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Regional Strategic Analysis and Knowledge Support System
by AKADEMIYA2063

Annual Trends and Outlook Report 2022

AGRIFOOD PROCESSING STRATEGIES FOR SUCCESSFUL FOOD SYSTEMS TRANSFORMATION IN AFRICA

Edited by
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Established in 2006 under the Comprehensive Africa Agriculture Development Programme (CAADP), the Regional Strategic Analysis and Knowledge Support System (ReSAKSS) supports efforts to promote evidence- and outcome-based policy planning and implementation. In particular, ReSAKSS provides data and related analytical and knowledge products to facilitate CAADP benchmarking, review, and mutual learning processes. AKADEMIYA2063 leads the work of ReSAKSS in partnership with the African Union Commission, the African Union Development Agency-NEPAD (AUDA-NEPAD), and leading regional economic communities (RECs). AKADEMIYA2063's mission is to provide data, policy analysis, and capacity strengthening support to enable African Union (AU) Member States to achieve economic transformation and shared prosperity in support of AU's Agenda 2063.

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ReSAKSS

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2022

Contents

Contents *Continued*

List of Tables

List of Figures

Figures *Continued*

List of Boxes

Abbreviations

AATS	Africa Agriculture Transformation Scorecard
ACET	African Center for Economic Transformation
AfCFTA	African Continental Free Trade Area
AGRA	Alliance for a Green Revolution in Africa
AIP	agro-industrial parks
AMU	Arab Maghreb Union
ARC	Agricultural Research Council
ATOR	Annual Trends and Outlook Report
AU	African Union
AUC	African Union Commission
AUDA-NEPAD	African Union Development Agency–New Partnership for Africa's Development
BR	Biennial Review
CAADP	Comprehensive Africa Agriculture Development Programme
CAAPs	Common African Agro-Parks
CEN-SAD	Community of Sahel-Saharan States
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
ETF	European Training Foundation
EU	European Union
F&V	fruits and vegetables
FAO	Food and Agriculture Organization of the United Nations
FMD	foot-and-mouth disease
GDP	gross domestic product
GII	global Innovation Index
GIZ	German Agency for International Cooperation
GVCs	global value chains
ICT	information and communication technologies
IGAD	Intergovernmental Authority on Development
ISIC	United Nations International Standard Industrial Classification
JSR	Joint Sector Review
M&E	monitoring and evaluation
NAIP	national agriculture investment plan
PPP	public–private partnership
PPP	purchasing power parity
R&D	research and development
REC	regional economic community
ReSAKSS	Regional Strategic Analysis and Knowledge Support System
RF	Results Framework
SADC	Southern African Development Community
SAKSS	Strategic Analysis and Knowledge Support System
SDGs	Sustainable Development Goals
SEZ	special economic zone
SME	small and medium enterprise
SSA	Africa south of the Sahara
TAV	traditional African vegetables
TVET	technical and vocational education and training
UMA	Arab Maghreb Union
UNFSS	United Nations Food Systems Summit
UNIDO	United Nations Industrial Development Organization
UN	United Nations
WBES	World Bank Enterprise Survey
WoSA	Wines of South Africa
WTP	willingness to pay

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Foreword

Recent global trade shocks resulting from the COVID-19 pandemic in 2020 and the Ukraine-Russia crisis in 2022 have illustrated the exposure of African countries to market disruptions and the importance of increasing food production on the continent. Food demand in Africa is rising, spurred by growing populations, urbanization, and increased incomes. This growth in demand can translate into increased incomes and better livelihoods for the continent's smallholders, but only if they are able to reach consumer markets. The agrifood processing sector is increasingly essential to connect food system actors and transform the crops produced by farmers into the foods demanded by consumers. A healthy and competitive processing sector will generate employment opportunities along the value chain, unlock smallholders' access to growing and lucrative urban markets, and allow Africa to meet more of its own food demand from local production, reducing reliance on imports.

The processing sector is also central to the challenge of ensuring healthy diets and good nutrition in Africa. Greater consumption of processed foods high in fat, salt and sugar will exacerbate the rising prevalence of overweight, obesity, and non-communicable diseases in the continent. However, the development of processing also has the potential to increase the availability of healthy foods, including orphan crops and traditional staples, by offering them in convenient forms that are more accessible for urban households. Further evidence is needed on strategies to mitigate the risks and seize the potential of the processing sector to contribute to good nutrition.

The status and development of the agrifood processing sector remains an understudied area despite its importance. The 2022 Annual Trends and Outlook Report (ATOR) aims to contribute to filling the knowledge gap by examining policies to enhance the contribution of the agrifood processing sector to successful food systems transformation in Africa. The ATOR uses available cross-country data as well as case studies from value chains throughout the continent to provide an overview of recent growth in the processing sector and the performance, structure, and major constraints of key processing subsectors.

The report discusses the challenges that prevent small and informal agrifood processing firms from growing and formalizing, and examines required policies and strategies to strengthen the sector, including by establishing enabling business environments as well as offering targeted support for skills development and access to finance and technology. The report argues that such strategies are important not only to increase performance in the agrifood processing sector itself, but also to better connect smallholders to markets, incentivizing farm production and productivity increases and catalyzing broader growth and transformation.

Several years of successive crises have presented serious challenges and threatened the achievement of Africa's development goals. The 3rd continental Biennial Review report, launched in March 2022, showed that Africa is not on track to meeting the goals and targets of the Malabo Declaration by 2025. A healthy, vibrant and productive agrifood processing sector would help to accelerate progress toward meeting many of the Malabo goals, in particular the commitments to boost intra-African agricultural trade, to end hunger, and to halve poverty through inclusive agricultural growth and transformation. It is our hope that this report will help to inform policies, strategies and investments to strengthen the agrifood processing sector and capitalize on its potential as a key contributor to sustainable food systems transformation in Africa.

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Executive Summary

The 2014 **Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods** laid out a number of ambitious continental goals, including commitments to end hunger and to halve poverty through inclusive agricultural growth and transformation. **Africa's agrifood processing sector is central to achieving these goals**. A high-performing, resilient, and competitive processing sector can create remunerative employment opportunities, link producers to growing and lucrative urban markets, and help to ensure that consumers have access to sufficient and healthy food. The agrifood processing sector is growing in response to increasing demand for processed and high-value foods in the continent. However, processing firms, many of them small and informal enterprises, face serious constraints. The 2022 Annual Trends and Outlook Report (ATOR) examines Africa's agrifood processing sector and its role in sustainable food systems on the continent. The report examines available evidence on the current status and performance of the sector, discusses key challenges, and identifies required policy actions to maximize its contribution to achieving sustainable healthy diets for all.

Food Systems Transformation and Agrifood Processing

Drivers of Food Systems Transformation

Demographic shifts and economic growth are leading to marked changes in Africa's food systems. Africa is experiencing the fastest population growth of all world regions, and urban populations are increasing even more rapidly. Although the continent is still the least urbanized of major world regions, the share of Africa's population that lives in urban areas is forecast to increase from 43.5 percent in 2020 to 48.4 percent in 2030, the largest increase in the world. Strong economic growth beginning in the 2000s has meant that Africa's population is becoming richer as well as more urban; Africa's middle-class population is estimated to have increased by more than half between 2000 and 2010. These changes are triggering sharp increases in the overall volume of food demanded, as well as major shifts in the composition of demand. Diets are shifting away from unprocessed staples to higher-value foods, including perishable foods such as animal products, fruits, and vegetables as well as processed foods. These changes are most pronounced among higher-income and urban consumers, but are also occurring across a broad spectrum of consumers. The shares of high-value, perishable, and processed foods in diets are expected to continue to rise with further income growth and urbanization.

Rising and changing demand for higher-value foods has led to lengthening and increased complexity in value chains that triggers rapid development in their midstream segments, including processing, packaging, and distribution. The agrifood processing sector in particular is expanding and increasing in importance as the role of processed food in diets grows. Increasingly, processing constitutes an essential link between producers and consumers: by transforming farm output into the more sophisticated and higher-value products that consumers demand, the processing sector is an essential element in strategies to promote smallholder commercialization and rural development.

Patterns, Structure and Performance of the Agrifood Processing Sector and Key Subsectors

Although comprehensive data and information on Africa's agrifood processing sector are lacking, the ATOR authors use available cross-country data as well as case study evidence to characterize the development of the sector and the performance of key subsectors. The report finds that in most countries with available data, the agrifood processing sector represents a substantial share of total manufacturing employment and value added. Agrifood processing employment, output, and labor productivity are growing, and the share of the agrifood processing sector in total manufacturing output is increasing significantly in many countries. Small and medium enterprises and informal firms constitute a large

share of agrifood processing firms. Increasing the relatively low labor productivity of small and informal firms could have large benefits in terms of employment generation and performance of the sector.

Improvements in productivity would also help to reduce the share of demand for processed food that is currently supplied through imports. Although processed agricultural products are not widely exported outside of the continent, they account for a large and increasing share of intra-African agricultural trade; there is potential to further expand intra-African trade in processed products by increasing the competitiveness of domestic firms and their ability to meet consumers' needs in terms of product quality and food safety.

Case studies on several fruit and vegetable value chains—tomato products in Ghana and Nigeria, fruit juices across the continent, pineapple products in West Africa, and traditional African vegetables in Kenya and Tanzania—demonstrate the potential of agrifood processing sectors as well as the challenges that must be addressed to strengthen their performance. In each of these subsectors, growing demand in urban areas presents important opportunities, but several constraints limit the capacity of processing sectors to fully meet demand and compete with imported products from outside of the continent. Fruits and vegetables are seasonal as well as highly perishable; poor transport infrastructure and insufficient cold chain facilities result in high losses and prevent many larger processing firms from operating at full capacity year-round. In general, unstable and low-productivity domestic production of these commodities results in high farmgate prices that raise costs and reduce processors' competitiveness. In addition to efforts to increase farm productivity, organization of small producers to aggregate their output would help to reduce costs and improve the stability of supplies for processors. There is growing awareness of the importance of hygiene and food safety in fruit and vegetable processing industries, but national food safety certification systems and capacities to adhere to best practices remain limited.

