that PDBs worldwide already provide nearly two-thirds of all formal agricultural financing, with annual investments approaching US $1.4 trillion (Agri-PDB, 2023).

- Public Sector and Government Programs provide subsidized credit, guarantees, and interest rate support, though often lacking sustainability and alignment with broader financial reforms (Jayne et al., 2018).
- SMEs themselves are leading the agriculture value chain financing effort. They support value chain financing, particularly through contract farming by supplying inputs, technical assistance, and assured purchase agreements, enabling farmers to produce and reduce market risk. These contractual ties improve farmers' creditworthiness and enable banks to extend external finance into the chain, creating a virtuous cycle of investment and rural financial deepening. Backward integration, where firms control upstream supply, consolidates value chains and enhances SME-led coordination of inputs and production (FAO, 2008).

Despite diverse players as shown above, agriculture finance and investment flows are unevenly distributed across the value chain. A growing share of investment is flowing into downstream segments (e.g., processing, distribution) and digitally enabled services due to clearer revenue models and reduced agronomic risk. Conversely, primary production and aggregation remain undercapitalized, despite their foundational role in food security (ISF Advisors, 2020; Aceli Africa 2023; AfDB 2024; AGRA 2024).

The conceptual framework (Figure 1) illustrates the dynamic interplay between financial actors, investment instruments, and the components of Africa's agrifood system. It highlights the core premise that unlocking the continent's food system transformation hinges on the deployment of integrated, context-specific value chains supported by suitable financial solutions, delivered through coordinated public and private sector collaboration.

This visual framework offers a comprehensive depiction of the financial architecture supporting Africa's agrifood systems. It maps the key value chain segments: production, aggregation, processing, distribution, and consumption, and aligns them with a variety of financial instruments and stakeholders critical to their development.

Understanding Africa's agrifood system

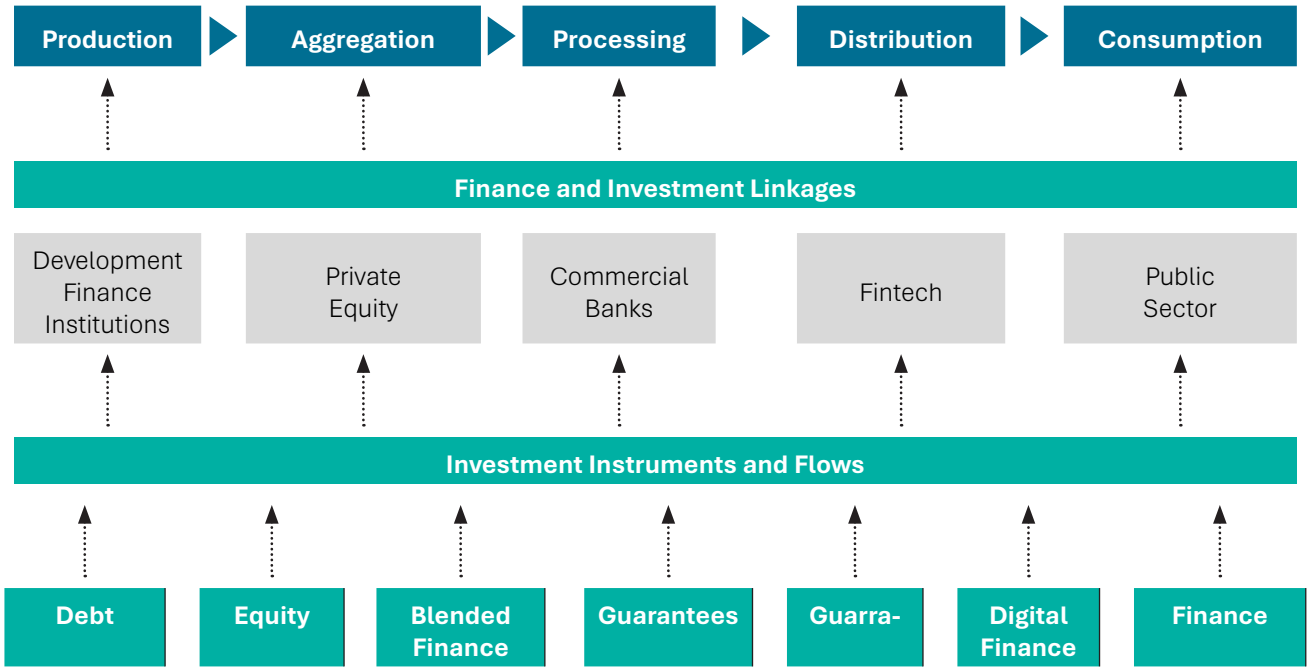

Figure 5.1: Understanding Africa's agrifood systems: finance and investment linkages. Source: Authors

Current landscape of agricultural finance and investment in Africa

Trends in agriculture finance across the continent

Agricultural finance and investment in Africa have evolved over the past two decades, showing distinct trends across sectors and instruments. Between 2014 and 2023, agricultural investment in Africa increased. Donor development flows to agriculture reached USD 18.2 billion in 2023, with Africa receiving the largest share (49%). The top recipients were concentrated in North Africa (Egypt), East Africa (Kenya and Ethiopia), and West Africa (Nigeria) (FAOSTAT, 2025). Investment flows remain uneven across regions and value chain segments. As shown in Table 5.1, Kenya, Nigeria, and South Africa dominate the investment landscape, reflecting relatively mature financial markets, stable policy frameworks, and high investor confidence (Dalberg Advisors, 2021; ISF Advisors, 2020).

Nigeria, Ethiopia, and Kenya lead in total investment flows, reflecting their large populations, diverse agro-ecological zones, and strategic roles in regional markets. The production segment attracted the largest share of investments across all countries, signaling continued prioritization of on-farm productivity improvements (e.g., irrigation, mechanization, seed systems). Processing and logistics remain underfunded, despite their importance in reducing post-harvest losses and enhancing value addition.

Retail and market access attract the lowest investments, reflecting a persistent bottleneck in linking farmers to high-value markets. Input supply investments remain modest but growing, especially in countries with strong Agri-SME sectors (e.g., Kenya, Ghana).

Between 2014 and 2023, Africa's financing mix shifted but remained uneven. Commercial bank lending to agriculture stayed structurally low, often below 4–5% of bank portfolios, as shown in a 2014 cross-country review and later in Kenya (~3.6% in 2019). oreign direct investment (FDI) was volatile, ending 2023 at USD 53 billion, a 3% year-on-year decline. Private equity and venture capital in agrifood rose to a record USD 636 million in 2022 before declining to USD 275 million in 2023. Blended-finance activity was flat/stop-start with a growing climate tilt rather than a steady climb. Digital agri-fintech rode mobile-money rails, Sub-Saharan Africa led globally, and West Africa doubled registered accounts (2013–2023). Government schemes remained large and crucial but are often cyclical and vulnerable to political and fiscal volatility (e.g., Nigeria's ABP ≈ ₦1.09–1.12 trillion cumulative by 2023). While public development banks continued to play an increasing role in agriculture finance.

Investments in digital agriculture are gaining traction, with countries like Kenya and Nigeria attracting venture capital to support platforms offering mobile-based agronomic advice, credit scoring, and market linkage services (CTA & Dalberg, 2019). However, primary production and input distribution still lags in terms of sustainable finance, receiving relatively less attention despite their importance in food system resilience.

Table 5.1: Investment flow by country and value chain segment in USD M (Last 10 Years)

Country	Production	Processing	Storage & Logistics	Input Supply	Retail & Market Access	Total
Nigeria	3200	1500	1200	800	600	7300
Kenya	1800	1100	900	500	400	4700
Ethiopia	2000	950	700	450	350	4450
Ghana	1200	700	500	300	200	2900
Rwanda	950	400	250	150	150	1900
Zambia	1100	500	400	250	200	2450
Côte d'Ivoire	1500	800	650	400	300	3650
Senegal	1000	450	300	200	150	2100

Source: Rebuilt from multiple sources by the authors

- Debt finance remains dominant, particularly through commercial banks and microfinance institutions. Yet its rigidity, short tenors, and high interest rates limit its suitability for agriculture. Equity financing, though growing, is concentrated in larger agribusinesses and agri-tech ventures with high growth potential (OECD, 2023). Blended finance, which combines concessional development finance with private capital and leverages public expenditure to expand resources for agrifood transformation, is essential to scaling the sector.
- Concessional finance, primarily from bilateral and multilateral donors, remains vital for fragile and food-insecure countries. International financial flows such as ODA, FDI, remittances, and philanthropic capital continue to shape agricultural investment trends. ODA and concessional finance focus on infrastructure, capacity building, and value chain development, while FDI is more prominent in export-oriented agricultural economies, supporting capital inflows, technology transfer, and access to global markets.
- Remittances, which exceeded USD 95 billion in Sub-Saharan Africa, remain largely untapped for agriculture. With proper structuring, for example through diaspora bonds or investment guarantees, they could provide a significant and stable source of financing for rural SMEs (AfDB, 2023).

Annual public expenditure on agrifood systems in Africa

Public investment in agriculture remains one of the most critical pathways for Africa to achieve food and nutrition security and the structural transformation required. Yet, African countries continue to fall short of the commitments made under the Maputo (2003) and Malabo (2014) declarations. In January 2025, through the Kampala Declaration, the African Union (AU) renewed its commitment that member states allocate at least 10 percent of annual public expenditure to agrifood systems, with the goal of mobilizing USD 100 billion by 2035 and reinvesting at least 15 percent of agrifood GDP annually in the sector.

The composition of expenditure remains a concern. In many countries, most allocations go to input subsidies (mainly fertilizers and seeds) rather than to productive investments such as irrigation, rural infrastructure, extension, and research (Benin & Yu, 2023; Malabo Montpellier Panel, 2020). This expenditure pattern raises questions about efficiency and sustainability, as subsidy-heavy budgets often deliver short-term yield gains but crowd out resources for long-term structural transformation. This subsection reviews recent trends, challenges, and evidence linking public agricultural expenditure to food systems outcomes.

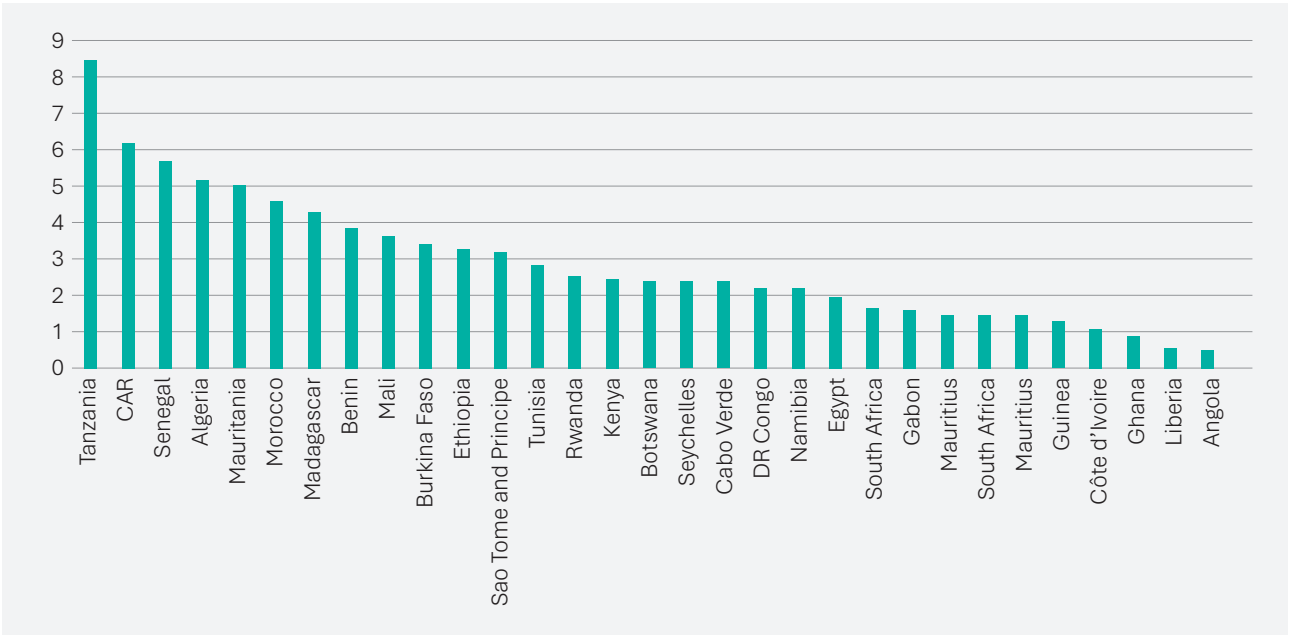

Figure 5.2: Share of total expenditure on agriculture across countries in 2023. Source: Authors using FAO data.

Trends in public expenditure on agriculture

The chart below ranks African countries by the share of public spending allocated to agriculture (percent) in 2023.

FAOSTAT data show that in 2023, public expenditure on agrifood systems in Sub-Saharan Africa averaged only 2.7 percent of total national budgets, well below the 10% target. Only a few countries, such as Tanzania, Central African Republic, Senegal, and Algeria spent more than 5% of their national budgets on agriculture with Tanzania spending 8.4% as the highest. In 2023, no African country met the Malabo target, despite earlier commitments by 42 countries under the CAADP framework.

In real terms, annual growth in per capita public agricultural expenditure remained low or negative in many countries, driven by inflation, currency depreciation, and rising debt burdens. Compounding the challenge, the quality of budget execution remains weak. A study by FAO (2021) across a 13-country sample found that, on average, 21% of agricultural budgets went unspent each year, with the figure rising to nearly 40% for donor-funded allocations. This underscores the limited institutional capacity of governments to design and implement complex, integrated programs. At the same time, input subsidies continue to absorb a disproportionately large share of agricultural resources, particularly in countries such as Burkina Faso and Malawi, often crowding out investments in longer-term priorities such as agricultural research, extension services, and infrastructure. While subsidies provide short-term yield and food security gains, evidence shows that their returns diminish over time, whereas investments in research, extension, and rural infrastructure generate higher and more sustainable productivity growth (Benin & Yu, 2023; Malabo Montpellier Panel, 2020).

Key challenges in the existing financial landscape

Despite progress, African agriculture continues to face systemic financial bottlenecks:

First, access to affordable and appropriate financial services is severely limited, especially for smallholder farmers and agri-SMEs. High interest rates (often exceeding 25% annually), collateral requirements, and low levels of financial literacy exclude the majority from formal credit (Beaman et al., 2020).

Second, agriculture is widely perceived as high risk, affected by weather variability, price shocks, and policy uncertainty. These risks disincentivize banks and private investors from engaging deeply, especially in upstream activities like input provision and smallholder finance (World Bank, 2023). The absence of reliable credit information systems and crop insurance further amplifies these risks.

Third, weak investment climates, unclear land tenure systems, and frequent policy reversals undermine investor confidence. For instance, abrupt changes in export bans, subsidies, or price controls distort markets and lead to capital flight (Jayne et al., 2018). Many countries also lack coherent agricultural finance strategies that align public expenditure, donor support, and private sector incentives.

Subsidy programs, though politically attractive, often crowd out private finance and are rarely aligned with broader financial sector development strategies. Moreover, underfunded credit guarantee schemes and underdeveloped capital markets limit the diversity of instruments available for agricultural finance (OECD, 2023).

The financial landscape for African agrifood systems is shifting as traditional sources of development finance decline, particularly from major players such as the United States. Historically, bilateral, and multilateral donors, including the U.S. through USAID and related agencies, have been central in providing concessional funding for agricultural infrastructure, research, and food security programs. However, recent fiscal constraints, shifting foreign policy priorities, and growing domestic pressures have led to a gradual reduction in U.S. and European development assistance, creating funding gaps across key agricultural value chains (Kohnert, 2025; OECD, 2023). This contraction is compounded by a global trend in which Official Development Assistance (ODA) is increasingly volatile, with a declining share directed to the root causes of food insecurity and malnutrition (FAO et al., 2024; Otekunrin et al., 2024).

Reduced donor flows are forcing African governments, regional institutions, and development partners to rely more on innovative financing models, blended finance mechanisms, and private capital mobilization to meet investment needs (UNCTAD, 2022). While this shift may catalyze deeper private-sector engagement, it also underscores the urgency of building resilient, diversified financing systems that are less dependent on a shrinking pool of traditional donors.

Innovation in agricultural finance

Development Finance Institutions (DFIs) play a central role in bridging finance gaps and catalyzing private sector engagement in agriculture. They are also leading agencies for innovations in agricultural finance and investment. Institutions such as the African Development Bank (AfDB), World Bank, International Finance Corporation (IFC), and the Dutch FMO deploy patient capital and technical assistance to de-risk investments and support enterprise development (Attridge & Engen, 2019). Yet the outreach of DFIs remains limited in fragile and low-income countries, constrained by concerns over investment readiness and governance.

Blended finance instruments facilitated by DFIs such as first-loss capital, guarantees, and technical assistance facilities have proven effective in crowding in commercial investment. However, their scale and sustainability are constrained by high transaction costs and a shortage of bankable projects (Convergence, 2022). This highlights the need for readiness funding and institutional capacity to implement large-scale programs.

Blended finance mechanisms

Blended finance is the strategic use of concessional public or philanthropic capital to de-risk investments and attract private finance into high-impact sectors such as agriculture (Attridge & Engen, 2019). It plays a key role in correcting market failures, especially where returns are uncertain, transaction costs are high, or beneficiaries are not traditionally bankable.

Several successful blended finance case studies in Africa include:

- **Aceli Africa:** Operating across East Africa, Aceli provides financial incentives and first-loss coverage to commercial lenders who serve high-impact agricultural SMEs. Between 2020 and 2023, Aceli catalyzed over USD 80 million in SME loans by covering risk premiums and offering capacity-building support (Aceli Africa, 2023).
- **Agri-FI Kenya Challenge Fund:** A blended finance initiative co-funded by the EU, Agri-FI provides matching grants and technical assistance to agribusinesses to enhance their investment readiness. It has supported more than 50 enterprises across value chains such as dairy, horticulture, and aquaculture by leveraging grants with private capital (European Union, 2022).
- **Fund for Agricultural Finance in Nigeria (FAFIN):** FAFIN is a private equity fund with blended capital from the Nigerian government, DFIs, and private investors. It provides long-term patient capital to agri-SMEs while integrating ESG principles and technical assistance (Sahel Capital, 2022).

Digital finance and fintech solutions

The spread of mobile technology has sparked a digital finance revolution in African agriculture. Mobile money platforms, digital wallets, and AI-based credit scoring systems are transforming access to financial services for millions of farmers and informal agri-entrepreneurs previously excluded from formal systems (CGAP, 2022).

A wave of financial and technological innovations is transforming access to capital and services in Africa's agrifood systems. Mobile money and digital wallets, such as M-Pesa, Airtel Money, and MTN Mobile Money, now enable millions to conduct secure transactions, save, and access loans, significantly expanding financial inclusion (Jack & Suri, 2016). AI-powered credit scoring by firms such as Apollo Agriculture uses satellite data and algorithms to assess borrower risk, providing input loans and insurance without traditional collateral (Apollo Agriculture, 2023).

In parallel, mechanization-as-a-service platforms like Hello Tractor connect farmers to tractor owners through a pay-as-you-go model, bundling the service with financing to improve productivity (IFC, 2021). Finally, asset financing models pioneered by M-Kopa extend digital repayment systems, first used for solar kits and smartphones, to agricultural tools and irrigation systems, broadening access to critical assets (M-Kopa, 2023). Collectively, these innovations bridge financing gaps, increase efficiency, and accelerate inclusive food system transformation across the continent.

Impact investment and Environmental, Social and Governance (ESG)-focused funds

Impact investing and ESG-focused capital are increasing in African agriculture and food systems. Impact investors seek financial returns alongside measurable social and environmental outcomes, with increasing attention to climate resilience, gender inclusion, and food security.

According to the Global Impact Investing Network (GIIN), impact investing assets under management exceeded USD 1.2 trillion globally in 2022, with about 10% allocated to food and agriculture (GIIN, 2022). Funds like the African Agriculture and Trade Investment Fund (AATIF) and the Acumen Resilient Agriculture Fund (ARAF) channel ESG-aligned capital into agribusinesses that promote sustainable land use, water conservation, and climate-smart practices.

Initiatives such as the ClimateShot Investor Coalition channel private capital into climate-resilient agricultural solutions, including agroforestry, regenerative farming, and drought-tolerant seed systems (CGIAR, 2021).

Innovative financial instruments and their impact on food system actors

Figure 3 illustrates how innovative financial instruments, including blended finance, digital loans, asset-based financing, insurance, and impact capital, interact with different actors in the agrifood system. This systems-based visualization shows how different innovations fill finance gaps, improve inclusion, and unlock transformation across the agrifood value chain.

This section examines the strategic alignment of financial instruments with specific actors within Africa's agricultural value chain. The section underscores the importance of tailored financial solutions for enhancing the efficiency, inclusivity, and resilience of agrifood systems in Africa. It maps instruments such as grants, concessional debt, equity capital, guarantees, and digital credit to stakeholders ranging from smallholder farmers to retailers. The insights are useful in channeling and targeting financial resources to specific actors along the agrifood value chain.

Grants/subsidies → Smallholder farmers

Smallholder farmers in Africa often face barriers such as limited access to finance, lack of collateral, and high climate risk exposure. Matching grants and subsidies enable farmers to adopt improved practices, invest in inputs, and build resilience. These instruments often serve as catalytic capital for market entry and livelihood improvement. Ton et al. (2014) highlight that innovation grants targeted at smallholder farmers can facilitate the adoption of new technologies and practices, leading to enhanced productivity and income.

Concessional debt → Aggregators

Aggregators, who consolidate produce from multiple farmers, need affordable working capital to invest in post-harvest infrastructure and transport. Concessional debt, provided at below-market rates, offers a solution to support scale and inclusivity. Hague et al. (2020) discuss the impact of concessional finance on agribusinesses, noting that such financial instruments can catalyze growth and development in the agricultural midstream sector.

Equity Capital → Processors

Processors typically require significant upfront investment in equipment and facilities. Equity capital is effective because it brings both financing and strategic

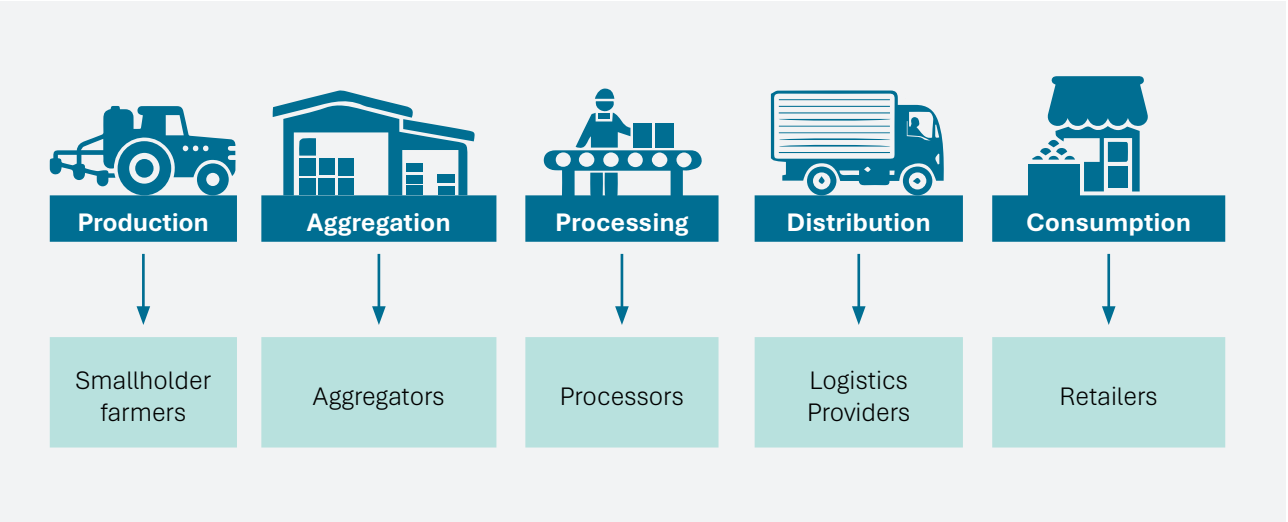

Figure 5.3: Innovative financial instruments and their impact on food system actors. Source: Authors

support without requiring immediate repayment. Grujić et al. (2023) analyze the determinants of capital structure in the agricultural sector, emphasizing the role of equity financing in enabling processors to expand operations and improve efficiency.

Guarantees/insurance → Logistics providers

Logistics providers contend with high operational risks, such as perishability, theft, and infrastructure gaps. Guarantees and insurance products reduce risks and enable providers to expand into underserved areas. Wang et al. (2023) examine the role of agricultural insurance in capital-constrained environments, concluding that such instruments are crucial in mitigating risks and encouraging investment in logistics.

Digital credit/fintech → Retailers

Retailers, particularly in informal markets, often lack access to traditional financing. Digital credit solutions powered by mobile data and alternative scoring models can bridge this gap. Zhang et al. (2021) investigate the impact of rural e-commerce development on farmers' digital credit behavior, finding that digital platforms significantly enhance credit access and financial inclusion for retailers.

The strategic deployment of tailored financial instruments is crucial for building resilient and inclusive agrifood systems. Aligning tools with the operational realities of stakeholders, from smallholder farmers to retailers, can enhance productivity, manage risks, and foster sustainable growth.

Africa commitment over the next decade

Mobilizing $100 billion in agrifood investments in Africa by 2035

In 2023, the African Development Bank (AfDB) and the Government of Senegal convened the Dakar II Feed Africa Summit to generate new political and financial momentum for transforming Africa's agriculture sector. Central to this ambition is the target of mobilizing USD 100 billion in agrifood investments by 2035, a goal anchored in the African Union's Comprehensive Africa Agriculture Development Programme (CAADP) and reaffirmed in 2025 through the Kampala Declaration.

This investment target is not merely aspirational, it is a strategic imperative. As already discussed from the preceding sections, African food systems face mounting pressures from climate change, global supply disruptions, and underinvestment in productivity and infrastructure. The Dakar II Summit demonstrated that Africa possesses the tools, partnerships, political will, and commitment to turn these challenges into drivers of inclusive growth, resilience, and food sovereignty.

The Dakar II Summit was a pivotal moment in Africa's agricultural transformation agenda. It brought together over 30 heads of state, 70 ministers, and a coalition of development partners and private investors, generating USD 70 billion in pledges, 70% of the 2035 investment goal. These commitments include USD 10 billion from the AfDB and USD 60 billion from development partners. They are embedded in 41 Country Food and Agriculture Delivery Compacts outlining national strategies for boosting productivity, strengthening value chains, and scaling climate-smart agriculture.

These efforts build on the CAADP framework, particularly the 2014 Malabo Declaration and the 2025 Kampala CAADP Declaration, where governments reaffirmed commitments to allocate at least 10% of public expenditure to agriculture and achieve 6% annual agricultural growth. The Kampala Declaration also emphasized the need for innovative financing, regional trade integration, and the empowerment of youth and women, principles now integrated into the Dakar II framework and outcomes.

A call to action for real progress from pledges

Mobilizing USD 100 billion in agrifood investments by 2035 will require consistent implementation, stronger institutional capacity, and coordinated, transparent accountability mechanisms. Country Food and Agriculture Delivery Compacts must be institutionalized through presidential councils, delivery units, and results-based frameworks. Development partners should align financing and technical assistance with national investment pipelines, with particular emphasis on project preparation and climate resilience. The private sector must be empowered through expanded access to finance, reliable market data, and efficient trade infrastructure. Equally important is building institutional capacity within governments to design and implement integrated agrifood systems.

The AfDB, as a convener and lead financier, has pledged full support. Yet the true engine of transformation lies in the collective determination of African nations to convert vision into action. As emphasized in the Dakar II Declaration, Africa can and must feed itself while securing its food sovereignty. Mobilizing USD 100 billion is not only a financial milestone but also a moral, economic, and generational imperative for Africa.

Enabling investment through policy and regulation

Investment climate reform

In transforming Africa Agriculture and Food Systems, investment climate reform is critical to attract FDI and unlock domestic private capital. Key reforms needed to revolutionize and transform the agrifood sector include:

- Improving regulatory frameworks: Transparent licensing, predictable taxation, and streamlined agribusiness registration procedures are essential to reducing business costs and risks. Rwanda and Ethiopia, for example, have introduced one-stop investment promotion agencies to facilitate agribusiness investments (World Bank, 2023).
- Strengthening land tenure systems: Secure land rights are essential for agricultural investment. Weak land governance and customary tenure systems in many African countries hinder land-based investments and limit the use of land as collateral. Land reforms and digitized land registries, as in Ghana and Kenya, are helping to reduce disputes and improve investor confidence (Deininger & Byerlee, 2012; Bugri, 2021).

Risk mitigation solutions

To address the high-risk perception of African agriculture, governments and development partners are deploying financial instruments that reduce exposure and improve bankability:

Credit guarantees: Credit guarantees partially absorb default risk, encouraging banks to lend to underserved agri-SMEs. Institutions such as AGRA and the African Guarantee Fund have scaled these facilities across West and East Africa (AGF, 2022).

Agricultural insurance: Index-based insurance schemes covering rainfall variability or yield losses are expanding in Kenya, Nigeria, and Zambia, often bundled with credit or input packages. These products improve farmer resilience and reduce lender risk (Hazell et al., 2017).

Currency hedging tools: In markets with high exchange rate volatility, hedging instruments are essential to protect cross-border investors and enable longer-term financing. DFIs and multilateral agencies already play a role, with initiatives such as the TCX Fund providing currency derivatives to mitigate foreign exchange risk (TCX, 2022). Nevertheless, exchange rate risk remains one of the most significant constraints undermining the viability of African SMEs, underscoring the need for further financial innovation. Emerging digital tools, such as stablecoins for settlement and blockchain-based credit platforms for transparency and risk-sharing, offer potential to complement traditional hedging mechanisms and provide more accessible, cost-effective solutions for SMEs in frontier markets.

Public-Private Partnerships (PPPs)

PPPs are essential for mobilizing long-term capital and technical expertise, particularly in large-scale infrastructure and agro-industrial projects.

Bankable project structuring: Governments, with support from DFIs, can structure PPPs that combine public funding, concessional finance, and private equity to de-risk early-stage investment. Nigeria's Staple Crop Processing Zones and Senegal's Agro-pole initiative exemplify successful PPP models (FAO, 2020).

Government as a de-risker: Beyond financial commitments, governments play a critical role in absorbing first-loss risks, providing legal guarantees, and anchoring public goods such as roads, energy, and irrigation that lower private investment costs (OECD, 2021).

Table 5.2: Policy instruments for de-risking agricultural investment

Policy instrument	Description	Impact on investment
Credit guarantees	Public or DFI-backed partial risk-sharing facilities	Encourages lending to high-risk agribusiness SMEs
Index-based insurance	Weather- or yield-linked coverage for smallholders	Enhances farmer resilience and improves loan eligibility
Land reform and titling	Legal recognition and documentation of land rights	Unlocks collateral and supports long-term investment
Tax incentives	Targeted tax breaks for agribusiness investments	Improves returns and strengthens investment viability
PPP frameworks	Joint ventures for agri-infrastructure and agro-zones	Mobilizes private capital and supports scale-up
Foreign exchange hedging	Risk protection against currency volatility	Attracts international financiers and exporters

Source: Authors

Sector-specific investment opportunities

Climate-Smart Agriculture (CSA)

CSA encompasses practices that sustainably raise productivity, strengthen adaptation to climate change, and reduce greenhouse gas emissions. It is a major investment opportunity, particularly in Africa where climate variability and land degradation are acute risks (FAO, 2021).

Priority investment areas include irrigation, regenerative agriculture, climate risk insurance, and blended finance. Scaling access to solar-powered and precision irrigation technologies, including drip and sprinkler systems, has doubled horticultural yields in Ethiopia and Senegal (World Bank, 2023). Financing regenerative practices such as agroforestry and cover cropping help restore soils while attracting impact investors through carbon markets and sustainability-linked loans.

Climate risk insurance and digital advisory tools, such as those provided by Pula in Kenya, combine early warning systems, bundled insurance, and agronomic advice to strengthen resilience and financial viability. CSA is also being scaled through blended finance mechanisms, such as the Acumen Resilient Agriculture Fund (ARAF), which uses concessional capital to leverage private investment. Collectively, these targeted investments demonstrate how climate-resilient innovations can simultaneously raise productivity, protect livelihoods, and accelerate food system transformation.

Agro-processing and agribusiness

Agro-processing presents some of the strongest opportunities for value addition, employment generation, and rural industrialization. It also reduces post-harvest losses, estimated at 30–40% for some crops, and stimulates demand for farm produce.

Investment opportunities include primary processing facilities that add value to grains, dairy, oilseeds, and horticulture by strengthening aggregation and market linkages; integrated agro-industrial parks, such as those in Ethiopia and Nigeria, which reduce cost barriers and attract infrastructure investment; and cold chain and logistics systems, which are critical for reducing losses and improving market access for perishables. These areas are increasingly attracting public–private partnerships and co-investment from DFIs, sovereign wealth funds, and private equity firms targeting mid-size agribusinesses across East and West Africa (IFC, 2022). Collectively, they offer scalable entry points for investors seeking both commercial returns and systemic impact.

Table 5.3: Sector-specific investment success stories across select African Countries

Country	Sector	Investment vehicle	Impact
Kenya	Agri-tech	Apollo Agriculture (venture-backed)	Reached 200,000+ farmers with AI-based credit and input bundles
Nigeria	Agro-processing	Fund for Agricultural Finance in Nigeria (FAFIN, blended private equity)	Invested in 12 agribusinesses and created 5,000+ rural jobs
Ghana	Digital markets	AgroCenta (seed funding and grants)	Digitized smallholder sales and expanded access to finance
Ethiopia	Industrial parks	World Bank and Government of Ethiopia (PPP in Bure IAIP)	Catalyzed $100 million in agro-industrial infrastructure
Rwanda	Irrigation/Climate-smart agriculture (CSA)	Green Climate Fund (GCF)-financed small-scale irrigation schemes	Reduced yield gaps and improved resilience to drought

Source: Authors

Agri-tech startups

Agri-tech startups are pioneering digital tools that connect farmers to inputs, markets, finance, and extension services. They represent one of the fastest-growing investment segments in Africa's agriculture and food systems.

Investment models range from seed and early-stage funding, where impact funds and angel investors back startups such as ThriveAgric (Nigeria) and AgroCenta (Ghana), to venture and growth capital, which has enabled firms such as Twiga Foods (Kenya) and Vendease (Nigeria) to scale digital supply chains and logistics networks.

Corporate venture partnerships are increasingly common, with multinational agrifood companies co-investing in solutions for traceability, precision agriculture, and climate intelligence. Accelerator programs and catalytic grants provide initial support, but scaling requires greater access to working capital, bundled services, and regulatory clarity to ensure promising models transition into sustainable, system-wide solutions.

Conclusion and recommendations

Africa's food system transformation hinges on finance and investment as catalytic levers for change rather than as supportive elements. Although agriculture remains the backbone of livelihoods across the continent, the sector is chronically undercapitalized, fragmented, and highly vulnerable to climate and market risks. Mobilizing and deploying capital more effectively across the agrifood value chain is therefore essential to achieving inclusive growth, food and nutrition security, and environmental sustainability. This requires not only more financing but also appropriately designed instruments, tailored to the needs of different value chain actors, reinforced by risk-sharing mechanisms, and supported by coherent policies and institutional reforms.

Strategic policy actions are urgently needed to unlock Africa's agrifood potential. Governments should strengthen institutional frameworks for agricultural finance by mandating national strategies that align monetary, fiscal, and food system priorities. Reforms must also enhance the regulation of rural financial services to incentivize innovation while maintaining stability, and support apex organizations and credit bureaus to reduce risk premiums and expand outreach. Equally critical is stronger coordination among public, private, and donor investments. This can be achieved by establishing investment coordination units and

structured dialogue platforms that harmonize priorities, align public expenditure with private capital, and facilitate co-financing for infrastructure and risk-sharing. Building robust data systems is essential, including digital registries, geospatial data hubs, interoperable platforms, and open data standards to reduce information asymmetry, lower transaction costs, and improve underwriting across the sector.

At the programmatic level, regional economic communities such as ECOWAS, COMESA, and EAC should establish regional food system investment platforms to overcome fragmentation, aggregate pipeline opportunities, and support trade corridors, agro-industrial clusters, and financial harmonization mechanisms such as green bonds and diaspora funds. These platforms should be anchored by regional development finance institutions, including the African Development Bank and the Trade and Development Bank, to de-risk participation and mobilize cross-border flows. Addressing persistent financing gaps requires scaling up catalytic facilities such as challenge funds, development impact bonds, first-loss capital instruments, and guarantee schemes. In parallel, emerging digital and AI-based platforms can reduce distribution costs, expand credit access, and mitigate exchange rate risks. Targeted action is also required to empower youth- and women-led enterprises through dedicated investment windows, blended finance and mentorship programs, preferential procurement, and the inclusion of gender- and youth-sensitive indicators in fund evaluation systems.

Taken together, these recommendations reinforce the chapter's key messages: finance must be recognized as a transformative force; innovation and technology are critical to inclusion and scale; enabling policy and institutional reforms are indispensable; Africa's $100 billion agrifood investment commitment must translate into delivery; financial instruments must be tailored to diverse value chain actors; public finance should serve as catalytic capital; regional coordination is essential; and the evolving financial landscape requires resilient and diversified financing models.

Transforming Africa's food systems is no longer an aspiration but an urgent necessity. Governments must lead with vision and policy coherence. Public development banks should assume a stronger role in driving structural change. Donors and development partners must expand the use of catalytic instruments, while the private sector should scale inclusive financial models. Regional bodies must harmonize standards and anchor investment platforms. Only through collective commitment to inclusive, sustainable, and de-risked investment strategies can Africa shift from food dependency to food sovereignty, building agrifood systems that foster resilience, shared prosperity, and equity on a healthy planet.