Africa's meat processing sectors also face important constraints to meeting the potential presented by rising demand, both domestic and external. Meat production in Africa has nearly doubled in the past two decades, and meat consumption is also on the rise, although it remains low compared to other world regions. While Africa is increasingly an importer of meat products, exports tend to be of live animals; relatively few African countries have succeeded in exporting meat outside the continent. The case study of beef exports from Botswana and Namibia demonstrates the importance of investments in animal health and traceability systems in enabling the development of a beef sector for export to high-value markets. Case studies on beef trade in West Africa, meat production in East Africa, and the poultry industry in Mozambique and Ghana illustrate challenges including low-yielding breeds, a lack of veterinary care, high prices of feed, and insufficient infrastructure, which raise costs and undermine competitiveness. Investments to raise the productivity of live animal sectors and improvements in enabling policy environments, in terms of conducive regulations, support for producers, and the establishment of grading systems, would help to increase the capacity and performance of meat producers.

A common theme from the case studies of fruit and vegetable and meat value chains is the need for well-functioning linkages between producers and processors. The studies also suggest the importance of strategies to strengthen the productivity and stability of farm production in addition to policies that target productivity within processing firms.

Implications for Nutrition

Further research is required to better understand the complex impacts of growth in the processing sector on health and nutrition. In general, less-highly processed products are nutritionally superior to more-highly processed products, and many processed foods contain high levels of sugar, salt, and/or fat, increasing the risk of overweight, obesity, and noncommunicable diseases—all of which are becoming more common in Africa. However, processing can also increase the availability of healthy foods by providing forms of traditional staples that are more convenient for busy urban households: for example, consumption of millet has risen in West Africa as ready-to-cook and ready-to-eat millet products become more available. Processed tomato paste, while nutritionally inferior to fresh tomatoes, contributes to healthy diets by making cooked vegetable dishes more palatable. To minimize the health risks of processed foods, significant efforts will be required going forward, including the development and adoption of norms and standards for nutrient content, the identification of methods to preserve or enhance nutrient content during processing, and education for consumers on the nutritional value of different products. Support will be required to strengthen the capacity of processing firms in meeting standards and ensuring transparency throughout the food system.

Policies and Investments for Successful Agrifood Processing Sectors

Skills and Knowledge

The development of the agrifood processing sector requires a workforce with the necessary skills, including technical skills, such as machine operation, hygiene practices, and quality assurance, as well as managerial skills, such as negotiation and decision-making. However, opportunities to acquire these skills are limited. Public education and training systems face funding and human resource limitations and lack coverage of new and emerging technical skill areas and on-the-job training opportunities. Limited connections between training institutions and industry result in mismatches between the training offered and the skills required by firms, exacerbating skills gaps. Increasing coordination and collaboration between employers and education and training systems is essential to improve the focus, quality, and relevance of training programs. There is also a need for training programs aimed at developing entrepreneurial skills, incubation centers for new businesses, and advanced executive training programs that would strengthen capacities in finance and accounting, human resources, marketing, supply chain management, and other business management areas. Such programs should provide hands-on support to entrepreneurs and managers to help them build competitive businesses, ultimately leading to enterprise growth and employment generation.

Access to Finance

Adequate financial resources are required to allow firms to operate at full capacity, invest in future growth opportunities, and weather shocks and downturns. However, a large percentage of agrifood processing firms in Africa identify access to finance as a major constraint to their operations. Formal financial institutions tend to serve only large and formal firms; small and informal enterprises, which constitute the largest share of agrifood processing firms, rely mainly on their own funds or on informal financial service providers that tend to be more costly than formal providers. In some areas, microfinance institutions are available to provide very small loans, but firms have an unmet need for medium-scale financial services. Several challenges constrain the development of financial services for small and medium agrifood processing firms in Africa. These include generally underdeveloped financial markets, high transaction costs associated with serving numerous geographically dispersed firms, and limited availability of collateral and financial records. In addition, the risks associated with unstable and variable agricultural production patterns affect the stability of processing firms' output and revenue. Due to these and other issues, small and short-term loans to agribusinesses tend to be unprofitable for formal lenders.

Expanding access to financial services will require efforts on several fronts. In general, macroeconomic stability, conducive policy environments for business, and improvements in transport and communications infrastructure will help to reduce constraints to financial service development, including for small firms. On the firm side, efforts to strengthen managerial capacity and financial recordkeeping would facilitate the provision of financial services. Digital financial services and the use of artificial intelligence show significant potential to increase access to finance for small firms by reducing transaction costs and providing lenders with better data and analytical tools to assess risk. Other solutions to expanding access to finance include risk management tools such as partial credit guarantees and insurance products; long-term credit lines; equity investment; and blended finance models including technical assistance, matching grants, and concessional credit.

Access to Technologies and Support for Innovation Capacity

The ability of firms to innovate, in terms of inventing or adopting new products and processes, is an important factor allowing them to increase productivity and competitiveness. However, innovation among African agrifood processing firms is generally low, due to constraints including low investments in research and development and limited access to technology. Policymakers can promote greater innovation by facilitating linkages among firms—for example, technology transfer agreements between African and foreign firms—and between firms and other innovation actors, such as research institutions. Reliable and low-cost information and communication technologies (ICTs) can enable innovations involving digital communications and e-commerce, but access to ICTs among agrifood processing firms remains generally low. In addition to other efforts to support innovation along the value chain, policymakers should increase the availability of ICTs, focusing on access to broadband internet and telecommunications services.

Spatial Development Strategies

Delivery of services to agrifood processing firms—including skills development opportunities and access to finance and technology—is constrained by the difficulty of reaching small and sometimes remote or dispersed firms. Different types of spatially targeted development strategies, which seek to promote or take advantage of geographic proximity of related enterprises, have been rising in prominence in Africa. Industrial clusters, or spatial concentrations of related enterprises and institutions, can offer important benefits to individual firms as well as contributing to overall sectoral growth. Clustering can help to overcome some of the disadvantages associated with large numbers of small firms by lowering transaction costs and facilitating firms' access to input and output markets as well as providers of technology, financial services, and education and training. Case studies of Uganda's fish processing cluster and South Africa's wine cluster illustrate the potential benefits of relationships between industrial clusters and institutions that provide firms with marketing and technical support to promote growth and competitiveness.

In addition to promoting clustering and offering services to existing clusters, policymakers are increasingly exploring policy interventions such as agro-industrial parks, which provide high-quality infrastructure and services for firms in a demarcated area, sometimes with customized legal and regulatory environments that differ from the rest of the country. Such initiatives can attract investment, create interlinkages among value chain actors, facilitate the provision of services for investors and firms, improve policy coherence, and ultimately contribute to agricultural sector transformation. However, the conditions for success are complex and require attention to the particular competitive factors of each proposed project. Success factors include effective design and management of infrastructure, provision of supportive services, strong private sector involvement at all stages, and consistent political support.

Concluding Remarks

The COVID-19 pandemic beginning in 2020 and the Ukraine-Russia crisis in 2022 have slowed Africa's progress toward meeting its development goals and presented serious challenges for efforts to reduce poverty and food insecurity. The agrifood processing sector is a key factor in the continent's ability to build productive food systems that provide adequate and healthy diets for all. The 2022 ATOR aims to provide evidence on the current performance of the sector, challenges that constrain its development, and policies and investments that can improve its capacity and productivity. The report identifies key areas for policy action, including facilitating productivity growth in small and informal agrifood processing firms, boosting the competitiveness of formal processing firms, and increasing linkages between firms and other food system actors to facilitate access to services such as human capital development, finance, infrastructure, and technology. Strategies that succeed in strengthening the agrifood processing sector will also expand opportunities for producers, increase access to foods demanded by consumers, and facilitate the development and transformation of the food system at large.

CHAPTER 1

Introduction

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Introduction

Overall, the economic transformation process requires both diversification and sophistication (specialization) of a country's production system. Indeed, countries that undergo successful diversification and sophistication are more likely to achieve transformative development goals. In Africa, food systems are transforming, with value chains becoming more complex and purchased, processed, perishable, and high-value food products accounting for larger shares of consumers' diets (Tschirley et al. 2015a; Tschirley et al. 2015b). The midstream segments of agricultural value chains are increasing in importance in response to demand from urban markets for both greater volumes of food and greater value added (Reardon et al. 2015). Africa's agrifood processing sector is central to these changes, and growth and development of the sector will help to determine whether the burgeoning demand from urban food markets will be met through local production or through increases in Africa's already high levels of imports from outside the continent. The processing sector is the conduit through which smallholder farmers reach consumers, and as such it plays an important role in increasing income opportunities for farmers as well as creating employment opportunities along food value chains.

The United Nations Food Systems Summit (UNFSS) held in September 2021 underscored the need to apply a systems perspective to questions of agricultural and rural development and food and nutrition security, with attention to the range of interlinked processes and actors involved in food production, value addition, and consumption. Greater focus on midstream value chain segments is essential to advancing overall food system productivity and inclusivity, given their impacts on actors throughout the food system. Agrifood processing in particular is a key sector for value addition, and has the potential to smooth seasonal price and supply fluctuations and increase market stability for both producers and consumers, diversify markets for farm products, and reduce postharvest losses (Malabo Montpellier Panel 2021). In Africa, food processing has been described as the "missing link" of the continent's food systems (Halvorson 2017) due to its insufficient capacity to effectively channel strong urban demand for processed food to producers.

The African Union's 2014 Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods recognizes the important role of agrifood processing and other forms of agribusiness in achieving key agricultural and food systems goals. Commitment 4 of the Declaration calls for halving poverty by 2025 through inclusive agricultural growth and transformation, including by creating remunerative opportunities in agricultural value chains and supporting the participation of women and youth in agribusiness. Advances in the processing sector can also contribute to progress toward other goals, notably the Malabo Declaration commitments to end hunger and boost intra-African agricultural trade. Processing both facilitates trade by generating products that are easier to transport than raw materials and creates additional opportunities for trade by permitting greater product differentiation. The processing sector also plays an important role in nutrition as it allows nutritious foods to reach consumers far from production areas, but it can also increase the availability of unhealthy or poor quality food products. The technologies and practices of processing firms can alternatively protect, enhance, or damage the nutritional content of the foods they produce.