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6 Transforming africa's agrifood systems through infrastructure

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KEY MESSAGES

1. **Infrastructure gap constrains transformation**
   Africa faces an annual infrastructure gap of USD 67–108 billion in roads, electricity, irrigation, and storage, which limits food system transformation, job creation, and progress on AU and SDG targets.
2. **Financing remains the central bottleneck**
   Infrastructure needs are projected at USD 130–170 billion annually. While a 1% rise in public investment can increase GDP growth by 0.6%, bridging the gap requires mobilising USD 78–102 billion per year from private capital.
3. **Efficient logistics are transformative**
   30% of food spoils before reaching markets. Improved roads, cold chains, and logistics could cut this loss by half, while every USD one billion invested in transport generates between 110,000 and 150,000 jobs.
4. **Irrigation expansion is critical**
   Only 6% of Africa's land is irrigated. Expanding coverage to 15% would increase cereal yields by 40%, adding USD 22 billion annually to agricultural value.
5. **Storage (including cold-storage) and processing drive local value**
   Investments in storage, agro-processing, and digital tools amplify food system efficiency, with local milling increasing producer prices by 25–40%.
6. **Continental commitments guide transformation**
   The Kampala Declaration of 2025 emphasizes shifting from raw commodity exports to self-sufficiency, value addition, intra-African trade, and resilient, inclusive agrifood systems.
7. **Private investment sources are evolving**
   Foreign direct investment accounts for 70% of private capital inflows into Africa, while Sovereign Wealth Funds are emerging as important sources of long-term infrastructure finance.
8. **Blended finance is gaining traction**
   Blended finance approaches that pool public and private capital are becoming essential for addressing Africa's infrastructure financing deficit and mitigating investment risks.

Introduction

Infrastructure development is central to fostering economic growth, generating employment, and reducing poverty in Africa. The annual demand for infrastructure is estimated to be between $130 and $170 billion, with a financing shortfall of approximately $67.6–$107.5 billion (AfDB, 2024). Bridging this infrastructure gap could enhance growth rates by as much as 2% annually and decrease poverty levels by 25% in various areas. Furthermore, infrastructure initiatives can create substantial job opportunities, with every $1 billion invested yielding between 110,000 and 150,000 jobs (World Bank, 2024).

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Investments in agricultural infrastructure and extension services remain crucial for enhancing both food availability and access, particularly when combined with initiatives aimed at increasing the purchasing power of rural households (Pawlak & Kołodziejczak, 2020). An effective transportation network allows for the smooth transfer of agricultural inputs, including fertilisers and seeds, from urban areas to rural farms, while also facilitating the efficient movement of agricultural products from farms to markets and processing centres (Gold et al., 2012).

Additionally, irrigation infrastructure is vital for addressing the challenges posed by unpredictable rainfall and extended droughts, which are increasingly prevalent due to climate change (Amede et al., 2023). Irrigation allows farmers to grow high-value crops, boost yields, and prolong the growing season, by ensuring a consistent water supply for crop cultivation. This in turn improves food security and income generation. Moreover, investments in storage solutions, such as silos and cold storage facilities, are essential for minimising post-harvest losses, which can be significant in numerous African nations due to insufficient storage capabilities (Bettili et al., 2019).

A significant portion of Africa's essential infrastructure sectors continues to be underdeveloped. In 2024, 59% of Africa's population had access to electricity, an increase from 44% in 2010. Despite this progress, around 600 million people still lack electricity in their households. The transportation sector is similarly affected, with over 2 million km, with only about 30% paved. Merely 34% of the rural populace in Sub-Saharan Africa can access all-season roads. Transport costs in Africa can be up to 60% higher than the global average. Road transport accounts for about 29% of the price of goods traded within Africa (AfDB, 2024).

The length of railways throughout Africa is roughly 75,000 km; Yet a significant portion is non-operational or operates inefficiently. Most rail networks lack connectivity between nations and utilise various gauges. Africa accounts for only 3% of the global air traffic. Air traffic is growing rapidly but remains concentrated in a limited number of hub cities, such as Addis Ababa, Johannesburg, Nairobi, and Cairo. Seaports are responsible for handling about 90% of Africa's international trade. Major ports such as Durban, Lagos, Mombasa, and Abidjan handle most of the continent's trade. Inland waterways, such as the Congo River, Nile, and Lake Victoria, are not fully utilised but hold local significance.

Only approximately 6% of the cultivated land in Africa is irrigated, significantly lower than the global average of 20%. North Africa has irrigation coverage between 30% and 50%, attributed to more developed systems. In contrast, Sub-Saharan Africa experiences significantly restricted irrigation, frequently below 5%, particularly in the regions of West and Central Africa (World Bank, 2024). Africa retains less than 5% of its yearly renewable water resources, which constrains its resilience.

Internet penetration more than doubled from 16% in 2013 to 38% in 2024. As of 2024, over 532 million people in Africa are using the Internet. Internet usage is significantly higher in urban areas, with rates reaching 57% in 2024 compared to 23% in rural regions (World Bank, 2024). These statistics highlight the critical financial disparity between the existing demand and the current state of infrastructure in Africa (Afreximbank, 2024; AfDB, 2024).

Logistics and transport network infrastructure

Africa's Agenda 2063 sets ambitious transport goals (AU, 2015):

- Develop integrated roads, ports, and logistics hubs that facilitate intra-African trade
- Construct a high-speed rail network connecting all African capitals and commercial hubs
- Establish a unified air transport market to enhance the movement of goods and people
- Priority corridors are to be operational by 2033, with full network integration targeted by 2063

Transport infrastructure, roads, railways, seaports, and air freight, is fundamental to agrifood systems, enabling efficient movement of inputs and produce (Khadaroo & Seetanah, 2009). Africa underperforms across most indicators, with limited paved-road coverage, outdated rail systems, inefficient port operations, and fragmented air services. This inefficiency drives up costs, inflates insecurity, and suppresses trade. Evidence links transport costs to depressed trade

Africa's infrastructure snapshot

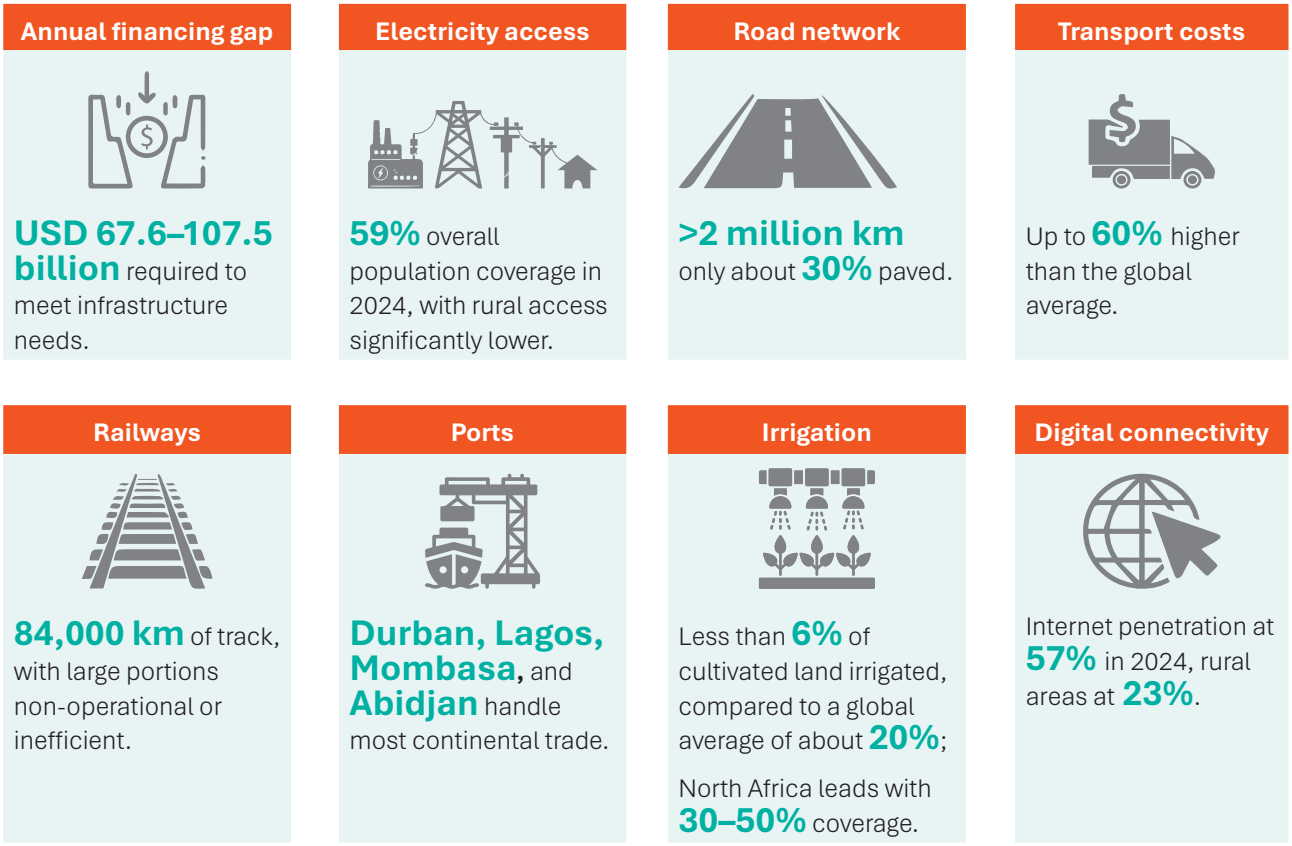

Figure 6.1: The state of Africa's infrastructure. Source: Authors - using Afreximbank, 2024; AfDB, 2024 data.

volumes, e.g., a 12% cost increase can reduce trade by 28% (Behar & Venables, 2010), and estimates suggest infrastructure gaps lower intra-African trade by 30–40% and GDP growth by ~2 percentage points (UN-Habitat, 2011).

With the implementation of the AfCFTA, intra-African trade is projected to rise by up to 40%, increasing freight demand by 28%, particularly for rail transport (ECA, 2022).

Road transport

Roads carry 77% of freight (201 million tonnes) (ECA, 2022), yet only 29.5% of the 1.61 million kilometres of road network is paved (World Bank, 2024; Krantz, 2024). Poor road access, especially in Central Africa and the Horn, limits market integration and exacerbates rural poverty. A 20% reduction in transport costs could raise farm-gate prices by ~6%, improving farmer incomes and productivity (Hine & Ellis, 2001).

Africa's road network is classified into five main categories based on their function and connectivity. Motorways are designed for high-speed, long-distance travel linking major cities and regions, with limited access points to ensure traffic flow. Trunk roads form the backbone of national and regional transport, connecting major cities, ports, airports, and strategic hubs, and may approach motorway standards but often have at-grade intersections. Primary roads link medium to large towns, districts, and important regional centres, serving as key conduits for trade and mobility. Secondary roads provide connections between smaller towns or local centres and the primary road network, facilitating intra-regional access. Tertiary roads are local access routes connecting villages, small settlements, and farms to higher-level roads, supporting rural accessibility and agricultural supply chains.

Table 6.1: Africa's road network by classification (2024). Source: World Bank.

Road classification	Number of roads	Length (km)	Paved (km)	Percent of Paved Road (%)
Motorway	14,986	22,400	17,744	79.2
Trunk	75,265	181,459	128,978	71.1
Primary	124,547	252,047	136,452	54.1
Secondary	158,674	365,939	97,904	26.8
Tertiary	299,573	790,067	94,373	12.0
Total	673,045	1,611,912	475,450	29.5

Despite new investments, trans-African corridors remain poorly connected, with slow border processes and non-tariff barriers (Krantz, 2024). Without substantial transport investment, AfCFTA's trade benefits will be delayed. Fontagné et al. (2023) estimate that reducing road, port, and border delays could boost Africa's exports by 11.5% and GDP by 2%. AfCFTA implementation may double truck haulage from 201 to 403 million tonnes by 2030 (ECA, 2022).

Rail transport

Rail transport is a cost-effective mode for moving bulky agricultural commodities over long distances, yet Africa's network is fragmented, underutilised, and in many areas deteriorated. It currently handles only 0.3% of intra-African freight (ECA, 2022), with just 80,607 km of track, barely 10,000 km more than India. Only Southern Africa has a functional regional network. AfCFTA could raise rail's share to 7%, expanding freight from 760,000 tonnes to 39 million tonnes (ECA, 2022). To support this growth, 9,059 km of critical rail links across Central, East, and Southern Africa need urgent modernisation and investment (ECA, 2022). Priority corridors for upgrade include:

- Central Corridor (Tanzania - DRC - Rwanda - Burundi - Uganda)
- Northern Corridor (Kenya - Uganda - South Sudan - DRC)
- Lobito Corridor (Angola - DRC - Zambia)

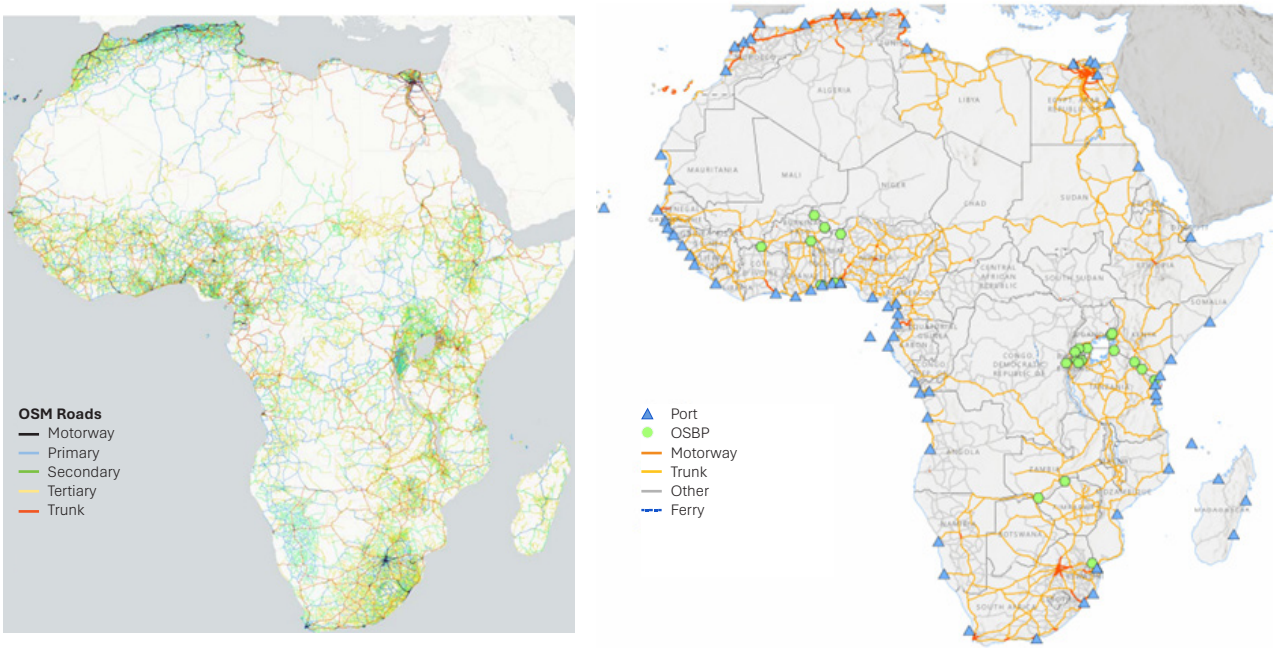

Figure 6.2. Existing transport network—roads, ports, and border posts. Source: OpenStreetMap (2025).

- Nacala Corridor (Mozambique - Malawi - Zambia)
- Beira Corridor (Mozambique - Zimbabwe - Zambia)
- Benguela Railway (Angola – DRC)
- Tanzania-Zambia Railway (TAZARA)
- Trans-Kalahari Railway (Botswana - Namibia)
- Maputo Corridor (South Africa - Mozambique)
- Southern Africa Regional Rail Network (South Africa, Zimbabwe, Botswana, Namibia, Mozambique).

There is also planned Trans–West African Coastal Railway, which will connect 11 countries in the ECOWAS region (Dakar (Senegal) – Abidjan (Côte d'Ivoire) – Lagos (Nigeria). In North Africa, the Maghreb Railway (Algeria-Tunisia-Morocco) is a planned critical corridor that links with the Trans-Saharan Railway (Algeria-Niger-Nigeria).

Rail investments in Africa have fallen behind road development, despite having favourable benefit–cost ratios, due to a mix of structural, financial, and institutional challenges. Historically, colonial rail systems were established primarily for extraction, connecting mines or plantations to ports instead of fostering integrated domestic or regional connectivity. This has resulted in a fragmented network characterised by varying gauges, inadequate inter-country connections, and obsolete technology (Pirie, 2010; Jedwab & Storeygard, 2019).

Financially, rail projects require larger upfront capital than roads and face longer payback periods and higher perceived risks. This renders them less appealing to both governmental bodies and private investors. In contrast, roads that can be constructed incrementally at a lower cost, are easier to finance through annual budgets, and offer greater flexibility in accommodating dispersed communities. Political agendas have also leaned towards road projects, as they provide quicker and more visible returns, aligning with the predominant role of road transport in freight and passenger movement (Teravaninthorn & Raballand, 2009; Buys et al., 2010).

Figure 6.3: Critical railway links for AfCFTA implementation. Source: ECA (2022).

On an institutional level, poor regional coordination, lack of robust regulatory frameworks, and underperforming state-owned rail companies have deterred investment. Even where benefit–cost ratios are favourable, weak policy support, poor maintenance, and limited integration with ports and logistics hubs deter investment—despite rail's lower long-term operating costs and environmental advantages (Gwilliam, 2011; World Bank, 2019).

Maritime transport

Maritime transport remains the backbone of global trade, handling 80% of global trade volume due to its cost-efficiency and reliability, especially over long distances (World Bank, 2024). Over the past two decades, developing countries have increased trade in raw materials and manufactured goods driven by China's growth. However, Africa's share of global maritime trade remains stagnant at 5%. Between 2018 and 2023, African port calls by container ships and tankers increased by 20% and 38%, respectively, with the highest growth seen in South-South waterways linking Sub-Saharan Africa to other developing regions (UNCTAD, 2023).

Intra-African maritime freight accounts for 22.1% (58 million tonnes) of the region's freight demand. Under AfCFTA, this is projected to rise to 131.5 million tonnes, possibly tripling fleet capacity for bulk and container ships by 2030 (ECA, 2022). Key growth routes include Southern Africa to North Africa (26.7%), East Africa (12.6%), and West Africa (10.3%). While African ports generally rank low in global performance assessments, several ports perform well regionally and internationally. Notable examples include:

- Port of Durban (South Africa)
- Port Said East (Egypt)
- Tanger Med (Morocco)
- Port of Mombasa (Kenya)
- Port of Djibouti (Doraleh)
- Lekki Deep Sea Port (Nigeria)
- Port of Abidjan (Côte d'Ivoire)
- Port of Cape Town (South Africa)
- Port of Beira (Mozambique)
- Port of Lagos (Apapa & Tin Can, Nigeria)

Air transport

Air transport plays a vital role in moving passengers and high-value perishables, particularly for agrifood systems like fresh horticulture and seafood. Yet, it comprises only 1% (2.3 million tonnes) of intra-African freight (ECA, 2022). Despite constraints, African air traffic grew 13.2% in 2024, exceeding the global average. Freight volumes are expected to double to 4.5 million tonnes by 2030 under AfCFTA. Growth is however limited by high costs, weak infrastructure, poor connectivity, and regulatory barriers. To unlock the potential of air trade, governments must accelerate the implementation of the Single African Air Transport Market (SAATM) and reduce travel costs and visa restrictions (AU, 2023).

Airport tax systems represent a significant regulatory obstacle to the expansion of air transport in Africa, leading to increased ticket prices and hindering the continent's connectivity objectives. Numerous African nations levy substantial passenger service fees, tourism taxes, and various other airport-related charges. This can occasionally surpass the base airfare, especially on short-haul flights. These taxes frequently lack harmonisation across borders, resulting in a disjointed array of rates and structures that complicate regional route planning and pricing (UNECA, 2018).