Despite the key role of the agrifood processing sector in advancing food system and economic transformation and its importance to achieving many of the Malabo Declaration commitments, there is a relative lack of research evidence on the current status and performance of the sector and strategies to enhance its competitiveness. The *2022 Annual Trends and Outlook Report* (ATOR) focuses on the agrifood processing sector and strategies to maximize its contribution to achieving sustainable healthy diets for all. More explicitly, the 2022 ATOR addresses issues including growth, potential, and constraints in Africa's agrifood processing sector; dynamics and trends in key processing subsectors; and policies and investments required to help processing sector firms overcome challenges, increase performance and competitiveness, and enhance the contribution of the sector to broader growth and development. In this introductory chapter, we provide a brief review of performance and constraints to growth in the processing sector before summarizing the report's chapters.

Growth in Africa's Agrifood Processing Sector

Africa is urbanizing rapidly. About 41.2 percent of the continent's population was estimated to reside in urban areas in 2015, and this share is projected to rise to 48.4 percent by 2030 and 59.9 percent by 2050 (UNDESA 2018). Incomes have

also risen significantly since the early 2000s. Prior to the COVID-19 pandemic, steady economic growth over almost two decades had reduced the prevalence of poverty in Africa south of the Sahara from 58.4 percent in 2000 to 40.4 percent in 2018 (World Bank 2021). Despite the persistence of high rates of poverty, the size of Africa's middle class increased by over half during the 2000s, accounting for 34.3 percent of the continent's population by 2011 (Ncube, Lufumpa, and Kayizzi-Mugerwa 2011).

Growing urbanization and rising incomes have led to marked changes in the composition of diets, with rising demand for purchased and processed foods and for higher-value foods such as animal products and fruits and vegetables. In urban areas, increased time pressures have raised demand for more convenient processed foods that can be prepared quickly (Hollinger and Staatz 2015). However, even in rural areas, rising incomes are associated with increased demand for processed and perishable foods (Tschirley et al. 2015a). Prospective analyses of food demand in eastern, southern, and western Africa suggest that these trends will persist into the future, with continued rapid growth in overall food demand and rising shares of processed food (Tschirley et al. 2015a; Zhou and Staatz 2016). The COVID-19 pandemic, which severely impacted Africa's economic growth in 2020 and is estimated to have pushed millions of Africans into poverty (Mahler et al. 2021), has had complex impacts on diets due to changes in incomes, food prices, and trade (Ulimwengu and Magne Domgho 2020; FAO 2021). The Russia-Ukraine conflict that began in early 2022 has also had severe impacts on food security through international trade shocks and high food price inflation (Badiane, Fofana, and Sall 2022). The impacts of recent crises and their likely duration are not yet clearly understood. However, as the continent's economic recovery continues, the role of the processing sector as an intermediary linking producers, especially those in rural areas, and consumers will likely continue to grow in importance.

Potential and Constraints of the Agrifood Processing Sector

Africa's agrifood processing sector is characterized by the presence of a small number of large firms and a proliferation of small and micro firms, with smaller firms showing lower labor productivity (Hollinger and Staatz 2015; Snyder et al. 2015; Soderbom 2011). Agrifood firms are affected by a number of constraints, including lack of skills and human resources; limited access to land, finance, and capital; poor energy and transport infrastructure; high costs of operation; and lack of consistent and reliable access to raw materials. These barriers affect firms of all sizes, and often prevent small informal firms from expanding operations and employment and entering the formal sector (Hollinger and Staatz 2015).

Local processing firms' low capacity to upgrade product quality limits their ability to appeal to consumers and expand market shares. The preferences of relatively affluent urban consumers related to food quality, food safety, marketing, and packaging can be difficult for local producers and processing firms to meet. Focus groups of urban consumers in Lagos, Nigeria, and Accra, Ghana, found that consumers preferred products based on traditional staples, such as gari and yam products, but did not purchase them due to concerns about food safety and quality (Hollinger and Staatz 2015). Similarly, consumers in Senegal were found to purchase imported dairy products despite stated preferences for local dairy due to food safety concerns (Boimah and Weible 2021).

Outline of the Report

The three chapters that follow this introduction set the backdrop for the subsequent analysis by introducing many of the drivers of processing sector development, placing agrifood processing development into context as a key enabler of smallholder commercialization, and reviewing dynamics and trends in key agrifood processing sectors. First, in chapter 2, Badiane and colleagues argue that efforts to strengthen agrifood processing firms do not simply benefit the processing sector itself, but rather should be viewed as key elements of strategies to promote and incentivize smallholder commercialization. The authors review the drivers of food systems transformation in Africa, including urbanization and income growth, which have led to shifts in diets and the rise in importance of processed foods. Changing diets mean that the products demanded by consumers are very different from those available at the farmgate; thus, efforts to promote smallholder commercialization not only need to overcome the physical distance between smallholders and consumer markets, but also must bridge the difference in product sophistication. The processing sector is thus key to linking producers and consumers in the context of changing food systems. The authors review the examples of millet and other crops for which the development of a processing sector has been key to expanding consumption. They make recommendations for

policies and investments to promote the growth and development of the agrifood processing sector at different stages through provision of technical, institutional, and capacity strengthening support.

In chapter 3, Schreinemachers and co-authors review Africa's fruit and vegetable processing sectors through case studies of tomato processing in Ghana and Nigeria, fruit juices across the continent, pineapple processing in Benin, and traditional vegetable processing in Kenya and Tanzania. African countries tend to export unprocessed fruits and vegetables and import processed, higher value-added products; efforts to strengthen local processing sectors face significant challenges, including high production costs, difficulties in obtaining a reliable and consistent supply of raw materials, and the lack of cold chain infrastructure. Policies should focus on increasing the competitiveness of locally produced fruits and vegetables, including through the adoption of varieties more suited to processing, improvements in production processes to increase the stability of supplies, and institutional arrangements to organize smallholders into groups to facilitate coordination. Given the nutritional tradeoffs inherent in processing fresh fruits and vegetables, further research is needed to examine how to maximize nutrient retention during processing.

In chapter 4, Rich and co-authors examine evidence on Africa's rapidly transforming meat processing sectors by reviewing available data and presenting case studies from a number of countries. Traditionally, Africa's livestock exports have been primarily of live animals; efforts to add value and increase production and trade of meat products face numerous constraints. These include the use of low-yielding breeds, high prevalence of animal diseases, poor infrastructure, costly inputs, and limited domestic demand. In addition, improvements to the enabling policy environment are needed; for example, the development of grading systems would help to differentiate products and incentivize quality improvements. Case studies on meat production and processing in southern, western, and eastern Africa illustrate the complexity of meat value chains and underline the context-specificity of the challenges facing meat sectors across the continent. The authors note that, because of the close linkages between the live animal production sector and the meat sector, policies that promote the productivity, safety, and resilience of the live animal sector will also benefit the meat processing sector. In particular, commercialization policies that increase small-scale producers' access to formal markets are needed.

The next set of chapters examine different aspects of agrifood processing sector development to draw lessons and recommendations to guide policies and investments. Chapter 5, by Ellis and co-authors, sets the stage by examining patterns in the sector's growth and highlighting challenges and opportunities for improving performance. A review of broad trends for countries with available data shows that the agrifood processing sector accounts for an important share of manufacturing employment and value added, and employment and labor productivity in the sector are growing. In-depth analysis for Tanzania and Ethiopia suggests that the processing sector is dominated by small and informal firms, which play important roles for livelihoods but often show relatively low labor productivity. Building on the growing role of processed food products in intra-African trade and redirecting demand for imported processed products to local products offer opportunities for growth of the sector. However, several challenges must be addressed, including increasing productivity in the agricultural production sector and in small processing firms.

In chapter 6, Tabiri and Sakyi examine the role of industrial clusters in transforming Africa's agrifood processing sector, suggesting that promoting clusters can be an important strategy to improve the sector's performance. Clusters, defined as spatial concentrations of related enterprises and institutions, provide a range of benefits to individual firms as well as for broader sectoral and economic growth; in the African agrifood processing sector, clustering can help small firms overcome some of the constraints to growth by facilitating access to markets, technology, inputs, and infrastructure. The authors discuss case studies of Uganda's fish processing cluster and South Africa's wine cluster, which demonstrate the importance of well-functioning institutions to provide marketing and technical support to promote firm growth and competitiveness. The authors provide recommendations for the roles of government and research and training institutions to capitalize on the potential of clusters to promote processing sector growth and development.

Firms' ability to innovate is an important factor in determining whether small enterprises can increase in size and profitability, generate employment, and contribute to economic transformation (Badiane and McMillan 2015;

Sonobe and Otsuka 2011). Chapter 7, by Tadesse and Gachango, focuses on factors that contribute to or inhibit innovation in firms in Africa's agrifood processing sector. Using enterprise survey data from selected countries, the authors find that the share of firms innovating—in terms of inventing or adopting products and processes—is relatively low and has declined over time. Governments can facilitate innovation by strengthening connections between firms and other innovation system actors through technology transfer agreements, contract farming, and the promotion of clustering. Expanding access to information and communication technologies (ICT) is critical to enable firms to interact with other actors, contribute to areas such as food safety, logistics, and traceability, and enable the development of new ICT-based products and services. To maximize effectiveness, programs to support innovation should target small enterprises and those with young or female managers, as they face especially steep barriers to investment and technology access.

Chapter 8, by Jenane and Ulimwengu, takes an in-depth look at the role of geographically targeted agricultural development initiatives, or agro-parks, in the development of Africa's agrifood processing sector as well as overall agricultural and economic transformation. The authors review current and past experiences with different types of agro-parks, including special economic zones, agro-industrial parks, and agri-clusters, and identify factors contributing to their success or failure. The chapter makes recommendations for the successful implementation of the African Union's Common African Agro-Parks (CAAPs) initiative, which seeks to increase the supply of locally produced and processed agricultural products. The chapter suggests that agro-parks can attract investment, create interlinkages among value chain actors, facilitate the provision of services for investors and firms, improve policy coherence, and ultimately contribute to agricultural sector transformation. However, the conditions for success are complex and require attention to the particular competitive factors of each proposed project. Essential success factors include effective design and management of infrastructure, provision of supportive services, strong private sector involvement at all stages, and consistent political support.