Key innovations in transport infrastructure

Governments in Africa are increasingly aligning transport development with agricultural and economic planning. National Transport Master Plans, along with continental initiatives under African Union's PIDA, emphasise the need for rural and feeder roads to connect smallholder farmers with markets. These policies guide investment towards regions where inadequate transport infrastructure significantly constrains productivity and inclusion in value chains (AU, 2023). Public–private partnerships (PPPs) are increasingly used to finance roads, agro-logistics hubs, and multimodal corridors, easing fiscal pressure while bringing innovation, efficiency, and scale. Increasingly, PPP frameworks are aligned with agrifood priorities such as cold chain systems and agro-processing logistics (AU, 2023).

Digitalisation is also reshaping Africa's transport systems. The adoption of ICT, AI and IoT technologies is enabling "smart" transport networks. These include roads embedded with sensors that monitor traffic and road conditions in real time, allowing for predictive maintenance and optimised delivery routes. For example, South Africa's Freeway Management System (Gauteng) uses real-time data to optimise signal timing, reduce congestion, and trigger predictive maintenance alerts (World Bank, 2022).

Mobile-based digital logistics platforms are enhancing last-mile connectivity, particularly for transporting perishable produce, and are contributing to reduced post-harvest losses and improved farm-level profitability (UN, 2024). Kenya's Twiga Foods (AI-driven last-mile delivery) epitomises the above. The Twiga innovation reports reductions in post-harvest losses and higher farm-gate returns through route optimisation and direct market access (Twiga Foods, 2023).

The development of agro-logistics hubs and transport corridors further strengthens supply chain efficiency. These hubs, often co-located with cold storage, processing facilities, and transport terminals, enable aggregation, storage, and streamlined distribution of farm goods. They help reduce unit costs, enhance rural-urban market linkages, and support intra-regional agricultural trade (COMESA Business Council, 2019).

Cold chain innovation plays a particularly important role in managing perishables such as fruits, vegetables, dairy, and fish. Technologies like solar-powered cold trucks and portable cooling units help reduce spoilage, improve food safety, and extend product shelf life. In sectors where losses reach 30–50%, cold chain investments are critical. The African cold chain logistics market is expected to grow at a compound annual growth rate of 8.3%, reaching $14.9 billion by 2029 (EHS Africa Logistics, 2024).

At the same time, climate-resilient rural roads are being introduced to improve year-round accessibility in areas prone to flooding. These roads use sealed surfaces and erosion-resistant materials to enhance mobility and economic resilience in rural economies (Cervigni et al., 2016). Similarly, the rise of solar-powered and electric transport, such as cargo bikes and tricycles, has improved short-distance, last-mile connections, particularly in off-grid areas. These innovations reduce fuel dependency and emissions while expanding access to markets (AFSIA, 2025).

Complementing these efforts are renewed investments in railways and navigable inland waterways, which offer sustainable alternatives for long-distance bulk transport and foster the development of regional agri-value chains (AUDA-NEPAD, 2018). Advanced geospatial technologies like GIS, drones, and remote sensing are also improving infrastructure planning, enabling better targeting of investments and increased transparency (Lee, 2025).

Finally, regional trade integration is accelerating through cross-border corridors such as the Northern, Central, and Abidjan–Lagos corridors. These routes enhance agricultural trade by harmonising regulations, reducing customs delays, and strengthening connectivity—core objectives of the AfCFTA (AfDB, 2023).

Irrigation and water management infrastructure

Africa holds an estimated 60% of the world's uncultivated arable land, yet productivity remains constrained by reliance on erratic rainfall. Expanding irrigation and water management infrastructure is essential to unlocking the continent's agricultural potential (Veldwisch et al., 2019). In Sub-Saharan Africa, agriculture accounts for 80–90% of total water withdrawals, but only 3–4% of cultivated land is irrigated. Across the continent, irrigated land covers approximately 14–15 million hectares (about 7% of cultivated land), compared with 37% in Asia and 14% in Latin America. Most smallholder farmers rely solely on rainfed agriculture, with irrigation coverage varying significantly by region, 4–5% in East Africa, 2–3% in West Africa, 5–6% in Southern Africa, and less than 2% in Central Africa, leaving them highly susceptible to seasonal fluctuations and climate extreme events such as droughts and floods.

The absence of modern water infrastructure results in suboptimal yields, post-harvest losses, and restricted cropping intensity (Dirwai et al., 2024). Although irrigation has the potential to increase yields by 50% or more, rainfed agriculture continues to dominate food production in Africa (DIE, 2017).

Water availability remains a fundamental constraint to agricultural production and food security across Africa,

especially in the face of worsening climate variability. Effective water management systems, such as drip irrigation, water harvesting, and smart scheduling, are increasingly recognised as essential tools to help African agriculture withstand climate shocks (Scoones et al., 2019). Irrigation also strengthens agrifood value chains by ensuring a consistent and timely supply of produce for agro-industries.

This encourages investment in contract farming and food processing (Osewe et al., 2020). Stable water access reduces seasonal production fluctuations, on the back of climate variability, and enhances the quality of produce thus opening new markets. Importantly, marginalised groups such as women and youth benefit disproportionately from irrigation infrastructure, as secured irrigation helps overcome systemic barriers to land, inputs, and productivity (Wanyama et al., 2024).

Africa's Agenda 2063 underscores the need for substantial investment in renewable energy, cross-border water pipelines, and integrated management systems to ensure universal access to water and modern irrigation by 2063 (AU, 2015). Central to this vision are technological innovations that combine sustainability with affordability and scalability. Under the Kampala Declaration, the African Union Member States are expected to quadruple their area under irrigation, moving from 6% to 25 % by 2030.

Solar-Powered Irrigation Systems (SPIS) have emerged as a transformative solution. Africa receives more solar radiation than any other continent, an average of 4.5 kWh/kWp/day. This potential remains largely untapped (Armstrong, 2022). Since 2012, solar energy costs have declined by more than 60%, with utility-scale generation costs now below $1.30 per watt. These trends position SPIS as a cost-effective and sustainable option for expanding irrigation. Projections suggest that solar capacity in Africa could reach 70 GW by 2030, and that investing just $3 billion annually in SPIS could yield over $5 billion in profits, primarily for smallholders (GGGI, 2024; IRENA, 2024).

When integrated with moisture sensors and intelligent irrigation controllers, these systems improve water efficiency and allow year-round cultivation of high-value crops (Falchetta et al., 2023). Although solar-powered irrigation provides a sustainable energy alternative for smallholder farmers, the unregulated extraction of groundwater may result in aquifer depletion and the degradation of ecosystems. African governments must implement policies that encourage efficient water usage, including metering, quotas, and zoning regulations, to harmonise agricultural productivity with environmental sustainability (FAO SOFA, 2021).

Water harvesting and storage infrastructure, such as check dams, reservoirs, and tanks, is vital in regions prone to drought and erratic rainfall. In 2022, around 226 million people in Eastern and Southern Africa lacked access to basic water services (AUDA-NEPAD, 2022). Trials across the Sahel, East, and Southern Africa show that small-scale irrigation, combined with effective storage, can boost yields by up to 100% and water-use efficiency by 30–70%. These systems can double or triple household farmers' incomes when integrated with market access and extension services. Scaling requires coordinated investment, including from PPPs, climate finance, and initiatives such as CAADP-NAIPs.

Irrigation status in Africa

~200 million
hectares
Africa's total cultivated land

80-90%
Water withdrawals in Sub-Saharan Africa

~14-15 millions
hectares (~7 % of cultivated land)
Africa's total irrigated land

28-35%
North Africa irrigated share

-5% **Share of global irrigated area**

Sub-Saharan Africa (SSA)
7 millions
d'hectares irrigated
(~3-4 % of cultivated land)

Cultivated land irrigated

4-5% East Africa	**2-3%** West Africa
5-6% Southern Africa	**<2%** Central Africa

Remote sensing and GIS technologies enhance irrigation planning by generating real-time maps of water availability, aquifer locations, and river flows (Schinde et al., 2023). These tools support precision agriculture, early warning systems, and climate adaptation by informing data-driven decisions across the agrifood system. Integrating sensor-driven smart irrigation with drip technology can reduce water consumption by up to 95% compared with traditional methods, without compromising crop yields.

The use of soil moisture sensors, weather predictions, and automated valves facilitates accurate water distribution, thereby minimising waste and preventing over-extraction (FAO, 2021; World Bank, 2020). For example, pilot initiatives in Morocco and Kenya have demonstrated water savings ranging from 60% to 90% through the implementation of solar-powered drip-sensor systems (IWMI, 2022). Nevertheless, the broader adoption of such solutions necessitates the availability of cost-effective sensors, training for farmers, and regulatory measures to avert groundwater depletion (AU, 2022). This combination of precision agriculture and the Internet of Things (IoT) serves as a model for sustainable water management in water-scarce areas, particularly in Africa.

Closing Africa's $68–108 billion annual infrastructure financing gaps will require strong public-private collaboration. The success of Morocco's PPP-led drip irrigation initiatives illustrates how private capital can improve water efficiency and farm incomes (IFC, 2022). Scaling such models across Africa could significantly improve water-use efficiency and farm incomes, contributing to more resilient agrifood systems.

Agricultural markets infrastructure

The transformation of Africa's food systems depends heavily on the development of agricultural market infrastructure, particularly in cold chain logistics, storage, and processing. These systems are vital for reducing post-harvest losses, improving food quality, increasing market access, and enhancing overall value capture across agrifood chains. Despite their importance, significant infrastructure gaps persist, especially in rural and semi-urban areas where most production occurs. These gaps lead to high levels of food waste and income loss, disproportionately affecting smallholder farmers and limiting the continent's trade competitiveness (IFC, 2023).

Recognising this, Agenda 2063 and the CAADP Strategic Action Plan promote investments in cross-border markets, livestock corridors, feeder roads, and storage facilities to lower transport costs and improve regional integration. Reforms also target customs modernisation, one-stop border posts, and SPS laboratories to boost market efficiency and reduce trade risks (AU, 2015).

However, fewer than 10% of perishable goods in Africa benefit from cold chain infrastructure, contributing to post-harvest losses as high as 40–45% for fruits, vegetables, and cereals in Southern Africa (FAO, 2023). Most storage facilities lack basic capabilities such as temperature control and pest management. Addressing these issues requires integration with transport networks and adoption of digital tracking tools for inventory and quality control (UNECA, 2023).

Table 6.2: Post-harvest losses across regions. Source: FAO/APHLIS 2023.

Region	Estimated Post-Harvest Loss (%)	Main Crops Affected
North	15 - 25	Cereals, fruits, and vegetables
West	30 - 40	Cereals, roots, tubers
East	35 - 45	Cereals, fruits, and vegetables
Southern	40 - 45	Cereals, fruits, and vegetables
Central	30 - 50	Cereals, roots and tubers, fruits, and vegetables

North Africa leads in cold storage capacity with 495,000 metric tons and a high utilisation rate of 82% (FAO, 2023), followed by Southern Africa at 425,000 metric tons (SADC, 2023). East Africa, led by Kenya and Tanzania, has rapidly grown to 365,000 metric tons with 71% utilisation (EAC, 2023), while West Africa, despite a lower 310,000 metric ton capacity, demonstrates strong ROI and innovation (ECOWAS, 2023; AU, 2023). AfDB (2022) reports returns of 4.5–5x on cold chain investments. Future progress will depend on integrating renewable energy solutions, advancing digitalisation, and adopting harmonised quality and operational standards (IFC, 2023).

Table 3: Cold chain statistics in Africa by region. Source: African Development Bank (2022).

Region	Cold Storage Capacity (MT)	Capacity Utilisation Rate (%)	Energy Cost (USD/MT)	Loss Rate (%)	Investment (Million USD)	GDP Contribution (Million USD)
North Africa	495,000	82	45	12	250	1,200
West Africa	310,000	65	68	25	150	750
East Africa	365,000	71	58	20	180	850
Southern Africa	425,000	78	42	14	220	980

Processing infrastructure plays a key role in strengthening agricultural markets in Africa. It adds value to raw commodities, diversifies product offerings, enhances competitiveness, and fosters local economic development (UNECA, 2023). Yet, major regional disparities persist. Many areas still lack essential facilities for cleaning, sorting, and packaging, leading to the export of unprocessed goods and continued dependence on imported processed food, limiting domestic value retention (World Bank, 2023).

Secondary processing activities, such as packaging and quality certification, require significant investments in both infrastructure and skilled labour to meet international standards and penetrate premium markets (Arab Maghreb Union, 2023). Technology integration is becoming indispensable, with innovations like IoT sensors, blockchain, and mobile payments improving traceability, quality assurance, and supply chain efficiency (West African Agricultural Productivity Program, 2023). However, limited access to finance remains a major barrier. PPPs, blended finance models, and development finance institutions could be approached to close this gap (AU, 2023).

AfCFTA highlights the urgency of harmonised infrastructure and coordinated regional investments to reduce costs and improve access (EAC, 2023; SADC, 2023). Sustainability also matters; Renewable energy and water-efficient technologies help cut costs and reduce environmental impact. Inclusivity remains limited, with infrastructure investment often overlooking women and marginalised groups. Targeted training programmes and inclusive ownership models are needed to ensure equitable participation (IFC, 2023).

Capacity-building, especially in technical and managerial fields, is vital, supported by vocational training partnerships (Falchetta et al., 2023; UNDP, 2023). Regional leaders include North Africa and Southern Africa, while other subregions progress unevenly. To transform Africa's processing sector, investment, innovation, and placing high on the national development agenda, and inclusive governance are essential (World Bank, 2023; African Union, 2023).

Sustainable energy solutions

The integration of sustainable energy solutions into Africa's food systems represents a convergence of food security, climate resilience, and economic development. Since 2020, renewable energy adoption in agricultural processes has increased by about 45% relative to 2020 levels (IRENA, 2023). According to AfDB (2023), sustainable energy interventions in evaluated programmes boosted agricultural productivity by up to 30% and cut post-harvest losses by around 25%. Solar-powered irrigation now covers approximately 15% of irrigated farmland, and biogas digesters process about 20% of on-farm agricultural waste in surveyed countries (FAO, 2023). In selected agri-zones, renewables power about 25% of cold storage and around 30% of processing centres (UNDP, 2023).

Regionally, Eastern Africa, especially Kenya and Ethiopia, records about 40% solar-irrigation adoption among small irrigators (EAC, 2023). In Western Africa, Ghana and Nigeria have introduced biogas systems in 35% of large-scale agro-processing units (ECOWAS, 2023). Southern Africa, especially South Africa and Zimbabwe, reports 45% renewable usage in cold chain infrastructure (SADC, 2023). These efforts reflect growing regional momentum towards clean energy–driven agrifood transformation.

Figure 6.5 summarises these regional adoption patterns across solar irrigation, biogas, and solar cold storage. Solar-powered irrigation systems have emerged as the most widely adopted technology, with installation costs decreasing by 60% since 2018 (World Bank, 2023). Biodigesters show increasing popularity, particularly in regions with significant livestock operations. UNIDO (2023) reports that hybrid solar-wind systems are gaining traction in coastal agricultural areas, providing reliable power for processing and storage facilities. Annual investment in sustainable energy for African agriculture is about $5.2 billion (AfDB, 2023). IFC (2023) estimates that these investments have generated 200,000 jobs and reduced operational costs by 40% in farms. Energy-efficient processing facilities have reported productivity increases of 35% and reduced post-harvest losses by 45% (AU, 2023).

Looking forward, the outlook for sustainable energy in African food systems remains positive. UNDP (2023) projects renewable-energy adoption in agriculture could triple by 2030 relative to 2020 levels. AU (2023) has further set targets for 50% renewable energy usage in agricultural processing by 2025. This, combined with emerging technologies, including artificial intelligence for system optimisation and blockchain for supply chain management, is expected to further enhance efficiency and accessibility (UNIDO, 2023).

Africa's agrifood transformation is increasingly tied to sustainable energy infrastructure. In alignment with Agenda 2063 and the CAADP Strategic Action Plan, the AU prioritises renewable generation and cross-border interconnections, alongside integrated water–energy management. Flagship projects such as the Grand Inga Dam and the North–South Power Transmission Corridor reflect efforts to catalyse regional power generation and transmission for broader access and reliability (AU, 2015).

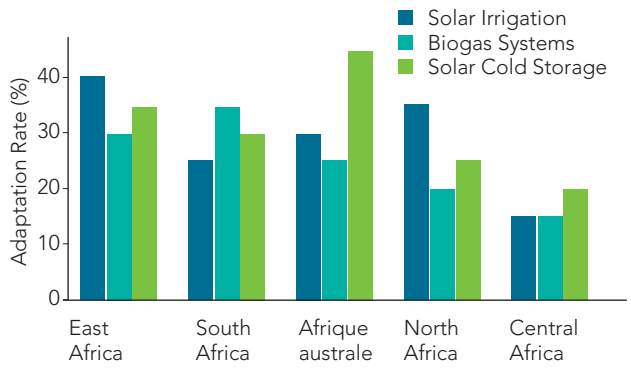

Figure 6.5: Renewable energy adoption in agriculture by region in 2023. Source: AfDB (2024)

Decentralised Renewable Energy Systems (DRES) are central to these ambitions. Technologies such as solar mini-grids, stand-alone home systems, and biomass-powered solutions are enabling off-grid communities to power irrigation, cold storage, processing, and digital tools (IEA/IRENA/UNSD/World Bank/WHO, 2023). These systems reduce reliance on diesel, cut post-harvest losses, and foster energy sovereignty, especially in rural areas. They also create jobs, promote entrepreneurship, and enhance food security through resilient infrastructure (Alliance for Rural Electrification, 2024).

Technological innovations further strengthen this progress. Affordable solar-powered equipment, digital

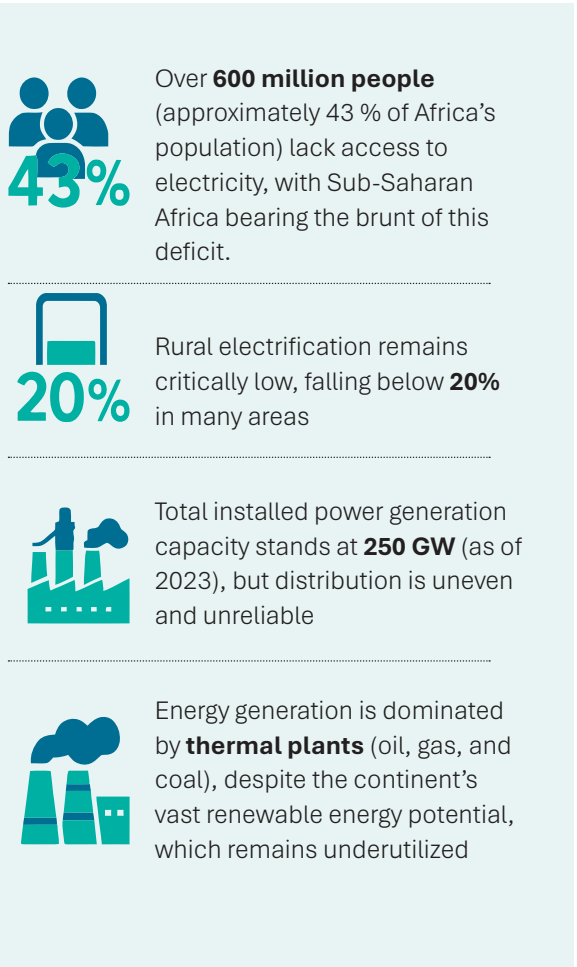

Figure 6.6: Status of electricity solutions in Africa. Source: Authors.

marketplaces, mobile advisory services, and remote sensing tools are improving yields, reducing waste, and enabling real-time decision-making across agrifood systems (Bingxin et al., 2025).