The report also includes two shorter boxes on featured issues and approaches in agrifood processing sector development. The first featured issue box, by Toshiaki Ono, discusses the challenges faced by agrifood processing firms—particularly small and informal firms—in obtaining external finance. Barriers to obtaining financing are particularly significant for small and informal firms. Some new developments, such as the rise of digital financial services, offer important potential to bridge financing gaps and help financial institutions and firms overcome constraints to broadening access to financial services. The second featured issue box, by Oliver Kirui, discusses required policies and investments to promote the development of technical, management, and leadership skills for agrifood processing enterprises. The author identifies several important practices to pursue, including building partnerships between private sector companies and public training and education providers to ensure that training matches labor market needs, and focusing attention on developing skills required for entrepreneurship.

In addition to assembling evidence on key development issues, the ATOR serves as the official monitoring and evaluation report of the Comprehensive Africa Agriculture Development Programme (CAADP). Chapter 9, by Collins and co-authors, reviews progress in CAADP implementation as well as the status of countries, regions, and the continent as a whole with respect to the indicators of the CAADP Results Framework. Progress on many of the Results Framework indicators, as well as toward the goals and targets of the CAADP-Malabo Biennial Review, was significantly delayed by the COVID-19 pandemic beginning in 2020 and is likely to be further affected by the Russia-Ukraine conflict of 2022 and associated trade disruptions. However, progress on several fronts, including in maintaining strong economic growth and reducing poverty and hunger, had already slowed before the pandemic. The authors note several challenges affecting the implementation of national agriculture investment plans in Africa and the need for concerted efforts to enhance implementation.

Taken together, the chapters of the 2022 ATOR provide a multifaceted view of the evolution and performance of Africa's agrifood processing sector, the challenges it faces, and the potential it offers to contribute to food systems transformation and sustainable development. The report is intended to guide policymakers and partners in designing policies and investments to strengthen the sector and increase its ability to provide healthy diets for all.

CHAPTER 2

The Rise of Africa's Processing Sector and Commercialization of Smallholder Agriculture

Ousmane Badiane, Julia Collins, Katrin Glatzel, and Wondwosen Tefera

Introduction

Across many parts of Africa, commendable progress has been made in recent years to increase agricultural productivity; reduce hunger, malnutrition, and poverty; create new employment opportunities; and improve the livelihoods of rural communities. Yet, demographic change, urbanization, shifting diets, and climate change mean that pressure is growing on food systems to make more varied and nutritious food available and accessible. Coupled with continued population growth, the significant economic growth experienced over the past two decades has accelerated food demand, leading to rapid increases in food imports despite strong agricultural sector growth (Christiaensen 2020; Seleshi 2021).

Africa must accelerate its transition from mainly producing and exporting raw materials and importing processed foods to develop a thriving and competitive agro-processing sector that delivers on the African Union's Agenda 2063 targets of economic growth, wealth generation, and employment (Aspiration 1) (AUC 2015). Failure to do so will mean continued food import dependencies, heightened vulnerability to global supply shocks, and lost opportunities for significant incremental wealth generation among rural and urban populations.

Sustaining past progress and responding to emerging pressures will require innovative means of resolving—faster and at scale—the institutional, infrastructural, and technological obstacles to future competitiveness in Africa's food value chains and thus reducing the continent's dependency on other regions for food. A host of recent developments—ranging from faster economic growth, rapid urbanization, advances in biotechnologies, digitalization, and deepening globalization—are already having a considerable impact on how food is produced, processed, marketed, traded, and consumed across the continent. The same developments are transforming the environment for smallholder agriculture, the nature of its links with the rest of the economy, and ultimately the extent to which smallholder farmers and rural economies share in current and further growth opportunities. At its core, this new environment raises the question of how to continue the unfinished business of commercializing smallholder agriculture.

The key issue remains the same: how can the demand constraint facing smallholders be addressed, so that they are connected to new markets in order to raise sales and incomes and increase incentives to invest in boosting agricultural production and growth in rural areas? The rapid transformation of staples value chains, fueled by rising urban demand for processed foods, has fundamentally transformed the nature of demand constraints. Traditionally, the barriers to demand were linked to the geographic distance between growing areas and major consumption centers, and required solutions to the infrastructural and institutional obstacles to moving produce. In the current context, the demand constraints faced by smallholders arise from the difference between the simple, raw produce they supply and the processed, more sophisticated products that consumers in major urban markets demand. In this chapter, we argue that the distance separating smallholders and rural areas from new markets is no longer primarily physical but is increasingly related to processing and degree of sophistication. Rather than the quality of the road network and performance of local traders, it is the domestic processing sector's capacity to capture a growing share of the emerging urban demand that will determine smallholders' access to new markets. In other words, the demand facing smallholders is derived from the demand facing the processing sector, and thus, the constraints to commercializing smallholder agriculture come from the constraints faced by the emerging processing sector.

This chapter discusses opportunities and challenges related to enhancing the agro-processing sector's role as a bridge between smallholders and markets. The next section of the chapter discusses the objectives and strategic importance of smallholder commercialization, including its role in catalyzing broader economic growth. The third section discusses traditional approaches to commercialization, which have largely focused on overcoming the policy, institutional, and infrastructural barriers preventing the movement of agricultural produce from rural production areas to urban consumption areas. The fourth section assesses major trends that are transforming the composition of food demand and the nature of the commercialization problem. The chapter then discusses commercialization in the context of modern value chains, which requires a focus not on physical distance but on the distance between what is produced and what is demanded in terms of product sophistication. The chapter concludes with a discussion of policy recommendations to enable the development of competitive processing sectors, which would allow Africa's smallholders to better tap into the opportunities presented by growing demand.

Strategic Importance of Commercialization of Smallholder Agriculture

Agriculture remains the main economic activity and driver of livelihoods in rural areas of Africa. It is a main channel for transmitting broader economic growth and wealth creation in rural communities. In the current context of rapidly transforming value chains, it is crucial to find new ways of expanding and fostering access by smallholder farmers to the growing demand in urban markets. In essence, this is the same traditional challenge of commercialization, which, at its core, is a challenge of alleviating demand constraints faced by subsistence and other smallholder farmers. If a farmer has no access to markets outside his or her immediate area, then any surplus produced will go to waste or cause prices to collapse if it cannot be consumed. Farming households also will not be able to benefit from opportunities to earn revenue by supplying domestic markets. Demand constraints and barriers to markets therefore limit incentives for producers to expand production or make investments in increasing productivity.[1] Commercialization efforts seek to alleviate demand constraints by creating or expanding access to markets. The additional demand presented by these markets enables smallholders to generate and sell increasing surplus quantities more widely, sustaining prices and increasing incomes.

The welfare impact associated with smallholder farmers' move from subsistence agriculture to commercialization has been an issue of debate in the literature. Von Braun and Kennedy (1986) reviewed several studies from the 1970s and 1980s that assessed the effect of commercialization on household income and nutrition. The review challenged the conclusion made by earlier works that commercialization negatively affects the welfare status of poor farmers. Von Braun and Kennedy (1986) argued that the previous studies suffered from very small and biased samples and conceptual limitations, and failed to consider confounding factors. In support of this argument, von Braun (1995) conducted a summary of comparative studies undertaken by IFPRI and other institutions in selected countries in Africa and Asia. The findings showed that in the majority of cases, commercialization benefited smallholder farmers through improved employment, agricultural labor productivity, better income, and better household nutrition. A more recent review by Saha, Sabates-Wheeler, and Thompson (2021) corroborated these findings on increases in employment, income, and productivity, and Ogutu, Gödecke, and Qaim (2020) noted that increased incomes resulting from commercialization allow farmers to improve their consumption of purchased food. However, not all studies show the same results. Carletto, Corral, and Guelfi (2017) conclude, based on data from Malawi, Tanzania, and Uganda, that the impact of increased commercialization on improving the nutritional outcomes of smallholder farmers is weak. The authors argue that smallholders sell small quantities of the food they produce despite there being a high level of commercialization.

Evidence has shown that commercialized agriculture produces a host of benefits at multiple levels, not just for rural production areas but also for the economy as a whole. At the farm level, commercialization is a way for small farmers to raise their incomes and improve resilience. The income earned by farmers from selling produce outside their immediate area has the potential to stimulate additional production and income, which, when spent on local goods and services, boosts activities in the off-farm sector and stimulates growth in the broader rural economy, widely benefiting the rural population. At the national level, agricultural commercialization is a key catalyst for wider economic transformation and growth, as revenues generated in the agricultural sector and rural areas fuel demand for goods in the rest of the economy and help generate financial resources to invest in public goods and services. The commercialization and growth of smallholder agriculture, therefore, contribute to broader development goals including employment creation, poverty reduction, and nutrition, as shown by Hazell and Roell (1983).

The growth multipliers described above measure the additional income that results from re-spending income earned from the sale of tradable goods—in this case, smallholder producers spending income from selling agricultural crops on local goods and services that would not otherwise have been produced and sold (Delgado, Hopkins, and Kelly 1998). There is a wide consensus in the 1980s and 1990s literature that agriculture has a notable growth linkage in the rural

1 The experience of Ethiopia's maize sector in the early 2000s starkly demonstrated the damaging effects of lack of market access on incentives to raise productivity. Investments in production technology coupled with good weather led to large harvests in 2000/2001 and 2001/2002, but farmers were unable to sell all of their surplus production, leading to an 80 percent decline in the price of maize and crops going to waste. In the following year, producers reduced their input use; this, together with late rains, resulted in a drastically lower harvest (Rashid, Getnet, and Lemma 2010).

economy. That is, findings show that the increase in agricultural income from the sale of agricultural goods results in positive growth effects in the local nonfarm sector. Hazell and Haggblade (1991) emphasize that agricultural growth is the primary driving force for the rural nonfarm sector, since the increase in farm income leads to an increase in household expenditure on the consumption of goods and services.

Agricultural commercialization and growth influence nonfarm activities and generate multiplier effects through three channels: (1) consumption linkages emanating from the effect of additional farm income spent on goods and services, (2) production linkages resulting from the increased supply of such goods and services, and (3) labor market linkages due to increased demand for employment in and outside of the agricultural sector. Evidence suggests that in comparison to production linkages, the proportion of agriculture's growth multiplier effect that is attributed to consumption linkages is greater. For instance, Hazell and Haggblade (1991) and Delgado (1995) suggest that about 80 percent of induced income gains from agricultural multipliers were due to consumption linkages.

Haggblade, Hazell, and Brown (1988) have reviewed estimations of the magnitude of rural growth multiplier effects in Asian and African countries. They concluded that multiplier effects were about 40 percent lower among African than Asian countries, with average values estimated at 1.5 and 1.8, respectively. In other words, a US$1.00 increase in farmer incomes, say from the sale of agricultural products, creates an additional US$0.50 and US$0.80, respectively, in off-farm incomes. Weaker production linkages and less spending on nonfood rural consumer durables in Africa were identified as the main reason behind the lower level of the growth multiplier.

In contrast, the analysis by Hopkins, Kelly, and Delgado (1994) based on household survey data for Niger and Senegal found the presence of a higher level of multipliers in both countries, namely 1.77 in Niger and 1.83 in Senegal. The authors argued that the multiplier magnitudes obtained in the study are stronger when compared to findings in previous studies for Africa. The authors further argued that the functional characterization of all rural commodities in earlier studies resulted in a less accurate picture of the linkage between the farm and nonfarm sectors. That is, previous studies classify rural commodities into food and nonfood only, and later interpret the result as farm and nonfarm. This is argued to be the reason behind the lower level of multiplier reported in the earlier studies.

Finally, Hazell and Haggblade (1991) have shown that better infrastructure and agricultural income are associated with a stronger agricultural growth multiplier effect. The authors argued for government investments in rural infrastructure such as roads and electrification to amplify growth multiplier effects.

Haggblade, Hazell, and Dorosh (2007) questioned earlier studies that showed the presence of a higher agricultural growth multiplier effect. The authors criticized the underlying assumptions of fixed prices and perfectly elastic supply that were incorporated in several of the earlier studies. With a review of empirical estimates from more than 50 studies, they showed multiplier estimates that assumed fixed prices and unconstrained supply responses led to overly optimistic growth multipliers over price endogenous models that relaxed those assumptions. Similarly, Nseera (2014) pointed out that agricultural household income under the constrained supply elasticity model led to a lower increase (and hence lower income multiplier) when compared to the unconstrained model. However, it is important to note from Haggblade, Hazell, and Dorosh (2007) and Nseera (2014) that the agricultural income multiplier effect still exists with the constrained supply models.

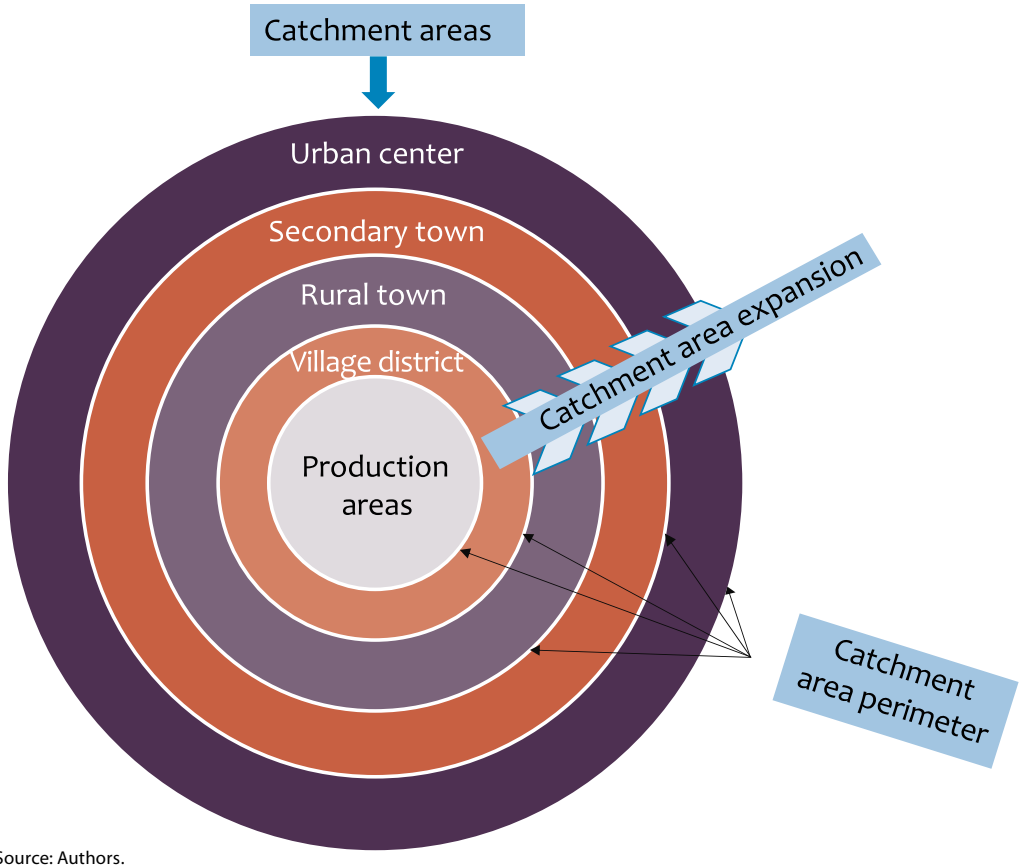
Traditional Commercialization Policy Objectives and Strategies

Traditional commercialization strategies ultimately aimed to trigger the multiplier effects described above by expanding market opportunities to raise demand for and incomes from crops produced by smallholder farmers. In the context of traditional value chains, commercialization strategies dealt with simple products that underwent minimum transformation as they were moved from the field to consumer households; often this involved nothing more than threshing, cleaning, and bagging. There was not much difference between the products that left the farm and those marketed to consumers. For example, prior to the rise of the processing sector in Senegal, the millet sold in urban centers was the same millet harvested from the field and obtained in rural production areas. In this context, the commercialization problem was primarily one of expanding the market catchment area—that is, increasing the distance the product can travel to reach a wider set of consumers.

Traditional commercialization policies aimed to solve the demand constraint resulting mainly from physical distance by facilitating the movement of goods across space, gradually from production areas to village districts, rural towns,

secondary towns, and finally major urban consumption centers (Figure 2.1). The success of these commercialization policies was reflected in the extent and reach of the catchment area boundaries and the associated level of efficiency in moving goods from rural production areas to urban centers and eventually into foreign markets. Policies dealt with key supply chain functions that facilitate commodity movement over physical distances at the lowest cost possible, starting with product collection, assembly, cleaning, sorting, bagging, transport, and storage. Key priority policy and investment areas included the promotion of farmer cooperatives, construction and operation of market infrastructure, development of road and other transport infrastructure, building and management of storage infrastructure, facilitation of access to financing, market regulation, and price information. The rapid urbanization of the last two decades, along with rising incomes and a growing middle class, has induced profound changes in demand and distribution patterns for traditional food staples. The simple products marketed traditionally from smallholder farmers to consumers are no longer demanded by urban households. Urban households want to consume the same traditional crops, but they are also asking for more convenience, safety, and diversity. They seek better-packaged food that is easier to prepare and consume. The emerging processing sector is therefore the main bridge between smallholder farmers and domestic markets. The distance between farmers and consumers is no longer primarily a physical distance but one of production sophistication. The next section examines the changes taking place in the processing sector, before turning to implications for modern commercialization policies in the subsequent section.

FIGURE 2.1—THE TRADITIONAL COMMERCIALIZATION PROBLEM



Source: Authors.

Drivers of Food Demand and the Changing Nature of Food Markets

New developments are transforming Africa's food systems, and with them, the challenges of smallholder commercialization. The changing nature of food demand, driven by demographic and income changes, has altered the nature of the constraints to commercialization and changed the focus of the problem to one of overcoming not physical distance, but the distance between the types of products produced by farmers and those demanded by consumers.

In this section, we discuss several major internal drivers of change in African food systems and the nature of food demand, including population growth, urbanization, and increasing incomes. These developments have increased the role of processed foods in Africa's food systems and led to a new set of challenges for smallholder commercialization.

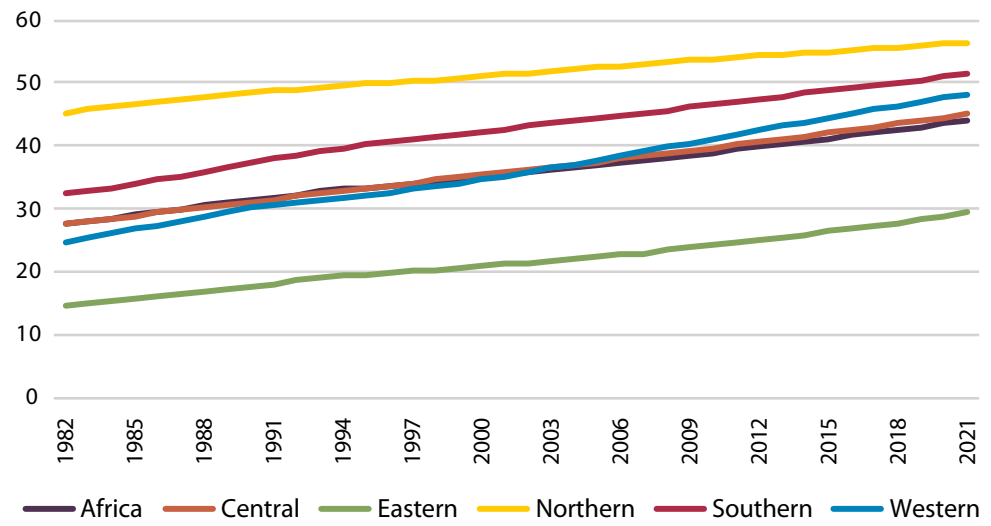
Population Growth and Urbanization

Africa is experiencing the fastest population growth of all world regions, with an annual increase of 2.5 percent during the 2015–2020 period, as compared to 1.1 percent for the world as a whole (UN DESA Population Division 2019). Urban populations in Africa are increasing even more rapidly, with annual population growth rates of 3.6 percent in urban areas during 2015–2020 (UN DESA Population Division 2018). Africa is still the least urbanized of major world regions, with 43.5 percent of the continent's population living in urban areas as of 2020, compared with 56.2 percent for the world as a whole. The share of the urban population experienced an upward trend throughout the last four decades for Africa as a whole, as well as for its different geographic regions (Figure 2.2). Despite all regions recording an upward trend, the pace of urbanization remained different across geographic regions. Northern and southern Africa stand out as the most urbanized part of the continent, while eastern Africa is the least urbanized, with the share of urban population at 29.3 percent in 2021—less than half of the share recorded by Africa as a whole for the same period.