However, financing remains a persistent barrier. Innovative financing models, such as blended finance, climate-smart agriculture funds, and digital microloans, are unlocking capital where conventional banking systems fall short. These mechanisms are especially impactful for smallholders and agri-SMEs, providing pathways to scale modern energy solutions and improve livelihoods (Rabbani et al., 2025).

ICT and digital infrastructure

Digital technologies possess the capability to revolutionise agrifood systems in emerging markets by enhancing the efficiency of all stakeholders within the value chain, including input suppliers, producers, off-takers, and retailers. Typically, an increase in investments in ICT infrastructure fosters inclusive growth, averaging between 0.4% and 0.7%. Insufficient regional connectivity among countries and sub-regions has exacerbated the gaps in access to ICT, thereby hindering inclusive growth as issues such as poverty, inequality, and unemployment persist. ICT infrastructure lowers transaction costs, boosts productivity, and increases firm output, leading to beneficial spillover effects on growth at both macroeconomic and microeconomic levels. In sub-Saharan Africa, over 400 digital agriculture solutions are operational, encompassing applications in financial services, market connections, supply chain management, advisory and information services, and business intelligence. Yet, nearly half of sub-Saharan Africa still lacks access to reliable electricity, which constrains the adoption and scalability of digital agriculture solutions.

The contribution of the internet to Africa's overall GDP has been tremendous, it is also anticipated to increase to between 5% and 6% by 2025, aligning with the levels observed in Sweden, Taiwan, and the United Kingdom. As of 2024, more than 532 million individuals in Africa are utilising the internet, representing 38% of the total population. Internet usage is notably higher in urban regions, with rates reaching 57% in 2024, while rural areas exhibit a lower rate of 23%, underscoring a significant digital divide between urban and rural populations on the continent. Mobile broadband, defined as 3G and above, now

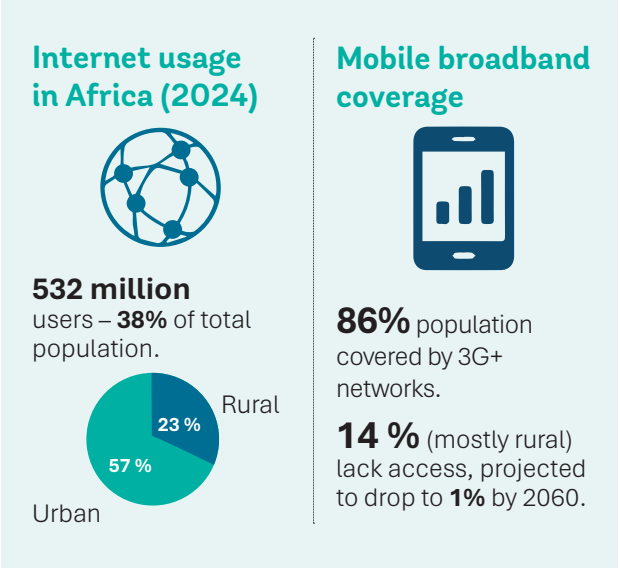

Figure 6.7: Status of ICT and digital solutions in Africa. Source: Authors.

extends to approximately 86% of Africa's population. Nevertheless, around 14% of the population, predominantly in rural areas, still lack access, a figure projected to decrease to 1% by 2060 (AfDB, 2024).

Under Agenda 2063 and the CAADP Strategic Action Plan, the African Union has committed to establishing high-speed internet infrastructure and digital corridors that connect all African nations. A key goal is to increase internet accessibility and reduce associated costs through transcontinental fibre optic networks (AU, 2015). These digital networks are central to modernising Africa's agrifood systems by improving data access, operational efficiency, and market connectivity.

Mobile digital technologies have become vital tools in transforming African agriculture. Smartphones, computers, and wearable devices provide farmers with access to real-time information, weather alerts, pest diagnostics, and soil health analytics through integration with remote sensing and drone technologies (Henze & Ulrichs, 2016). These digital innovations support early-warning systems for climate-related risks, aligning with the Fourth Industrial Revolution (4IR)'s vision for smart, inclusive agriculture (AUDA-NEPAD, 2021). Furthermore, digital traceability tools and e-logistics platforms enable more efficient intra-African trade under frameworks such as AfCFTA (Jessee & Moorthy, 2016).

IoT solutions have expanded precision farming by enabling sensors and cloud-based systems to manage irrigation, crop health, and environmental conditions remotely (CloudBankin, 2023). These tools are boosting productivity and profitability across rural and peri-urban areas. Farmers use smartphones not only to access market prices and planting schedules but also to diagnose plant diseases and improve harvest timing. These capabilities increase yields and reduce input costs (AUDA-NEPAD, 2021).

Digital platforms also support inclusive market systems. E-commerce and mobile money solutions such as M-Pesa (Kenya), EcoCash (Zimbabwe), and MTN Momo (Ghana) have transformed agricultural transactions and financial inclusion. They allow farmers to sell produce, receive payments, and access savings and loans without reliance on physical banking infrastructure. Similarly, agritech credit platforms such as Branch, Tala, and FarmDrive use mobile data to assess creditworthiness and disburse loans via mobile wallets, enabling smallholder investment and scaling (Chiegboka, 2023).

Africa's agritech ecosystem is growing rapidly. Between 2018 and 2022, the continent experienced a 44% annual growth in agritech startups, with over 500 startups active by 2022 and investment exceeding $60 million, up from $13 million in 2017. These startups focus on farm management tools, post-harvest technologies, digital marketplaces, and data analytics. Solutions such as Twiga Foods (Kenya) and AgroCenta (Ghana) connect farmers directly with buyers, reducing intermediary costs and ensuring better prices. Meanwhile, services from Apollo Agriculture, Farmerline, and WeFarm provide digital advice on weather, market trends, and agronomic practices, supporting more sustainable farm management (Chiegboka, 2023).

Governments and development agencies are also leading digital infrastructure investment. Many countries have integrated agriculture into their national ICT policies, recognising its importance for food security and rural development. PPPs are financing rural connectivity and smart agricultural tools, while blended finance mechanisms and credit guarantees help de-risk investments in agri-digital ecosystems. National efforts to extend telecom infrastructure are complemented by donor-funded projects targeting digital literacy, infrastructure, and innovation (AUDA-NEPAD, 2021).

Data science and digital analytics play a foundational role in optimising agrifood systems. The adoption of AI, blockchain, and IoT is enabling precision agriculture, real-time diagnostics, and smart logistics. Initiatives like CGIAR's digital soil mapping and the Plant Village Nuru AI platform support early detection of crop diseases, resource optimisation, and improved farm-level decision-making (CGIAR, 2023). Tools such as the Cassava Disease Surveillance System and the Cassava Seed Tracker are helping mitigate risks and increase resilience (Chen et al., 2023; Høxbroe Jeppesen et al., 2022).

Governments are leveraging digital infrastructure to align with broader goals of economic development and social equity. By investing in feeder roads, electrical grids, and telecom connectivity, countries can modernise agri-logistics and processing centres. A digitally connected agrifood sector also improves transparency, pricing, and traceability, which are essential for scaling value chains and achieving export readiness under AfCFTA (AUDA-NEPAD, 2021).

In summary, digital infrastructure is not merely a support tool but a transformational lever for achieving inclusive, efficient, and climate-resilient agrifood systems in Africa. Continued innovation in mobile technologies, IoT, agritech entrepreneurship, and data analytics, combined with strong PPPs and regulatory reforms, will be crucial for realising the continent's agricultural and economic aspirations under Agenda 2063.

Innovative finance for infrastructure development

Green financing

Typically, African governments dedicate 3-4% of their GDP to infrastructure, which falls short of the continent's requirements. International loans, frequently extended by organisations such as the World Bank and the IMF, serve as a vital source of funding (IMF, 2024). The 2023 Global Landscape of Climate Finance report indicates that the global flow of climate finance to agrifood systems is insufficient. Between 2019 and 2020, agrifood systems accounted for merely 4.3% of the total climate finance tracked at the project level, averaging $28.5 billion annually. Of this amount, 26% was allocated for adaptation efforts ($7.3 billion), 51% for mitigation initiatives ($14.4 billion), and 23% ($6.7 billion) was designated for dual-objective projects (ATOR, 2024).

Regarding sector distribution, two-thirds of the adaptation finance was directed towards agriculture, while only 2% and 1% were allocated to forestry and fisheries projects, respectively. Furthermore, investments in food loss and waste, as well as low-carbon diets, were minimal, indicating underinvestment in areas with high adaptation potential for enhancing adaptation within agrifood systems. The proportion of climate-related development finance directed towards global agrifood systems has been declining (Galbiati et al. 2023). Following a peak in 2020, when $21.8 billion was allocated, climate finance for agrifood systems decreased by 19% in 2021, potentially influenced by a change in priorities stemming from the COVID-19 pandemic.

Foreign Direct Investment (FDI)

FDI has been an important driver of private capital flows to Africa, accounting for about 70% of total private investment. Historically, FDI has been concentrated on Africa's mineral resources, including oil, gas, and mining, which still attract significant investment. In 2020, Africa attracted $40 billion in FDI inflows, of which a significant portion went to extractive industries. However, the potential for FDI to shift to infrastructure projects is growing, especially in sectors such as energy, transport, and telecommunications. FDI inflows to developing economies fell by 7% in 2023, while Inflows to Africa dropped by 3% to $53 billion.

Cross-border Mergers and Acquisitions (M&A), which account for about 15% of FDI inflows to Africa in recent years, remained flat at $8.5 billion. Countries such as Kenya and Nigeria have begun to attract FDI in infrastructure through innovative PPP structures. The total value of greenfield projects declared in Africa decreased to $175 billion, down from $196 billion in 2022. If implemented, these projects have the potential to create an additional 200,000 jobs in the area (UNCTAD, 2024). FDI to the 45 Least Developed Countries (LDCs) rose by 17% in 2023, reaching a total of $31 billion. The inflows were predominantly focused, with the five leading recipients, Cambodia, Ethiopia, Bangladesh, Uganda, and Senegal, together representing approximately 50% of the overall amount.

Public-Private Partnerships (PPPs)

Public-Private Partnerships (PPPs) are increasingly essential in financing infrastructure projects in Africa, addressing the continent's ongoing funding challenges. They facilitate the utilisation of private capital and expertise. Between 2016 and 2021, PPP-funded infrastructure initiatives in Africa increased, particularly in the energy and transport sectors. Nigeria's Lekki-Epe Toll Road is a successful PPP model that has improved road infrastructure and eased traffic congestion (AfDB, 2021).

Additionally, the Azura-Edo Power Plant, a $900 million investment, has improved energy access for more than 14 million individuals. South Africa's renewable energy sector has benefited from PPPs through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has attracted over $14 billion in private investments and contributed 6,422 MW of renewable energy to the grid since its launch. These successful initiatives illustrate the capacity of PPPs to unlock essential capital while simultaneously addressing infrastructure shortfalls throughout the continent (World Bank, 2017).

Blended finance

Blended finance is becoming a key mechanism for addressing Africa's infrastructure financing challenge, pooling public, and private resources to mitigate risks and attract investors. By leveraging public capital, blended finance minimises project risk and makes investments more attractive to private investors concerned about political or economic uncertainties. According to Convergence data, around $140 billion was mobilised globally between 2015 and 2020 through blended finance structures, of which Africa received 27% of these flows. This approach has particularly supported renewable energy, water, and transport infrastructure sectors. In Kenya, the Lake Turkana Wind Power project, the largest wind farm in Africa, was financed using a blended finance model that combined $698 million from public and private entities to deliver clean energy to more than one million households.

Sovereign Wealth Funds (SWFs)

Sovereign Wealth Funds (SWFs) are increasingly acknowledged as a viable source of financing for Africa's infrastructure requirements. Globally, SWFs manage assets exceeding $7.2 trillion. However, African SWFs constitute a relatively minor segment, with approximately $1.6 billion in assets. Despite their modest scale, these funds hold significant potential for infrastructure investment, particularly in commodity-rich nations. For example, countries such as Nigeria,

Angola, and Botswana have created SWFs that could enhance their contributions to infrastructure funding. Nigeria's Sovereign Investment Authority (NSIA) has invested in sectors such as power and healthcare, including a $5.5 billion commitment to infrastructure development. As African SWFs expand, there exists an opportunity to direct a greater portion of these resources towards long-term infrastructure initiatives.

International bond market

Global bond markets, particularly the Eurobond market, have become an important source of financing for infrastructure in Africa. Since Ghana's first Eurobond issuance in 2007, several African nations have entered these markets, attracted by historically low global interest rates. By 2020, more than 21 African countries had issued Eurobonds, raising over $155 billion for development projects. Nigeria, Zambia, and Rwanda have accessed these markets effectively and competitively. For example, Zambia issued a $750 million Eurobond in 2012 at a yield of 5.6%, while Rwanda raised $400 million in 2013 at 6.8%. These bonds have financed major infrastructure projects in the energy, transport, and telecommunications sectors.

Case studies

Ethiopia's Rural Road Program

Ethiopia's Universal Rural Road Access Program (URRAP) illustrates how infrastructure can transform agrifood systems in Africa. Launched in 2010, URRAP aimed to construct and improve over 70,000 km of rural roads, ensuring rural communities had access to all-weather routes (World Bank, 2018). The program has significantly improved agricultural households' market access. With the enhancement of roadways, smallholder farmers have benefited from decreased transportation expenses, reduced travel durations, and improved access to agricultural inputs and extension services.

This enhanced connectivity has allowed them to transition from subsistence farming to market-oriented practices. Consequently, rural economies have diversified, job opportunities have expanded, and food availability has increased. The road network has also provided indirect benefits, including better access to healthcare and education, stronger rural-urban connections, and greater resilience to economic shocks (World Bank, 2020). It has also promoted the development of agribusinesses and value chains by simplifying the movement of produce to processing facilities and consumers. This connectivity has fostered the commercialisation of agriculture, allowing farmers to market their produce more effectively and at more favourable prices.

Additionally, the improved road infrastructure has enabled greater engagement in off-farm activities, diversifying income streams and enhancing overall household earnings. The expansion of rural roads has played a key role in poverty reduction and resilience among rural communities. By reducing transportation costs and integrating markets, these roads have contributed to price stabilisation and improved access to agricultural inputs and technologies. This has resulted in increased agricultural productivity and enhanced economic conditions for rural households (Haile, 2023).

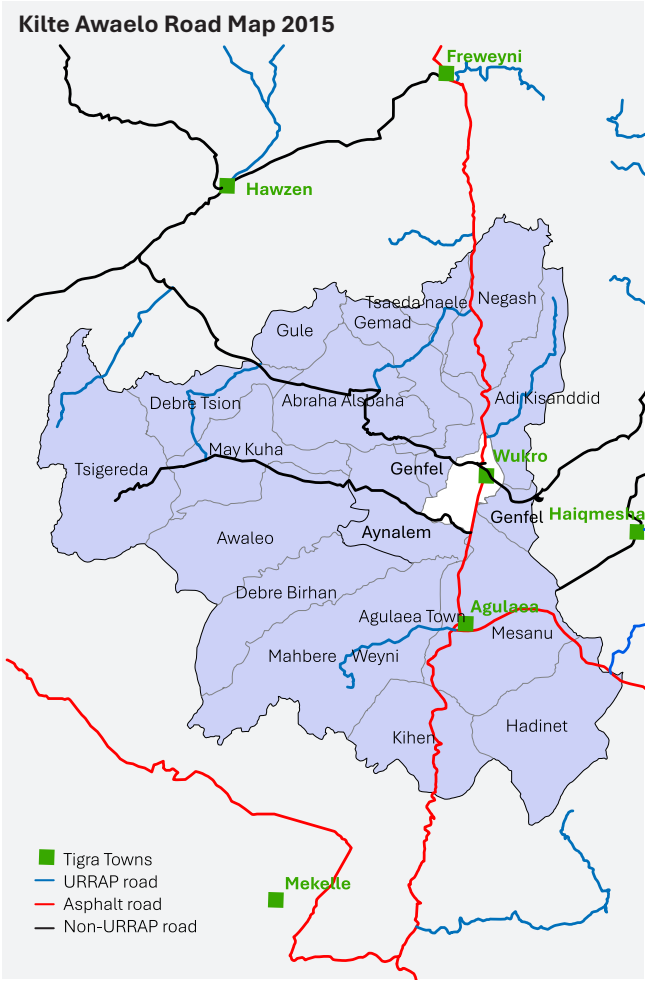

Figure 6.8: Example of URRAP in Ethiopia. Source: Authors.

Kenya's M-KOPA and digital platforms

Although M-KOPA is primarily recognised for its pay-as-you-go Solar Home Systems (SHS), it has broadened its offerings to include agricultural inputs and services as supplementary options for its existing clientele. Once customers have completely paid off their solar kits, M-KOPA permits these kits to be used as collateral for obtaining financing for water tanks, fuel-efficient cookstoves, and, importantly, agricultural inputs such as seeds or irrigation equipment. This strategy aids in disrupting the cycle of low agricultural yields and insufficient capital among farmers at the lower end of the economic spectrum. M-KOPA's SHS provides dependable off-grid electricity, facilitating the use of solar-powered irrigation pumps, cold storage, and various other agricultural technologies.

These products generate direct synergies, enabling farmers to irrigate, store, and process their produce cost-effectively and sustainably, thereby improving productivity. Anecdotal evidence suggests that young entrepreneurs are increasingly adopting solar-powered irrigation systems. By offering smartphones and electric motorbikes through manageable daily payments, M-KOPA cultivates customer credit histories, which in turn unlock access to microloans and digital financial services that farmers can reinvest in their businesses. For agricultural producers, this translates to affordable tools and inputs that were previously inaccessible (Kenya Bankers Association, 2015).

M-KOPA Kenya has successfully reached over three million users in Kenya, many of whom are involved in informal or agricultural sectors. It enhances rural value-chain mobility and market accessibility by generating 16,000 jobs, including agents who frequently reside in rural regions, and financing 1,500 e-motorbikes that facilitate transport and agricultural logistics. With more than 1.7 million first-time internet users and 3.3 million smartphones sold in Kenya since 2020, numerous smallholder farmers are now acquiring fundamental digital skills and gaining access to online agricultural information, market prices, and e-agriculture services through smartphones financed by M-KOPA (M-KOPA, 2024). The integration of clean energy infrastructure and cost-effective electric motorbikes, which enable riders to save approximately 30% daily compared to combustion alternatives, together with the enhancement of the circular economy via refurbished devices, fosters environmentally sustainable farming practices and energy consumption in rural regions.

Morocco's Green Plan

Morocco's Green Plan (Plan Maroc Vert), launched in 2008, represents a good case study of one of Africa's most comprehensive agricultural transformation initiatives, demonstrating remarkable success in modernising food systems infrastructure and agricultural productivity. The plan has mobilised more than $10 billion in investments over its initial phase, transforming Morocco's agricultural sector into a key driver of economic growth and food security (FAO, 2023). The initiative has increased agricultural GDP by 75% since its inception, creating over 342,000 additional jobs in the agricultural sector while significantly enhancing food systems infrastructure across the value chain (World Bank, 2023).