However, the continent is urbanizing at a fast rate. The United Nations estimates that the share of the urban population will increase by 11.3 percent over the 2020–2030 period to reach 48.4 percent, the largest increase in the world (UN DESA Population Division 2018). Other estimates that use remote sensing data to identify urban areas suggest that Africa's urban population share is increasing at an even faster rate and has already surpassed 50 percent (OECD and SWAC 2020; Tschirley et al. 2020). Either way, Africa's urbanization is uniquely characterized by growth in smaller cities and towns as well as large urban centers, and by increasing population density in rural areas (Tschirley et al. 2020).

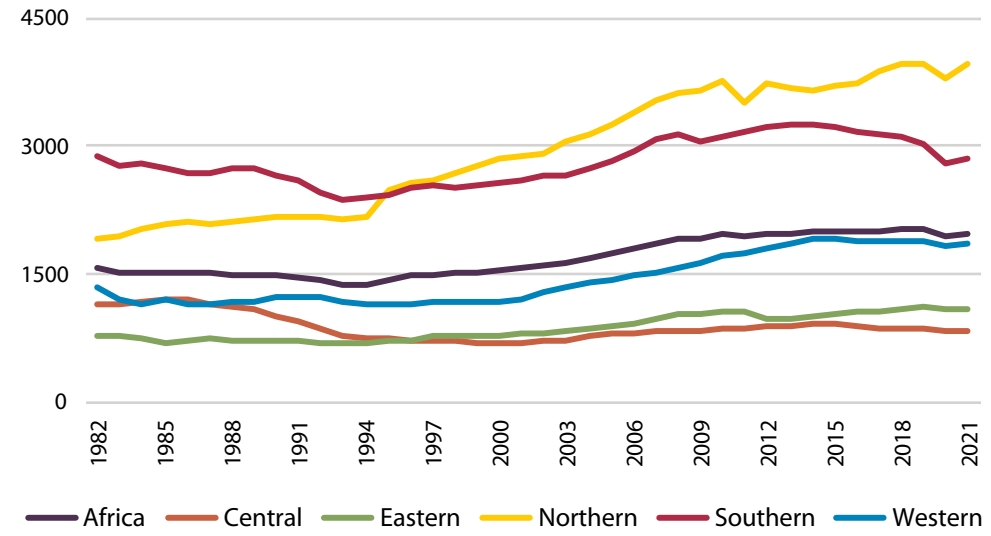
Africa's population is becoming more affluent as well as more urban. While not sufficient to rapidly decrease poverty, strong economic growth in the 2000s and 2010s nonetheless raised incomes and expanded the size of the continent's middle class. For example, GDP per capita increased by almost 30 percent between early 2000 and 2021 for Africa as a whole (Figure 2.3). Northern and southern African countries consistently recorded per capita income higher than the continent's average.

FIGURE 2.2—SHARE OF URBAN POPULATION IN TOTAL POPULATION IN AFRICA (IN %)



Source: Authors' computation based on World Bank (2022).

FIGURE 2.3—TRENDS IN GDP PER CAPITA



Source: Authors' computation based on World Bank (2022).

In contrast, per capita income was lower than the African average for the other regions, particularly for eastern and central Africa.

A 2011 African Development Bank study (Ncube, Lufumpa, and Kayizzi-Mugerwa 2011) found that Africa's middle class—defined as the population with per capita consumption ranging from US$2–20 (2005 purchasing power parity [PPP] USD) per day—increased from 204 million in 2000 to 327 million in 2010, or from around 27 percent of the continent's population in 2000 to 34 percent in 2010. However, more than half of that group were considered to be "floating middle class," meaning that they were situated just above the poverty line and vulnerable to reentering poverty.

Analyses that attempt to include only populations with greater levels of security have resulted in smaller estimates of the size of the middle class; for example, a Brookings study with a higher income threshold estimated that the size of the middle class in Africa south of the Sahara was around 114 million people in 2015 (Kharas 2017). An Ipsos study using criteria related to disposable income, education, and employment finds that around 60 percent of urban residents in 10 surveyed cities in western, eastern, and southern Africa are members of the middle class (van Blerk 2018). Despite differences in definitions as well as uneven income distribution across the continent, many studies agree that Africa has a growing population with more assets and disposable income, which is in turn driving the demand for more varied nutritious and processed foods (Deloitte 2013; Signé 2020; van Blerk 2018).

Finally, the growth of the agro-processing sector is likely to be stimulated by the continent's youth bulge, with its rapidly changing diet patterns. The continent's youth population is expected to continue growing throughout the remainder of the century and to more than double from its current levels by 2055. In 2015, 226 million youth ages 15–24 were living in Africa, accounting for 19 percent of the global youth population. By 2030, it is projected that the number of youth in Africa will have increased by 42 percent (UN DESA Population Division 2015). Between 10 and 12 million young people are expected to enter the African labor market each year over the next decade (AfDB 2016). Agro-industries are also likely to benefit from a more educated, younger population that meets their skill needs.

The Increased Role of Processed Foods

Growing populations, urbanization, and rising incomes are leading to strong increases in overall food demand. The World Bank has estimated that Africa's combined food and beverage markets will triple in value from US$313 billion in 2013 to US$1 trillion by 2030 (World Bank 2013). The demand for staple foods is estimated to be increasing by nearly 5 percent annually due to increases in the number of urban dwellers (Tasamba 2020).

In addition to increases in the volume of food demanded, these developments are also leading to profound changes in the composition of demand. Diets in Africa, particularly among higher-income and urban residents, are shifting away from staples and toward higher-value foods, including animal products, fruits and vegetables, and sugars. In addition, the time pressures associated with urban lifestyles have led to increased demand for faster-to-prepare processed foods that often contain high amounts of sugar, salt, or fat (Hollinger and Staatz 2015).

These changes are taking place across a broad spectrum of consumers. A study in eastern and southern Africa found that purchased and processed food shares rise with income, but that these foods are commonly consumed, even among the poor (Tschirley et al. 2015a). In Ethiopia, the share of processed cereals in food expenditures increased over time and from lower- to higher-income groups (Hassen et al. 2016). These trends are expected to continue: Tschirley and colleagues (2015a) estimate that the share of processed foods will increase to constitute 79 percent of diets by 2040 (Table 2.1). The high value-added processed food category, which includes vegetable oils, dairy, ready-to-eat products such as bread, and food away from home, is expected to show the largest increase in consumption, accounting for nearly half of diets by 2040.

TABLE 2.1—ESTIMATED DIETARY SHARES OF PROCESSED FOOD CATEGORIES, EAST AND SOUTHERN AFRICA (PERCENT)

	Unprocessed	Processed low value-added	Processed high value-added
2010	29.9	32.7	37.4
2040	21.4	30.0	48.6

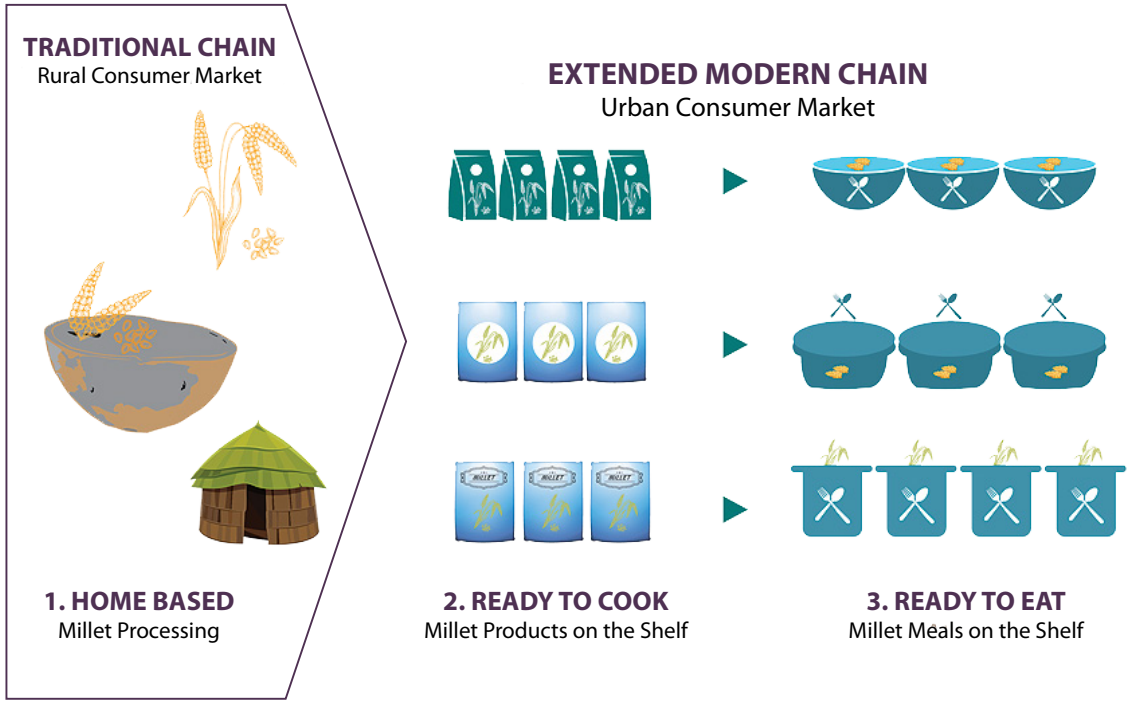
Source: Based on Tschirley et al. 2015a.