The strategic framework of Morocco's Green Plan centred on two primary pillars: modernising high-value agriculture and supporting smallholder farmers. This dual approach has enabled the development of sophisticated food systems infrastructure while ensuring inclusive growth (AfDB, 2023). Under the first pillar, Morocco established 19 modern integrated agricultural platforms, including cold storage facilities, processing units, and distribution centres. These investments have increased the value of agricultural exports by 117% between 2008 and 2022, according to the Ministry of Agriculture and Maritime Fisheries (2023). The second pillar focused on smallholder support, resulting in the creation of 63 aggregation centres that serve as crucial links between small-scale producers and modern value chains.

The transformation of Morocco's food systems infrastructure under the Green Plan has been particularly noteworthy. Morocco has developed over 150 modern processing facilities, increasing value addition capacity by 85% since 2008 (UNIDO, 2023). Storage infrastructure has expanded significantly, with IFC (2023) documenting the construction of 35 new cold storage facilities with a combined capacity of 1.2 million metric tons. These facilities have reduced post-harvest losses by 42% and extended the shelf life of perishable products by an average of 12 days. Transportation infrastructure has also been enhanced, with 3,800 kilometres of rural roads constructed to connect agricultural regions to markets and processing centres.

Digital transformation has played a crucial role in Morocco's agricultural modernisation. Morocco has implemented a comprehensive digital agricultural platform connecting 900,000 farmers to market information, weather services, and technical support (UNDP, 2023). This digital infrastructure has reduced transaction costs by 35% and improved price transparency across value chains. The system includes 120 automated weather stations and satellite-based crop monitoring, enabling precise agricultural planning and resource allocation. Digital payment systems now facilitate 65% of agricultural transactions, significantly improving financial inclusion in rural areas (World Bank, 2023).

The economic impact of Morocco's food systems infrastructure development has been substantial. Agricultural exports have grown at an average annual rate of 8.5% since the Green Plan's implementation (IMF, 2023). The modernisation of processing facilities has increased value addition in the agricultural sector by 95%, while improved storage and distribution infrastructure has reduced food waste by 35%. These improvements have increased farmer incomes by an average of 60% and created over 300,000 jobs in the agricultural value chain (World Bank, 2023).

Conclusion

Transforming Africa's agrifood systems is inseparable from the continent's broader infrastructure development agenda. Across transport, water management, market systems, energy access, and digital connectivity, the evidence is clear: resilient, inclusive, and climate-smart infrastructure is the bedrock upon which Africa can build a more productive, equitable, and sustainable agricultural future. The stakes are high. Without significant and targeted investment in both hard and soft infrastructure, the continent will continue to face persistent bottlenecks, post-harvest losses, limited market access, low value retention, and vulnerability to climate shocks that constrain growth and deepen rural poverty.

Yet, Africa also holds immense potential. Innovations in solar-powered irrigation, cold chain logistics, decentralised renewable energy, and mobile-based agritech platforms are demonstrating real, scalable solutions that are tailored to African realities. These advances, particularly when paired with regional integration efforts such as AfCFTA, promise not just increased agricultural output and reduced food loss but also the creation of value-added agro-industries and millions of rural jobs. Furthermore, regional corridor development and harmonised policy frameworks are essential to turning national progress into continent-wide transformation.

This transformation, however, will not be achieved through infrastructure alone. It requires strategic partnerships, sound governance, and financial innovation, from blended finance and climate funds to inclusive PPPs. Governments, donors, and the private sector must align their investments not only with market potential but also with long-term sustainability and inclusivity goals. If Africa is to achieve Agenda 2063 and the SDGs, it must centre its agrifood systems strategy around infrastructure that empowers its farmers, processors, and traders, connects its markets, and drives resilient economic growth.

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7 Knowledge support for agrifood system transformation in Africa

John M. Ulimwengu[1], Yifru Bekele[2], Jane Njuguna[3]

KEY MESSAGES

1 **Knowledge as a catalyst**
Robust, dynamic knowledge systems are foundational to food system transformation, linking data to decision-making across agriculture, nutrition, and climate resilience.

2 **Systemic weaknesses persist**
Africa's knowledge ecosystems remain fragmented and underfunded, with limited integration between research, policy, and frontline actors, hindering timely, evidence-based responses.

3 **Digital integration and co-production are essential**
Future-ready systems must be digitally connected, policy-aligned, and co-created with stakeholders to ensure contextual relevance and inclusive learning.

4 **From data to governance**
Moving from siloed data acquisition to systems-level knowledge governance is key to achieving Africa's food security, sustainability, and economic development goals.

Introduction

This section outlines why dynamic, evidence-based knowledge systems are indispensable for navigating contemporary agrifood challenges in Africa. Food systems across Africa are undergoing complex transformations, driven by demographic shifts, urbanization, climate change, and evolving consumption patterns. Navigating this transition requires more than just policy mandates or technological innovations; It necessitates robust, dynamic knowledge support systems that can guide decisions, foster coordination, and enable adaptive responses. These systems include the generation, organization, and application of data and analytics, as well as the management of research outputs and institutional memory. They are supported by decision-making infrastructures that ensure relevance and usability (Caron et al., 2018; Tschirley et al., 2013).

At their core, knowledge support systems include elements such as data infrastructure, modeling tools, knowledge networks, and institutional arrangements that help to generate and link evidence to policy and practice. For clarity, the term 'knowledge support systems' is used throughout this chapter to refer to the full ecosystem of institutions, tools, and processes that support evidence-informed decision-making in agrifood systems.

In Africa, such systems are critical to address structural weaknesses in policy design and implementation, fragmented governance, and capacity deficits. A study by Hendriks et al. (2023) emphasized that knowledge support must go beyond passive data repositories. It must be anticipatory, demand-responsive, and co-produced with stakeholders to drive real transformation in food and nutrition systems. To provide a structured lens for analyzing food system transformation, the tripartite framework, comprising activities, outcomes, and governance, is increasingly used (Ingram, 2011; Termeer et al., 2018).

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Figure 7.1: The tripartite framework, comprising activities, outcomes, and governance, is increasingly used to provide a structured lens for analyzing food system transformation, (Ingram, 2011; Termeer et al., 2018).

This framework not only shapes how food systems are analyzed but also illustrates where knowledge systems can most effectively intervene to catalyze change.

Critically, these three components are interdependent and often contested. For example, promoting agricultural productivity (an activity) must be balanced with nutrition and environmental objectives (outcomes) while being mediated through policy and institutional mechanisms (governance). Knowledge systems play a unique role across these domains, informing farm-level decisions, tracking nutrition and sustainability indicators, and evaluating policy effectiveness (Béné et al., 2019).

Despite the growing emphasis on data-driven transformation, the intrinsic value of knowledge and evidence is not yet fully appreciated across all governance and stakeholder levels in Africa. Bridging this recognition gap remains a critical priority. Despite rhetorical commitments, the operationalization of knowledge systems in policymaking remains weak, with limited institutional anchoring and financial commitment. Abdelradi et al. (2021) found that national research institutions and policy bodies are often disconnected, resulting in siloed knowledge generation and limited policy uptake. Furthermore, data systems are rarely consistent, poorly disaggregated (especially by gender and geography), and often lag in real-time usability. This makes it difficult for food system actors, from ministries to private firms to farmer groups, to respond effectively to emerging challenges such as droughts, supply chain shocks, or price volatility (Swilling, 2016; Mabaya & Porciello, 2022).

To meet the needs of dynamic, interdependent food systems, knowledge support must be digitally integrated, policy-aligned, and institutionally embedded. This means creating continental and regional platforms that link "knowledge clusters", networks of universities, research institutions, and innovation hubs, to governance structures like CAADP BR system, national food system councils, and AfCFTA monitoring units. Such systems would enable real-time analytics, predictive modeling, and participatory learning across borders and sectors (Hendriks et al., 2021; Termeer et al., 2018). Equally important is the role of learning for adaptive management. Continuous learning enables actors to respond effectively to evolving challenges and fosters institutional resilience.

Given the constraints outlined above, the next generation of knowledge systems must be purpose-built for complexity, uncertainty, and scale. The urgency is clear. Climate uncertainty, fragile fiscal systems, and nutritional transitions are converging. What is needed is not simply more data, but better translation of data to knowledge into strategic action, facilitated by integrated digital ecosystems, inclusive data governance, and sustained investments in knowledge infrastructure (Pereira et al., 2020).

In summary, transforming food systems in Africa requires an intentional shift toward systems-level knowledge governance. Future-ready knowledge support systems must be proactive, digitally connected, and capable of driving context-specific, evidence-based policy pathways anchored in the tripartite framework of activities, outcomes, and governance.

Lessons from the Malabo Biennial Review Process[4]

Robust accountability mechanisms are foundational to knowledge-driven governance in agrifood systems. The 2014 Malabo Declaration on Accelerated Agricultural Growth and Transformation placed accountability at the heart of Africa's agricultural development agenda. In doing so, it committed African Union (AU) member states to a Biennial Review (BR) process, a landmark mechanism to measure progress towards key agricultural goals through regular reporting, peer review, and continental scorecards. Four BR cycles have since been completed (2017, 2019, 2021, and 2023/24), offering critical insights into both the promise and challenges of using performance-based monitoring to drive continental transformation. This section assesses how the BR process has functioned as both a knowledge generation and governance accountability tool, offering lessons for future agrifood data systems in Africa.

The BR's defining feature has been its simplified scorecard system, which classifies countries as either "on track" or "not on track" in meeting Malabo goals. Using a numeric scale from 0 to 10, the methodology aggregates scores across commitment areas to provide an overall performance rating. This design aimed to enhance accessibility and peer comparability, although it may limit contextual nuance. As a structured evidence platform, the BR reflects how performance data, when institutionalized, can evolve into a form of strategic knowledge infrastructure.

While this approach has proven effective in promoting visibility and comparability, it is not without flaws. Equal weighting across all indicators, for example, can distort the relevance of certain commitments. For instance, assigning equal weight to irrigation infrastructure and youth engagement in agriculture overlooks sectoral investment disparities. Moreover, assigning a score of zero to missing data or to values below a benchmark penalizes countries doubly, both for underperformance and for non-submission. As the fourth BR report (AUC, 2024) notes, such penalties may unintentionally discourage transparent reporting, thus weakening the integrity of peer accountability. A more nuanced scoring approach is needed to sustain the legitimacy and accuracy of this mechanism.

Perhaps the most persistent challenge throughout the BR cycles has been the quality and reliability of national data systems. Although the BR process was envisioned as a tool to promote evidence-based policy, many countries still struggle with fragmented, outdated, or missing data. The 2023 BR found that only 59.1% of required data was submitted across 49 countries, with particularly poor reporting on newly introduced indicators (AU, 2024). Problems ranged from inconsistent units and undocumented sources to implausible values and misclassification of missing data as zero. These deficiencies undermine the utility of the BR not just as an evaluation tool but also as a decision-making resource for governments and donors.

To address this, one of the most significant institutional innovations has been the introduction of the eBR platform. The platform represents a shift from merely technical streamlining, towards embedding digital infrastructure in pan-African knowledge governance. It was first deployed during the second BR cycle in 2019. This web-based system replaced cumbersome manual processes with automated tools for data entry, validation, and analysis. It has built-in functions such as outlier detection and real-time feedback. The eBR has helped streamline the process and reduce data entry errors. It now serves as a repository for over 300 indicators covering the period 2015 – 2022 to support longitudinal analysis of agricultural transformation. The platform exemplifies how digital innovation can be harnessed to support complex governance challenges.

Another effective solution has come in the form of country data clusters, launched by Regional Strategic Analysis and Knowledge Support System (ReSAKSS) to improve the completeness and accuracy of BR submissions. These clusters bring together national experts in statistics, research, and planning. Their role is to identify data gaps, verify sources, and strengthen methodological consistency. The clusters have significantly improved reporting rates, up to 88.4% in some cases, compared to the continental average after being piloted in five countries and later expanded to ten (Makombe et al., 2025). Importantly, these clusters do not just gather data; They help embed a culture of collaboration, transparency, and methodological rigor in national reporting processes.

4 Summarized from Tsitsi et al. (2025)

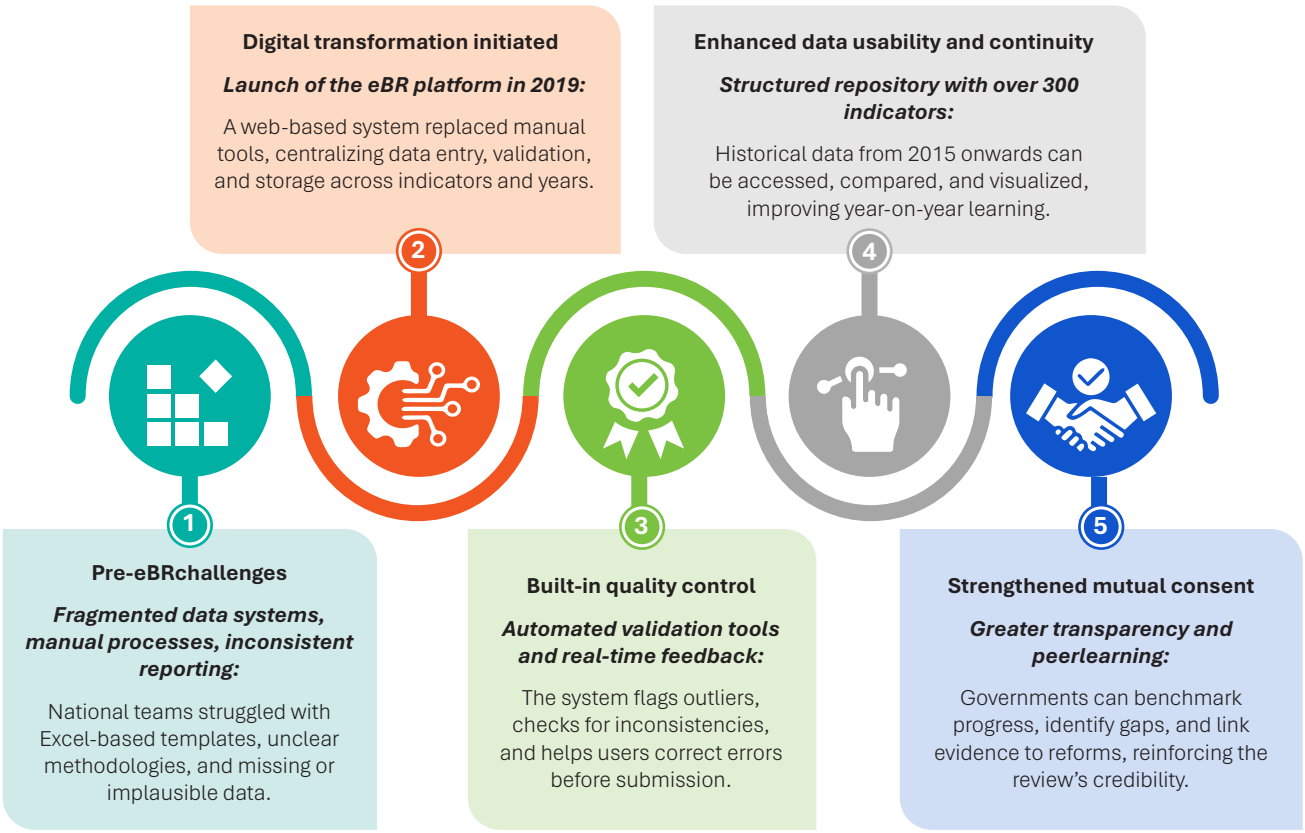

Figure 7.2: How the eBR platform strengthens accountability. Source: Authors

Despite such innovations, staffing and technical capacity remain serious bottlenecks. Many country BR teams consist of just a few individuals, while RECs often rely on a single focal point. Limited M&E skills, combined with high staff turnover, hinder data quality, delay submissions, and constrain the effectiveness of capacity-building initiatives. While the African Union Commission (AUC) and its partners have supported training sessions, these are often short-term, underfunded, and accessible to only a handful of participants per country. Strengthening national M&E systems and investing in long-term analytical capacity is not optional, it is essential for meaningful accountability.

Encouragingly, the BR process is not merely an accountability tool; It is also driving tangible change through learning and adaptation. Several countries have translated BR findings into reforms. For instance, Niger created an agency for promoting private agricultural investment, while Côte d'Ivoire introduced tax incentives to stimulate agribusiness. Kenya developed an integrated agricultural information system, while Togo updated its agricultural data systems to include BR indicators. Mozambique launched programs targeting youth and women in agriculture, while Ghana and Rwanda have embedded BR insights into their national agriculture investment plans. These examples highlight the power of performance reviews to catalyze policy alignment and institutional learning. The adaptations reinforce the BR's evolving role not only as a performance tracker but also as a catalyst for iterative policy learning and reform.

The BR system can be further analyzed using the tripartite framework. As an activity, it promotes data collection. In terms of outcomes, it aims to improve accountability and policy alignment; and its governance features include peer review and AU oversight. This lens can help identify gaps and strengths more systematically. Beyond performance monitoring, the BR has also fostered a culture of mutual accountability and peer learning. It has provided a unique platform for countries to reflect, benchmark, and share best practices.

One of the most recurring constraints the BR process faces is underfunding. National governments have not allocated sufficient resources for BR implementation, training, or data collection. Despite commitments under CAADP to invest 10% of national budgets in agriculture, few countries have met this target, limiting their capacity to operationalize BR insights. Without dedicated funding for the BR process, the ambitions of mutual accountability risk being compromised.

The Biennial Review process is a promising tool for promoting transparency, tracking progress, and aligning national actions with continental goals. But to unlock its full potential, African governments must commit to improving data quality, revising scorecard methodologies, expanding technical capacities, and ensuring adequate financing. The future of Africa's agricultural transformation depends not just on ambition, but on the systems and resources that translate commitments into impact. For the BR process to continue adding value, it must be institutionalized within national knowledge systems, supported by sustained financing and embedded in long-term capacity development agendas.

Mapping Africa's agrifood knowledge landscape

The performance of Africa's agrifood systems is increasingly shaped by the strength, coherence, and responsiveness of its knowledge institutions comprising national research institutes, universities, statistical bureaus, and regional and international organizations. Yet, the continent's knowledge ecosystem remains diverse but uneven. National institutions remain the bedrock of knowledge production. Most countries maintain agricultural research systems, yet their capacity varies widely. Funding shortfalls, brain drain, and outdated infrastructure hinder effectiveness, with many countries spending less than 1% of agricultural GDP on research, which is below the 1% target recommended by the African Union (AGRA, 2022). Universities are key contributors, though many lack strong research linkages to policymaking processes. National statistical offices, though critical for data collection and reporting, often face staffing, budget, and technical constraints thus limiting the frequency and quality of agricultural and rural surveys (PARIS21 & Mo Ibrahim Foundation, 2021).

At the regional level, institutions such as the Regional Network of Agricultural Policy Research Institutes (ReNAPRI) and ReSAKSS serve as hubs for evidence-based policy dialogue and harmonization. These bodies aggregate data and policy analysis across countries and promote regional collaboration (ReNAPRI, 2023). International centers under the CGIAR umbrella, such as International Institute of Tropical Agriculture (IITA) and International Livestock Research Institute (ILRI), also generate high-quality research, often in partnership with local actors. Despite these efforts, knowledge generation remains fragmented, sporadic, and uneven across the continent (Dalberg, 2023).