Growth in demand for perishable, high-value, and processed foods is leading to changes within food value chains, including increased length and complexity of value chains, sharp increases in the volume of food handled, and rapid growth in the number of firms investing in midstream segments, including processing and packaging (Reardon et al. 2015). Figure 2.4 shows the extent of the transformation of staples value chains, based on the example of the millet value chain in Senegal. Until recently, the chain hardly went beyond the first stage, where millet grown on the farm was milled in a neighborhood mill and the flour was processed in the household into various products for home consumption or sales in the same neighborhood. The chain was so short that most of these products were hardly ever found outside of the main millet production areas, leading to a continuous decline in millet consumption, not just in the capital city of Dakar, but also in other larger cities, including some near or inside the main production areas. In the 1980s and 1990s, several projects and other efforts at the National Institute of Food Technologies developed and extended new processing and conservation technologies, laying the foundation for the emergence of a millet processing industry. The second stage of the chain, which consists of bringing branded flour and other ready-to-cook derivatives to urban markets, started in the early 2000s. The third stage, with a range of ready-to-eat meals, is currently in the middle of a rapid expansion (Badiane and Ulimwengu 2017).

Similar changes in the length and complexity of value chains are occurring across the continent, as local foods, including traditional staples, become increasingly available in processed forms in urban markets. Urban retail inventories carried out in Mali, Ghana, and Tanzania have documented the presence of domestic and regional processed products based on local staples (for example, fermented milk products, fufu flour, maize flour, and plantain chips) alongside processed products imported from outside the continent (Andam et al. 2015; Snyder et al. 2015; Thériault et al. 2017).

The lack of disaggregated data on economic activities in many countries makes it difficult to quantify growth in the agro-processing sector, but observers have noted the proliferation of small and medium enterprises processing local staples and other crops across the continent in recent years (Hollinger and Staatz 2015; Reardon et al. 2015). While manufacturing plays a relatively small role in African economies, as much as half of total manufacturing is likely constituted by the agro-industrial sector, which handles the transformation of farm outputs into food and nonfood products (ECOSOC 2017). In turn, food and beverages account for at least half of agro-industry in many African countries (Woldemichael et al. 2017). Analyses of UNIDO data presented in later chapters of this volume suggest that employment, output, and labor productivity in the food and beverage manufacturing sector are growing in most countries with

FIGURE 2.4—LENGTHENING OF THE MODERN MILLET VALUE CHAIN IN SENEGAL



Source: Badiane and Ulimwengu (2017).

available data (see chapter 5) and that the sector's share in total manufacturing output is increasing significantly in many countries (see Table 6A.2 in chapter 6).

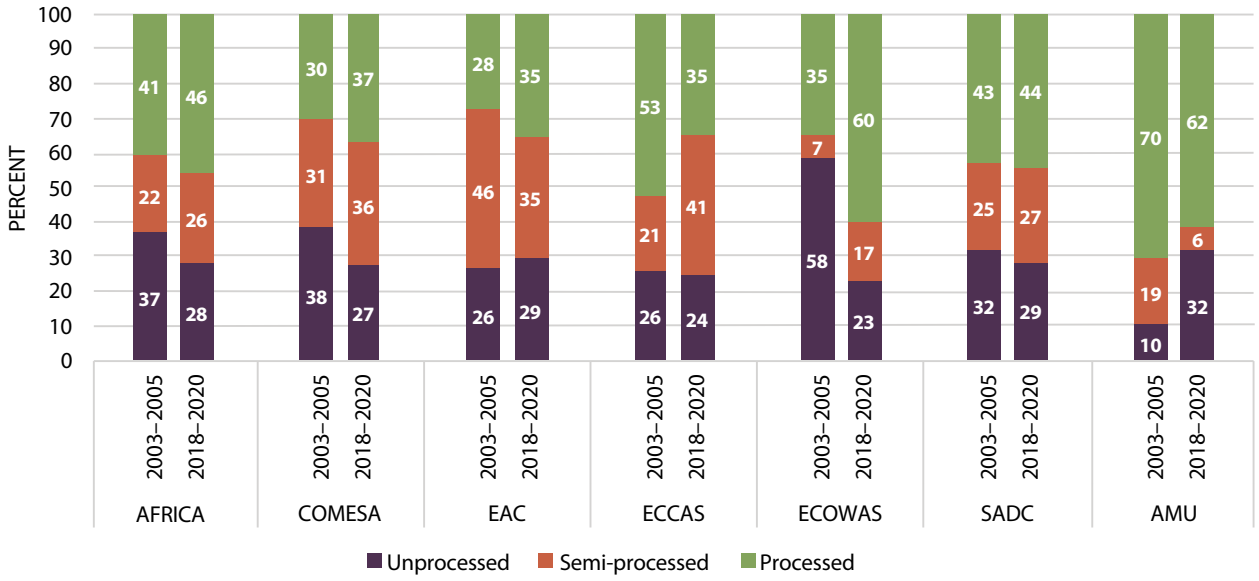
Recent analyses of employment data also suggest that the agro-processing sector is expanding. A study of recent employment changes in nine African countries found that employment in agro-processing and other nonfarm agrifood system segments is growing rapidly, although from a low base (Yeboah and Jayne 2016). Tschirley and colleagues (2015b) project sectoral employment changes to 2040, based on expected changes in food demand, for a group of six eastern and southern African countries. They predict rapid growth in employment in off-farm segments of the agrifood system, with an employment share rising from 8.0 percent in 2010 to 11.2 percent in 2025 and 13.5 percent in 2040. Food away from home will show the strongest growth among off-farm agrifood sectors, followed by food manufacturing.

In their study of youth employment opportunities in three countries, Allen and colleagues (2017) estimate that over the next five years, off-farm agrifood jobs will account for 18–22 percent of new jobs in Tanzania, 18 percent in Nigeria, and 11 percent in Rwanda. The number of food manufacturing jobs is expected to grow between 12 and 20 percent in these three countries.

Regional trade patterns reflect the increased levels of production and consumption of processed foods. Although processed agricultural products exported outside of the continent remain low, the share of processed products in intra-African agricultural trade is significant and has risen markedly in the past two decades. During the 2003–2005 period, processed and semi-processed products accounted for 63 percent of intra-African agricultural exports; this share rose to 72 percent in the 2018–2020 period (Figure 2.5). Of Africa's major regional economic communities, the Economic Community of West African States (ECOWAS) showed the largest share of processed and semi-processed intra-African exports in 2018–2020, as well as the largest increase in the share of processed exports between the two periods. It appears that African markets provide more attractive destinations for locally processed products than for unprocessed products: in 2019, 53 percent of Africa's total exports of processed agricultural products were traded within the continent, while less than 10 percent of unprocessed agricultural exports were (Goundan et al. 2022; Goundan and Tadesse 2021).

Despite the increased role of domestic and regional processed products in African markets, much untapped potential remains for local producers and processors to reach expanding urban markets. Imports from outside of the continent supply large shares of the demand for processed food. For example, in Bamako, Mali, imported milk powder represents more than two-thirds of dairy consumption, despite consumer preferences for fresh and local milk

FIGURE 2.5—COMPOSITION OF AGRICULTURAL EXPORTS TO AFRICA BY PROCESSING STAGE



Source: Goundan et al. (2022)

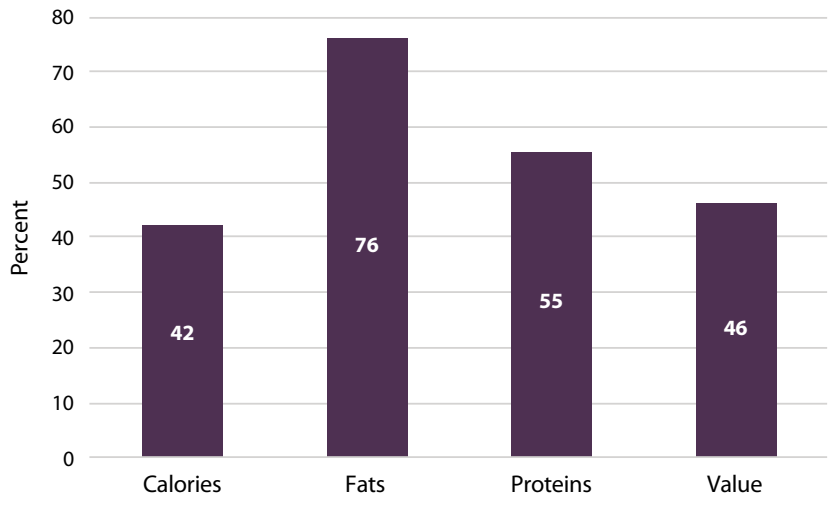
Note: COMESA = Common Market for Eastern and Southern Africa; EAC = East African Community; ECCAS = Economic Community of Central African States; ECOWAS = Economic Community of West African States; SADC = Southern African Development Community; AMU = Arab Maghreb Union.

(Vroegindewey et al. 2021). Focus groups in Lagos, Nigeria and Accra, Ghana revealed that urban consumers prefer local foods, but often choose imported products due to the need for quicker and more convenient foods. As stated by a student participant in Accra, "Time is the main factor in deciding what to eat, price is next" (Hollinger and Staatz 2015, 179). In many cases, issues with the packaging and presentation of locally processed food items, as well as concerns over food safety and quality, led consumers to purchase imported products.

The increased availability and consumption of processed foods is associated with impacts on nutrition that are complex and require attention to craft future growth strategies for the agrifood industries. Changing diets can both mitigate undernutrition and exacerbate growing issues of overnutrition. For example, Demmler and Qaim (2020) found that greater consumption of processed foods associated with supermarket shopping in Kenya led to higher rates of obesity and overweight in adults, but reduced undernourishment in children. Casari and colleagues (2022) found that urban diets in Burkina Faso were associated with higher rates of overweight and obesity but lower rates of undernutrition and child malnutrition. In some cases, processing can expand the availability of healthy foods. The time constraints associated with urban lifestyles mean that many consumers cannot carry out the time-consuming traditional home processing of local staples. Combined with a reduced physical workload from increasingly deskbound economic activities, this means that obesity levels have increased at a much faster rate than reductions in undernutrition (WHO 2016). Processed ready-to-cook or ready-to-eat products based on local staples and without excessive added levels of sugar, salt, or fat can allow consumers to incorporate nutritious choices that would not otherwise be available.