A central weakness is the fragmented nature of Africa's food system knowledge architecture. Monitoring of food, health, climate, and trade is handled by different agencies, often in silos. Ministries rarely coordinate or share data systematically, resulting in fragmented information systems. For example, ministries of agriculture focus on production statistics, health ministries monitor nutrition, meteorological agencies track climate data, and trade ministries oversee price and market information, rarely sharing data systematically (Sokourenko et al., 2022). The result is a patchwork of siloed information systems that fail to reflect the interconnected nature of food systems.

This fragmentation hampers evidence-based decision-making. Policymakers struggle to access comprehensive, real-time insights into evolving food system challenges. Core agricultural data is often outdated, with censuses and household surveys conducted infrequently. Moreover, cross-sectoral coordination is minimal, and institutional mechanisms for knowledge sharing are weak or nonexistent. During the COVID-19 pandemic, the absence of timely and integrated data severely constrained governments' ability to respond effectively to food supply disruptions (Goedde et al., 2021).

In addition to data fragmentation, there are systemic barriers to knowledge uptake in policy. These include low analytical capacity within ministries, limited demand for evidence among decision-makers, and a lack of real-time feedback mechanisms. M&E systems are often designed for donor accountability rather than adaptive decision-making. As a result, policy cycles are not sufficiently informed by dynamic data flows or predictive analytics (Dalberg, 2023).

INSIGHT

COVID-19 exposed system-wide data gaps
During the pandemic, many African governments were unable to track disruptions in food supply chains due to the lack of timely, integrated data. This exposed the vulnerabilities of fragmented knowledge systems and underscored the urgency of reform.

To address these gaps, several reforms are necessary:

- **Prioritize** the integration of sectoral data systems. Governments need to create interoperable platforms that combine agricultural, health, trade, and climate data can offer a holistic view of food system performance. Initiatives such as the Africa Food Systems Dashboard and the CAADP Biennial Review provide promising models (Sokourenko et al., 2022). These platforms should be scaled and institutionalized to ensure regular data updates and policy relevance.
- **Invest** in digital tools and innovations, such as remote sensing, mobile surveys, and real-time dashboards, to enhance timeliness and granularity of data. Kenya's Agricultural Observatory Platform demonstrates how satellite and crowdsourced data can support real-time policy responses (Goedde et al., 2021).
- **Formalize** coordination mechanisms such as inter-ministerial data task forces or national food system councils to foster regular dialogue between sectors. These bodies should include researchers, statisticians, civil society, and the private sector to ensure inclusive and informed policy formulation.
- **Build** analytical capacity within governments and foster stronger links between researchers and policymakers. Embedding data scientists within ministries and investing in training programs can promote a culture of evidence use. Over time, these reforms will help transform Africa's agrifood knowledge landscape into one that supports adaptive, inclusive, and sustainable food system transformation.

Ultimately, the transformation of Africa's knowledge landscape must be institutional, not just technical. Governments should embed knowledge management functions within policy cycles, budget processes, and inter-ministerial collaboration frameworks to ensure sustained and systemic change.

Building knowledge clusters and digital connectivity

This section outlines how knowledge clusters, when strategically embedded in national governance structures and digitally connected, can enhance evidence generation, policy alignment, and adaptive management.

Transforming Africa's agrifood systems requires a more structured, inclusive, and connected approach to generating and using knowledge. One promising strategy is the development of "knowledge clusters". These are thematically organized groups of research institutions, universities, data producers, and government actors that collaborate to co-create and apply evidence for food system transformation. These clusters would operate as centers of excellence embedded in national food governance systems. They should be digitally connected to real-time data platforms supporting evidence-informed policy. They should be deliberately aligned with AUDA-NEPAD's Technical Networks to ensure standardization and policy coherence at both national and continental levels.

The concept of knowledge clusters aligns with Africa's post-Malabo commitment to evidence-based planning and mutual accountability in agrifood systems transformation (African Union, 2014). Despite the presence of capable institutions across the continent, knowledge production remains fragmented, underfunded, and disconnected from decision-making (ReSAKSS, 2023). Clusters fill this gap by pooling resources, standardizing methodologies, and coordinating evidence translation into policy. However, to fully align with a food systems approach, clusters must integrate expertise from across agriculture, nutrition, health, environment, trade, and other relevant domains.

Each knowledge cluster should connect to a national digital knowledge platform, a centralized system that aggregates, harmonizes, and analyzes real-time data from multiple sources, including research centers, government databases, NGOs, and private actors. Current food system data in Africa is often siloed across ministries and agencies, leading to duplication and inefficiency (Jeedigunta & Kumar, 2025).

A national platform allows for interoperability between datasets, such as crop yields, market prices, nutrition indicators, and climate forecasts, enabling dynamic dashboards and timely analytics for decision-makers. Successful examples offer a blueprint; Kenya's Agricultural Observatory Platform, led by KALRO, integrates satellite, field, and mobile survey data to provide near real-time insights into crop performance and risks (Goedde et al., 2021). Similarly, Senegal's Agricultural Policy Support Project, with support from International Food Policy Research Institute (IFPRI)'s and ReSAKSS, created a research and analytics network to feed into joint sector reviews and enhance national planning (IFPRI, 2017). These models illustrate how localized clusters, when connected to digital platforms, can enhance national governance mechanisms.

Importantly, clusters must be embedded within national food system governance structures, including Joint Sector Reviews (JSRs), inter-ministerial committees, and technical working groups. Many African countries have institutionalized JSRs under the CAADP framework as platforms for mutual accountability (ReSAKSS, 2023). Governments can ensure evidence feeds directly into performance monitoring, budget planning, and policy revision by designating clusters as analytical engines for these reviews. For instance, in Senegal, cluster members contributed technical analyses to agricultural JSRs, enabling real-time diagnosis of implementation gaps (IFPRI, 2017).

Knowledge clusters serve four core functions:

- **Co-generation of data.** This involves collaborative data collection between researchers, extension officers, and communities using digital tools, enhancing both coverage and ownership. Such collaboration improves data quality and relevance, as shown in IFAD's partnership with AKADEMIYA2063 to strengthen food systems finance data ecosystems across Africa (IFAD, 2024).
- **Collective interpretation of trends.** Multi-disciplinary teams within clusters (e.g., agronomists, economists, nutritionists) jointly analyze patterns in productivity, consumption, or risk. This participatory process enhances trust in the evidence and helps surface policy-relevant insights (Ulimwengu, Mutyasira, & Keizire, 2024).
- **Cross-border learning.** Clusters can link with peers across countries through regional networks such as the Forum for Agricultural Research in Africa (FARA) and RUFORUM, which are already facilitating transnational exchanges on agroecology and resilience (FARA & RUFORUM, 2024). This allows innovations, such as biofortified crops or digital market tools, to scale more quickly through South – South cooperation.

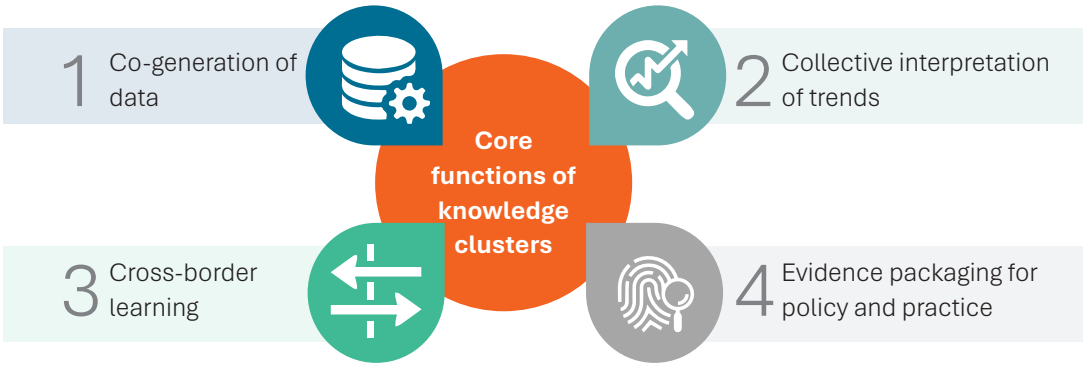

Figure 7.3: The four functions of knowledge clusters.

- **Evidence packaging for policy and practice.** Clusters synthesize technical findings into policy briefs, scorecards, and dashboards tailored to stakeholders, whether national planners, donors, or farmers. The ReSAKSS model demonstrates how structured knowledge products (e.g. Annual Trends Reports, policy notes) can elevate the visibility and usability of research (ReSAKSS, 2023).

Having established the functions of knowledge clusters, attention must now shift to the practical modalities for implementation. Institutional design is key; Countries should appoint a lead institution (e.g. a national research institute or university) to coordinate each cluster, supported by steering committees with representatives from government, academia, and civil society. Memoranda of understanding can formalize data-sharing protocolsThese institutional arrangements require sustained investment in digital infrastructure and workforce development, including training for data analysts, IT professionals, and science communicators. Financing could come from blended models, including public funding, donor support, and private sector partnerships (Jeedigunta & Kumar, 2025).

The rollout can be phased. Countries might start with a thematic cluster, e.g., on climate-smart agriculture or food price monitoring, linked to a pilot digital dashboard. Over time, additional clusters and datasets can be integrated, and national platforms linked regionally to support continental analysis under AU frameworks. Political commitment must be reinforced through formal reporting mechanisms, budget alignment, and inclusion in national agricultural investment plans reviewed under CAADP (Ulimwengu et al., 2024).

In the long run, this architecture will yield transformative outcomes. Governments will be better equipped to respond to crises, adapt policies dynamically, and engage in regional harmonization. Most importantly, the system will shift from fragmented, reactive data use to continuous, inclusive, and strategic knowledge-driven governance, a prerequisite for sustainable food system transformation in Africa.

Institutional innovation for translating knowledge to action: The case of Ethiopia's Agricultural Transformation Agency

This section examines how the Ethiopian Agricultural Transformation Agency (ATA), now the Agricultural Transformation Institute (ATI), emerged as a strategic institutional innovation to bridge persistent gaps between agricultural evidence and implementation in Ethiopia's food systems.

In the face of persistent food insecurity, low agricultural productivity, and fragmented governance, Ethiopia has emerged as a unique example of how targeted institutional innovation can translate knowledge into action. The establishment and evolution of the Ethiopian Agricultural Transformation Agency (ATA), now the Agricultural Transformation Institute (ATI), demonstrates the power of a dedicated, high-capacity institution to bridge the gap between evidence and implementation in food systems. This section explores ATA's strategic model, achievements, and lessons for broader African transformation efforts.

The genesis of the ATA traces back to a 2009 diagnostic study commissioned by the Government of Ethiopia with technical support from the Bill & Melinda Gates Foundation, IFPRI, and McKinsey & Company. The study highlighted entrenched constraints in the Ethiopian agricultural sector, including fragmented coordination, narrow development approaches, and a chronic lack of implementation capacity. Crucially, it recommended the formation of a new, independent institution with a focused mandate to identify systemic bottlenecks and deliver transformative solutions at scale.

In response, Ethiopia's Council of Ministers established the ATA in 2010 through Regulation No. 198/2010. Unlike traditional ministries, the ATA was designed as an autonomous agency, overseen by an Agricultural Transformation Council chaired by the Prime Minister himself. This structural innovation provided the ATA with unparalleled political backing, authority to coordinate across sectors, and the agility to operate outside bureaucratic constraints. The agency was empowered to conduct rigorous diagnostics, support

implementation of key initiatives, and enhance institutional linkages across the agrifood system.

ATA's operational model has rested on three strategic pillars: innovation and capacity strengthening, systemic interventions, and place-based programming. Initially, ATA served as a think tank, delivering high-quality analytical studies and policy recommendations. However, a key institutional shift occurred in 2016 through Regulation No. 380/2016, which expanded ATA's mandate to include project implementation that could have critical and transformative nature. This repositioning transformed the agency from a knowledge center and policy advisor into an execution-oriented catalyst, capable of turning its own action-oriented analytical studies into real-world results.

Among ATA's most notable initiatives is the Agricultural Commercialization Clusters (ACC) program. After drawing lessons from two years of piloting, the ATA launched the ACC in 2019 at scale (covering 300 Districts or Woredas) as a five-year initiative designed to integrate over five million smallholder farmers into value chains by clustering farmers with adjacent lands geographically and providing holistic support services across the prioritized commodities and the agrifood ecosystem. ACC introduced improved agronomic practices, market access, input supply, and infrastructure development working across four major regions and focusing on ten priority commodities, including wheat. This program not only boosted productivity but also improved commercialization, catalyzed investment, and strengthened local institutions. The ACC initiative that began with the four regions has been fully embraced and scaled up by the federal Minister of Agriculture and regional governments.

In 2021, Ethiopia's federal government restructured its institutional framework under Proclamation No. 1263/2021, and ATA was formally renamed the Agricultural Transformation Institute (ATI). While many institutions had been either reformed, repealed or merged during this transition, the transition preserved the Ethiopian ATA's mandate and strategic direction as it transitioned into an institute, reaffirming its central role in national development. Its impacts and contributions across multiple institutions in the country have not only ascertained its continuity but also signifies the importance of the institute in driving innovations that can catalyze structural transformation.

During the first decade, the ATA/ATI also implemented a series of high-impact systemic innovations. Some of these include the Ethiopian Soil Information System (EthioSIS), a digital soil fertility mapping tool that informed customized fertilizer blending; A national e-voucher system to streamline input distribution; And a farmer advisory hotline (8028), which reached millions with agronomic guidance. ATA also played a central role in designing Ethiopia's national market information system and in coordinating the country's rural and agricultural development policy, and food systems strategy.

ATA's interventions generated an estimated $1.7 billion in economic value, directly lifted 286,000 farmers from poverty, and indirectly impacted 3.5 million people through the ACC model (FAO, 2020). At the micro level, farmers experienced increased access to inputs, extension services, and market linkages, while bottlenecks in seed and fertilizer systems were significantly addressed.

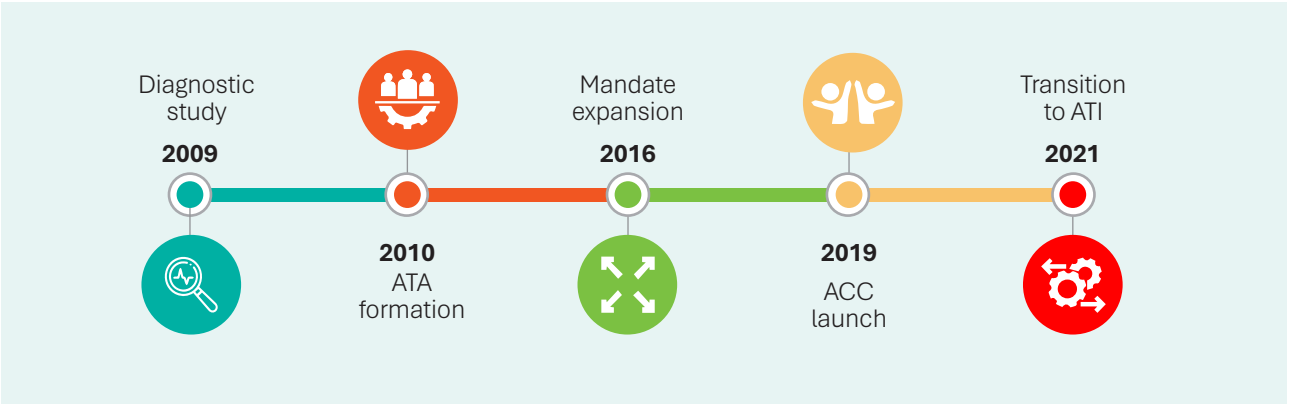

Figure 7.4: Institutional evolution model ATA to ATI. Source: Authors

As African countries seek to build resilient, inclusive, and evidence-based food systems, the Ethiopian case offers critical insights. Institutional design matters. The success of ATI shows that transformation requires more than technical expertise, it demands strategic positioning, cross-sectoral authority, and sustained investment. Moreover, bridging research and policy through dialogues and is insufficient without embedding mechanisms for implementation, iteration, and feedback. ATA's evolution from a think tank to a systems integrator illustrates a viable institutional model for turning evidence into coordinated policy action.

Importantly, ATI also demonstrates that food system transformation is a dynamic process. Success requires the capacity to adapt to changing political and economic conditions, to build coalitions across government and civil society, and to scale innovations without losing sight of inclusion and sustainability. Today, the ATI functions as Ethiopia's premier institution for coordinated design and implementation of food systems strategies at national and sub-national levels.

Ethiopia's experience with ATA/ATI provides a compelling model of how a purpose-built institution, supported by political will, operational autonomy, and analytical capacity, can drive systemic change. It highlights that transforming food systems is not only about generating more data or writing better policies, but also about establishing agile, politically supported institutions capable of translating evidence into sustained and scalable development outcomes.

Innovations in knowledge infrastructure

For institutional innovations to deliver sustained impact, they must be underpinned by agile and inclusive knowledge infrastructure. This section outlines key emerging technologies shaping this foundation.

As Africa seeks to transform its food systems amid growing pressures from climate change, population growth, and economic uncertainty, innovations in knowledge infrastructure have become indispensable. The current challenge is not the absence of data but the fragmented, inaccessible, and underutilized nature of it. Recent advances in digital technologies offer the potential to reconfigure how knowledge is generated, shared, and applied.

Four emerging innovations are redefining the contours of food system knowledge ecosystems:

- open-data commons and federated systems;
- AI-enabled forecasting models;
- citizen and community science; and
- blockchain-based traceability.

Open-data commons and federated systems are central to democratizing access to agricultural data across national and institutional boundaries. An open-data commons promotes data as a public good, available to all stakeholders including researchers, policymakers, farmers, and the private sector. A federated system, for instance, allows data from

The agency's success can be attributed to several key factors:

- High-level political support from the Prime Minister and other senior officials created an enabling environment for reform.
- Strong and consistent leadership, particularly under the founding CEO Khalid Bomba, and the subsequent leaders who have ensured continuity, innovation, and accountability.
- ATA maintained analytical rigor, drawing on global best practices while tailoring solutions to local realities.
- The agency's autonomy allowed it to recruit top talent from both Ethiopia and the diaspora, fostering a culture of excellence and delivery.
- Its hybrid funding model, drawing from both domestic resources and international donors, ensured stability without compromising flexibility.

different ministries to be accessible through a unified platform without transferring ownership, thereby preserving sovereignty and privacy. Together, these systems support the aggregation and harmonization of disparate datasets from ministries, research institutions, NGOs, and even farmers, enabling more holistic insights. Platforms such as the Africa Food Systems Dashboard and ReSAKSS exemplify this approach by integrating indicators across productivity, nutrition, sustainability, and policy to support regional accountability and decision-making (Sokourenko et al., 2022; ReSAKSS, 2023).

Another key innovation is the use of artificial intelligence (AI) for forecasting agricultural production shocks and nutrition crises. AI models, when fed with satellite imagery, weather data, crop models, and market prices, can detect anomalies and predict outcomes with increasing accuracy. The Africa Agricultural Watch (AgWA) platform by AKADEMIYA2063 offers an excellent example of AI-based forecasting using satellite imagery and crop modeling to support early warning systems. These predictive tools are vital in anticipating food shortages, disease outbreaks, or price volatility before they occur. For instance, machine learning models developed by CGIAR and the UN Food and Agriculture Organization have been used to monitor crop performance and assess food security risks in near real-time (FAO, 2022). Similarly, AI-powered early warning systems have supported governments in Ethiopia and Kenya to prepare for droughts and deploy targeted interventions before crises escalate (Goedde et al., 2021).

Citizen and community science are emerging as powerful enablers of inclusive knowledge generation. These initiatives involve non-experts in data collection and monitoring activities, ranging from mobile-based surveys to participatory environmental observations. These initiatives democratize knowledge production, giving marginalized communities a voice in shaping food system policies. The inclusion of local communities not only expands data coverage but also fosters ownership, trust, and local relevance. For instance, IFAD's partnership with AKADEMIYA2063 supports community-based data collection to inform national food system indicators and align them with the Sustainable Development Goals (IFAD, 2024). These efforts help bridge the gap between formal research and lived experience, ensuring that data reflects local realities.

Blockchain and smart contracts are also gaining momentum in the realm of food traceability and trust. Blockchain provides a decentralized, tamper-proof ledger for recording transactions and information flows along the food supply chain. When combined with smart contracts, self-executing protocols based on pre-set conditions, these technologies enable secure, transparent tracking of food from farm to fork. This innovation is especially relevant in contexts where mistrust in supply chains is high, or food fraud is prevalent. These systems also hold potential for enforcing quality standards, verifying organic or climate-smart production, and unlocking premium markets.

In conclusion, innovations in knowledge infrastructure are not merely technological add-ons; They are foundational to building agile, inclusive, and transparent food systems in Africa. African countries can overcome fragmentation, anticipate risks, and foster accountability by leveraging open-data systems, predictive AI, grassroots data collection, and blockchain verification. These tools must be integrated into national governance frameworks and scaled through structured public – private partnerships, regional networks, and donor-supported innovation labs. Ultimately, investing in digital innovation is a prerequisite for evidence-based, resilient, and equitable food system transformation.

Systemic barriers and enablers

Transforming Africa's food systems through knowledge requires addressing systemic barriers and activating key enablers. Although technological and institutional innovations have laid the groundwork for more responsive and inclusive food system governance, the pace and depth of implementation remain uneven across the continent. Deep-seated structural impediments, ranging from issues of data control and institutional fragmentation to chronic underinvestment, continue to limit the efficacy of knowledge support systems. Addressing these challenges requires a multidimensional approach anchored in cross-sectoral collaboration, strategic funding, and the institutionalization of knowledge intermediaries.

One of the most pressing barriers is data sovereignty. This refers to the tension between open data sharing and the legitimate desire of nations and institutions to retain control over their data assets.

In many African countries, data, particularly in areas like agriculture, climate, and trade, is treated as a sensitive national resource. Governments often resist international data-sharing frameworks due to concerns over misuse, exploitation by foreign actors, or political vulnerabilities. While these concerns are valid, they can inadvertently lead to insular data ecosystems that prevent regional coordination and limit the potential of federated knowledge systems. Effective data governance must therefore strike a balance between safeguarding sovereignty and enabling interoperability.

Mistrust is another pervasive challenge. This includes mistrust between institutions, between governments and citizens, and between data producers and users. Often, data produced by research institutions is not accepted by policymakers due to perceived bias or lack of alignment with political priorities. Similarly, farmers and communities may distrust digital tools or data collection efforts, especially if they do not see tangible benefits or if past initiatives failed to deliver. This mistrust can stifle data-sharing, reduce participation in citizen science, and limit the uptake of evidence-based solutions. Rebuilding trust requires transparency, consistent engagement, and the co-production of knowledge involving all stakeholders. In addition to sovereignty, privacy concerns have emerged. Some actors hesitate to engage with digital systems due to fears of surveillance or data misuse. Privacy-protecting frameworks are essential to build trust and uptake.

Low investment in knowledge infrastructure compounds these challenges. Many African countries allocate less than 1% of agricultural GDP to research and development, falling short of the African Union's recommended targets (AGRA, 2022). Underfunding affects not just research capacity but also the hardware, software, and human capital needed for effective data collection, analysis, and dissemination. The result is a chronic dependence on external funding, which can skew research priorities and undermine long-term sustainability.

Institutional silos remain deeply entrenched. Agriculture, health, climate, and trade sectors often operate in parallel, maintaining separate data systems, funding streams, and governance bodies. This fragmentation leads to duplication, inefficiencies, and missed opportunities for synergy. For instance, agricultural production data is rarely linked with nutrition indicators or climate forecasts, making it difficult to design holistic interventions. Breaking down these silos requires both technological solutions (such as interoperable platforms) and political will to foster cross-ministerial collaboration. As described in Section 7.4, knowledge clusters can be connected through digital platforms that deliver actionable insights directly to the institution overseeing agrifood systems transformation, ensuring real-time policy support and coordinated responses across sectors.

There is absence of knowledge intermediaries. These are actors, or institutions capable of translating raw data into actionable insights for diverse audiences. These intermediaries include policy analysts, science journalists, and interface organizations that bridge research and governance. Without these intermediaries, valuable knowledge remains locked within academic circles or inaccessible to decision-makers.

Despite these barriers, there are clear enablers that can unlock progress. Cross-sectoral partnerships, linking agriculture, health, climate, and finance, can generate multidimensional data, foster systems thinking, and amplify impact. The integration of nutrition data into agricultural planning or climate data into trade policy exemplifies this approach.

Public – private innovation coalitions also serve as powerful enablers. By harnessing the dynamism and resources of the private sector alongside public mandates, these coalitions can accelerate the development and scaling of digital tools, open-data platforms, and forecasting models. Examples include agritech startups collaborating with ministries to develop market information systems or satellite analytics firms supporting drought monitoring.

Lastly, sustainable funding mechanisms are essential to build and maintain digital infrastructure and human capacity. These could include blended finance models, donor-supported trust funds, or earmarked government budgets. Investment must go beyond one-time procurement of technology; It must support long-term training, maintenance, and institutional resilience.

In summary, transforming Africa's knowledge support systems is not merely a technical exercise, it is a political, institutional and financial challenge. Overcoming systemic barriers and activating enabling mechanisms requires coordinated action across sectors, sustained investment, and an unwavering commitment to inclu-

sive, evidence-based governance; Embed cross-sectoral data governance into national planning and budget frameworks to ensure institutional continuity.

Conclusion

Africa's food systems are at a critical juncture, challenged by demographic growth, climate change, shifting consumption patterns, and fragile governance. Meeting these challenges demands a fundamental reorientation toward knowledge-driven governance, a shift that places evidence, data, and institutional learning at the heart of transformation.

This chapter has shown that while significant knowledge generation capacity exists across the continent, it remains fragmented, underfunded, and disconnected from policy cycles. Effective knowledge support systems must move beyond siloed data collection toward integrated, co-produced, and demand-responsive systems. These must serve the tripartite framework of activities, outcomes, and governance, enabling more coherent decisions around productivity, equity, and sustainability.

Two critical case studies underscore the promise and challenges of such systems.

First, the Malabo Biennial Review process offers a powerful model of continental accountability. Through peer benchmarking, digital platforms like the eBR, and innovations like country data clusters, it has helped institutionalize performance tracking across African agriculture. However, its impact is limited by poor data quality, unequal reporting capacity, and underinvestment. The experience highlights the need for sustained support to national statistical systems, deeper methodological refinement, and institutional commitment to transforming data into action. When done right, as seen in countries like Kenya and Ghana, the BR catalyzes reforms, fosters transparency, and aligns national priorities with continental goals.

Second, the Ethiopian ATA/ATI demonstrates how targeted institutional innovation can bridge the persistent gap between evidence and implementation. With strong political backing, operational autonomy, and a dual mandate for analysis and delivery, the ATA created a new governance model that has delivered tangible impact, transforming soil information systems, market data, advisory services, and commercialization clusters. Importantly, it evolved from a think tank to an execution agency, illustrating the importance of data-driven evidence, iterative learning, and adaptive implementation in knowledge systems.

Four strategic imperatives emerge from the case study insights. First, institutional design matters, countries must invest in purpose-built knowledge platforms that combine data science, stakeholder engagement, and operational agility. Second, digital infrastructure is a prerequisite, not a luxury, for real-time policy support. Third, co-creation with stakeholders, from community scientists to policymakers, is essential for trust, relevance, and uptake. Fourth, cross-sectoral governance, like the Joint Sector Reviews or national food system councils, should embed data systems into policy cycles, enabling continuous feedback and iteration.

The transformation of Africa's food systems will depend not just on more data or smarter policies, but on rethinking knowledge as a public, institutional, and political asset. Building a future-ready food system means constructing architectures that are inclusive, transparent, and adaptive, where data informs decisions, learning shapes policies, and evidence becomes the cornerstone of resilience and equity. The experiences of Malabo and Ethiopia point the way forward. The task now is to scale such innovations continent-wide.

The following recommendations are intended to chart a path forward:

- Invest in national knowledge clusters: Countries should establish thematic or sub-national clusters of universities, research institutes, and government agencies tasked with co-producing and interpreting evidence. These clusters should be aligned with national policy processes, such as joint sector reviews or national development plans, to ensure uptake and accountability.
- Develop a digital knowledge backbone: Governments must build interoperable digital platforms that harmonize data across agriculture, nutrition, climate, and trade sectors. These systems should support real-time analytics, policy surveillance, and Sustainable Development Goals (SDG) tracking.
- Institutionalize knowledge translation units: Ministries should include dedicated units

responsible for synthesizing scientific evidence into policy-relevant formats, briefs, dashboards, or scenario analyses, to bridge the gap between research and governance.

- Promote open data and co-creation: Legal and technical standards for open data sharing must be adopted, alongside mechanisms for participatory data collection involving communities, civil society, and private actors. This ensures that data ecosystems are inclusive, trusted, and demand responsive.
- Strengthen feedback loops and learning mechanisms: Governance structures should embed continuous monitoring and evaluation systems that connect frontline actors, such as farmers and local governments, with national institutions. These feedback loops are critical for adaptive policy responses and long-term resilience.

Ultimately, the transformation of Africa's food systems cannot succeed without a deliberate investment in the systems that underpin evidence-based action. Knowledge must be treated not as a static commodity but as a strategic asset, co-produced, shared, and mobilized to guide equitable and sustainable change. This paradigm shift is not optional; It is essential to realizing the continent's aspirations for food security, climate resilience, and inclusive development.

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8 A call to action on the implementation of the agrifood systems approach in Africa

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The 2025 Africa Agrifood Status Report (AASR) presents a compelling narrative: while the continent has achieved significant, albeit fragmented, progress across its agrifood systems, the time has come to move decisively from isolated gains to systemic transformation.

Chapter 1 laid the foundation by highlighting gains in production and persistent structural weaknesses, including undernutrition, vulnerability to shocks, policy fragmentation, and financing gaps that undermine resilience, equity, and sustainability.

The subsequent chapters present a multidimensional roadmap across governance, policy coherence, sustainability, trade integration, finance, infrastructure, and knowledge systems. This concluding chapter synthesizes those themes and calls for action on the chapter recommendations to guide agrifood systems toward a more inclusive, resilient, and prosperous future.

Africa's agricultural output has grown faster than in any other region since 2000, yet this growth has not yielded equitable outcomes. Increased production alongside rising undernourishment and high child stunting indicates system-level misalignment. As the CAADP Kampala Declaration states, the future requires an integrated agrifood systems lens that goes beyond farm-level interventions to address the full value chain and its systemic drivers.

The report's findings show that input use, mechanization, and caloric availability have improved, but gains remain uneven across regions. Challenges including limited dietary diversity, underinvestment in infrastructure, and incoherent policy frameworks persist because agricultural policy is not integrated with nutrition, environment, and trade. Future transformation must center on a coordinated response that links all parts of the food system.

Chapter 2 underscored governance as the bedrock of food systems transformation. Countries with stronger institutions and coordinated policies perform better on nutrition, resilience, and food affordability. Policy fragmentation remains a core challenge. Ministries of agriculture often work in silos, disconnected from those responsible for health, environment, or trade. This institutional misalignment produces contradictory interventions, such as fertilizer subsidies that promote monoculture while nutrition policies call for dietary diversity.

The Kampala Declaration's emphasis on subnational leadership, mutual accountability, and integrated implementation provides a timely corrective. Stronger regulatory frameworks, fiscal transparency, and inclusive planning, especially involving local governments and civil society, must become the new normal. The future of agrifood systems will depend as much on policy coherence as on technical solutions. The central call of this chapter is to strengthen institutions that enable policy coherence and foster good governance.

Chapter 3 highlighted the imperative for sustainable intensification, climate-smart agriculture, and regenerative practices. Africa's population is projected to exceed 2.5 billion by 2050, putting unprecedented pressure on land, water, and ecosystems. The nexus of sustainability and resilience must guide the next generation of interventions.

Nature-based solutions, pluralistic extension systems, and climate information services provide pathways to build productivity and adaptive capacity. The emphasis on inclusive approaches, engaging women, youth, and indigenous knowledge holders, reflects a needed shift toward people-centered innovation.

Sustainable farming is no longer optional; it is the only viable path forward. Scaling up climate-resilient seeds, reversing soil degradation, and investing in infrastructure must become central to national and regional strategies.

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These transformations are key to achieving the 2035 CAADP goals: increasing output by 45%, halving post-harvest losses, and reaching zero hunger.

Chapter 4 showed that spatial strategies, particularly food baskets and trade corridors, are powerful levers for systemic transformation. Intra-African agrifood trade has grown since 2003 but remains uneven, concentrated, and underutilized. Most countries continue to depend on raw exports, missing opportunities for domestic value addition.

Corridor-based development offers a framework to link high-production zones with urban and regional markets. Investments in roads, cold chains, logistics, and market systems along these corridors can drive inclusive, resilient growth. Such strategies also align with the African Continental Free Trade Area (AfCFTA), which seeks to create a seamless, integrated market.

Food corridors move goods and connect livelihoods. They can transform food systems by improving access to inputs, enabling surplus movement during climate shocks, and fostering agro-industrialisation that supports rural employment and local economies.

Chapter 5 highlighted the severe undercapitalization of Africa's agrifood sector. Despite its importance, agriculture receives less than 5% of commercial bank lending. Public investments remain low, and Official Development Assistance (ODA) has been insufficiently targeted towards systemic change.

Transforming Africa's food systems requires catalytic finance. Blended finance instruments, agricultural insurance, fintech solutions, and climate-aligned investment platforms can unlock private sector participation and extend support to smallholders and agri-SMEs.

A new paradigm is needed, repurposing subsidies toward resilience, expanding Development Finance Institution (DFI) partnerships, and improving transparency in financial flows. Investment must move from fragmented projects to systemic, long-term capital aligned with food systems goals. Governments must lead in creating enabling policy environments that de-risk investment and prioritize equity.

Chapter 6 showed that infrastructure is both a bottleneck and an opportunity. An annual financing gap of $67–108 billion constrains connectivity, irrigation, processing, and storage. Poor roads and energy infrastructure inflate food prices and suppress market access. Only 6 percent of farmland is irrigated, and nearly one-third of food is lost post-harvest.

Strategic investment in transport corridors, energy access, digital infrastructure, and irrigation systems must be a top priority. Such investment would reduce food waste, raise farm incomes, and strengthen national food security. Investments should also be climate-resilient and locally owned to ensure sustainability and impact.

Chapter 7 emphasized the critical role of robust knowledge ecosystems. Evidence-based governance requires timely, disaggregated, and actionable data. Yet, many African countries operate with siloed knowledge systems, weak feedback loops, and limited capacity to translate research into policy.

The Malabo Biennial Review has shown that data transparency can drive accountability and reform. But future knowledge systems must go further, embedding digital platforms, building regional knowledge clusters, and enabling predictive analytics. They must also prioritise inclusion by integrating gender, youth, and geographic diversity into data systems. Knowledge is not a passive input but a strategic asset that determines whether policies are effective, inclusive, and adaptable.

The insights emerging from the seven chapters of the Africa Agrifood Status Report (AFSR) 2025 converge into five cross-cutting strategic imperatives. These recommendations are not isolated actions but interdependent levers that, when executed in tandem, can propel the continent towards a coherent, resilient, and inclusive agrifood transformation. Each responds directly to the recurring bottlenecks, fragmentation, financing gaps, governance deficits, and weak data ecosystems, identified across the chapters.

***First*, the need for systemic alignment is paramount.** Africa's agrifood systems continue to suffer from sectoral silos and disjointed interventions. Agricultural development, nutrition, environmental management, and trade integration are still pursued as separate agendas. To overcome this, countries must institutionalise a unified agrifood systems strategy, one that aligns with the goals of the CAADP under the Kampala Declaration. Such alignment must extend beyond planning documents to budget allocation, cross-ministerial coordination, and multi-stakeholder

platforms that bridge agriculture with health, education, environment, trade, and other critical sectors.

***Second*, targeted investment is essential to drive transformation on a large scale.** Financing remains one of the most binding constraints on Africa's food systems. Traditional sources such as public funding and ODA are insufficient to meet the continent's growing needs. Blended finance, which combines concessional capital with private investment, offers a powerful mechanism to mobilise resources, especially for infrastructure, climate-smart innovations, and the growth of agri-SMEs. These financial flows must include accountability mechanisms and strong inclusivity safeguards to ensure they reach marginalised groups, especially women, youth, and rural communities, who are often excluded from traditional financing channels.

***Third*, strengthened governance must underpin every intervention.** As the report reveals, countries with more effective, accountable, and transparent governance structures consistently perform better on food security, nutrition, and resilience indicators. Transformational governance requires more than policy frameworks; it demands implementation capacity, decentralized authority, and consistent enforcement. Investments in public institutions, leadership development, and local accountability systems are crucial. Moreover, building coherence across ministries, harmonising legal frameworks, and embedding mutual accountability mechanisms will reduce policy contradictions and accelerate progress toward food systems goals.

***Fourth*, spatial transformation through the development of food baskets and trade corridors is paramount.** As highlighted in the report, strategic spatial planning has the potential to connect surplus-producing regions to deficit areas, foster regional integration, and catalyse value addition. Food corridors are not only logistical pathways but economic engines that support agro-industrialization, reduce rural-urban disparities, and build climate-resilient market systems. Governments must invest in supportive infrastructure while also empowering regional institutions to coordinate and govern these corridors effectively. Properly executed, these spatial strategies can reshape Africa's trade landscape by unlocking new markets and reducing reliance on extra-continental imports.

***Fifth*, the transformation must be informed and guided by next-generation knowledge systems.** Data and evidence are essential, not only for diagnosing problems but for crafting effective responses, monitoring impact, and enabling adaptive learning. However, Africa's knowledge ecosystems remain fragmented, underfunded, and disconnected from decision-making processes. Next-generation knowledge systems must be digitally integrated, co-produced with local stakeholders, and responsive to real-time challenges. Investments are needed in knowledge infrastructure, interoperable data platforms, predictive analytics, and inclusive research networks. These systems should enable coordination between policymakers, researchers, private sector actors, and communities, ensuring that decisions are grounded in sound evidence and local realities.

The last three decades have proven the continent's potential. The next decade must unlock this potential through coherent governance, catalytic investment, inclusive innovation, and infrastructure that connects people to opportunities. Transformation will not come from any single actor, tool, or policy. It will come from the alignment of efforts, the courage to abandon business-as-usual, and the clarity to put systems, not silos, at the center of Africa's agrifood future.

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