Processed foods comprise a wide range of products with greatly varying nutritional content. Further research will be required to characterize the health implications of processed foods and differentiate between types of processed foods produced in Africa, based on their ability to contribute to healthy diets. At the aggregate level, initial analysis by Goundan and colleagues (2022) suggests that processed agricultural products traded within Africa differ in nutritional content from unprocessed products. As shown in Figure 2.6, while processed products account for 46 percent of the total value of intra-African agricultural exports and a similar share of total calories, they are relatively rich in protein and particularly in fats, representing 76 percent of total fats traded with Africa. The high fat content of processed foods presents increased risks of overweight, obesity, and noncommunicable diseases. As the dietary transition continues, attention needs to be paid to strategies that harness the potential of processing to increase the availability of healthy foods while addressing the significant risks of contributing to growing health issues.

FIGURE 2.6—SHARE OF PROCESSED PRODUCTS IN INTRA-AFRICAN AGRICULTURAL TRADE, 2018–2020 (MEASURED IN NUTRIENT CONTENT AND VALUE)



Source: Authors, based on Goundan et al. 2022

The nutritional content of processed products depends on product composition, processing technology, and the food system regulatory environment. Africa is still near the beginning of a surge in the growth of its processing sector. As the sector matures and formalizes, norms and standards can be developed—and firms can be supported to acquire the capacities to adhere to them—to mitigate the health risks of processed foods and maximize the sector's contribution to healthy diets.

Diets across the continent have changed markedly and are continuing to do so. Unprocessed produce will feature less prominently in diets, particularly in the more affluent urban areas and among the growing middle class. It is only through competitive and well-performing processing sectors that African smallholders will be positioned to capture larger shares of the fast-growing urban demand.

Future commercialization strategies must be based on this recognition—how to do so successfully is the focus of the next section.

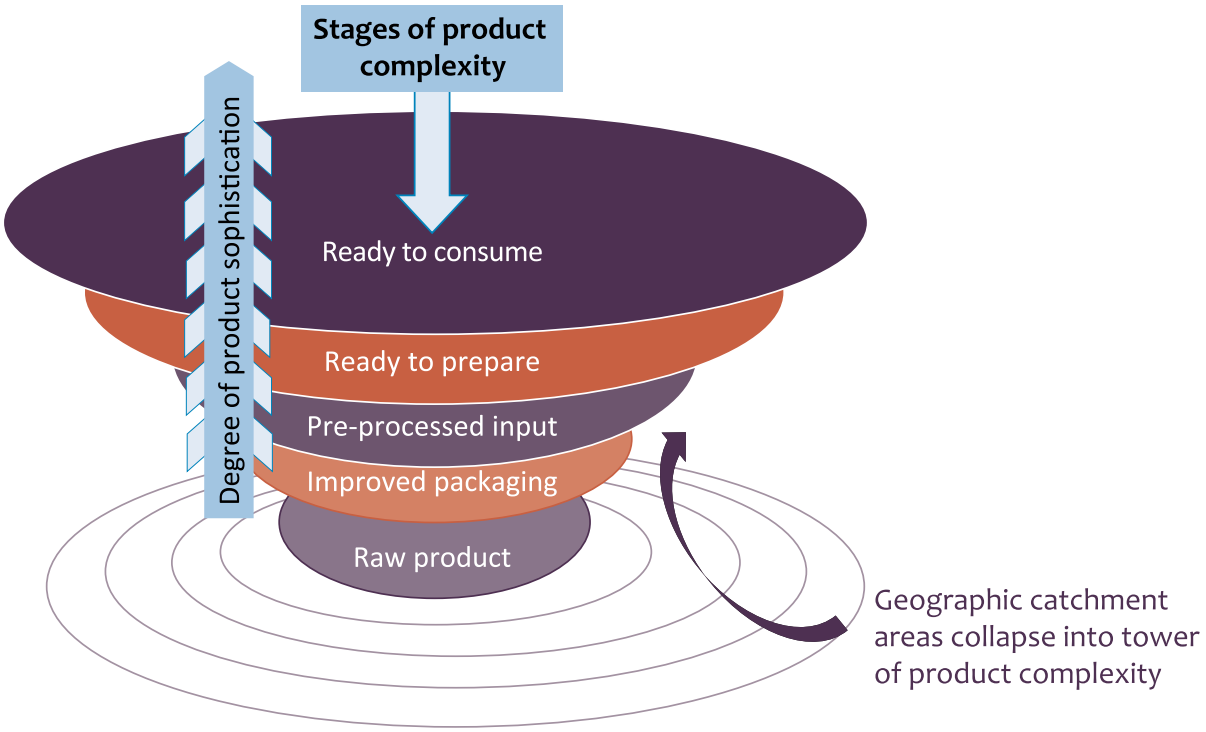
Commercialization Strategies in the Context of Transforming Value Chains

The transformation of African staples value chains has triggered a profound change in the type of demand facing Africa's producers. There is increasingly less of a place in diets, and in urban markets, for the unprocessed agricultural products supplied by smallholder farmers. Yet, as in the past, development ambitions require countries to sustain efforts to raise rural incomes and generate the same local multiplier effects by overcoming the new types of demand constraints facing smallholder farmers. The solutions to these demand constraints no longer involve expanding the geographic catchment area (see Figure 2.1). Rather, to capture larger shares of rapidly growing domestic markets, they call for increasing the processing of produce supplied by smallholder farmers to generate the more sophisticated products demanded by urban consumers.

Figure 2.7 illustrates how, in the context of transforming value chains and shifting demand to higher-value products, geographic catchment areas collapse into product complexity stages. Rather than moving products to more extended geographic areas further from the farm, products must be moved from their original forms to those that are ready to consume: preprocessed for input, ready to prepare, or ready to eat. Each stage of product sophistication depicted in the figure brings the produce from rural production areas closer to the form in which it is finally purchased and consumed in urban markets.

In this new context, the degree of product sophistication determines the new supply chain boundaries. Market expansion happens not just by reaching distant consumers, but by entering new markets through incremental transitions to more sophisticated products. The demand constraint is less a matter of spatial distance and more a matter of product sophistication. The volume of smallholder output that can ultimately reach urban markets is now determined by the processing sector's capacity to competitively produce and supply products with higher degrees of sophistication. Thus, policies to promote innovative and competitive processing sectors are central to modern strategies to commercialize smallholder agriculture.

FIGURE 2.7—COMMERCIALIZATION IN THE CONTEXT OF TRANSFORMING VALUE CHAINS



Source: Authors (2022).

The evolution of millet consumption in Senegal demonstrates the processing sector's key role in enabling producers' access to urban markets. From the 1990s until 2010, millet consumption experienced a sharp decline, both in terms of absolute consumption per capita as well as share of cereals consumption. The millet value chain then embarked on a process of rapid transformation by introducing a variety of new ready-to-cook and ready-to-eat millet products (see Figure 2.4). These advances in product sophistication led to increased consumption of millet, especially among higher-income urban residents (Box 2.1). Although traditional commercialization strategies, including improved transport and market infrastructure, have played important roles in enabling value chain expansion, the expansion of millet into urban markets was only possible through the intervention of the processing sector and the creation of new value-added products to meet the needs of urban consumers.

The rise of the millet processing sector has reversed declining trends in millet consumption, not just in urban areas but, more strikingly, among richer urban households. As Table 2.2 shows, the per capita consumption (49.5 kilograms) of processed millet alone in 2018 is slightly higher than the national average of millet consumption (48.9 kilograms) in 2009. More importantly, per capita consumption of unprocessed millet, a traditional staple formerly consumed predominantly in rural areas, is currently higher among the upper two quintiles than among the bottom two. The share of millet consumption among high-income earners (upper two quintiles) is now close to 30 percent, compared to 32 percent for imported rice. The introduction of more sophisticated millet products has opened up urban markets to smallholder producers, raising demand for millet and boosting prices in local markets, with expected associated changes in incomes.

Across Africa, there are similar stories of how the development of the processing sector has expanded consumption of local crops. For example, processing teff into ready-to-eat versions is associated with increased consumption in Ethiopia. Teff is a key crop for farm income and food security in Ethiopia; it was estimated to constitute 20 percent of all cultivated areas in Ethiopia in 2011/12, generating almost US$500 million in income per year for Ethiopian farmers. Teff is primarily used for producing injera, a traditional staple pancake (Minten et al. 2016a). A study by Minten and colleagues (2016b) found that while many households continue to prepare their injera at home, commercial injera markets are growing quickly in Ethiopia. As a share of total expenditure on teff, expenditures on injera spiked between 1996 and 2011, from 6.8 percent to 34 percent, respectively. During the same period, the amount of teff consumed also increased from 25kg per capita per year to 29kg, with the share of injera rising from 8 to 24 percent. Minten and colleagues also found that the wealthier urban population is primarily buying and consuming injera in a ready-to-eat form. This indicates that as Ethiopia's cities and middle class continue to grow and the food service industry develops (including hotels and restaurants), the ready-to-eat injera market is set to continue expanding. Formal export markets for injera are also expanding, accounting for US$10 million in

TABLE 2.2—ANNUAL CEREAL CONSUMPTION BY INCOME QUINTILE, SENEGAL (2017/2018)

	Income (in CFA francs/capita)									
	1st quintile [15,834–176,935]		2nd quintile [176,947–267,369]		3rd quintile [267,385–382,103]		4th quintile [382,110–579,781]		5th quintile [580,307–9,729,004]	
(in kg/capita)	kg	share	kg	share	kg	share	kg	share	kg	share
All cereals	119.0	100%	156.7	100%	177.1	100%	205.8	100%	290.4	100%
Millet (unprocessed)	25.5	21%	25.3	16%	28.4	16%	26.1	13%	33.3	11%
Millet (processed)	12.0	10%	22.3	14%	25.8	15%	40.0	19%	49.5	17%
Maize (unprocessed)	9.4	8%	11.8	8%	12.5	7%	13.0	6%	16.8	6%
Maize (processed)	5.9	5%	7.6	5%	9.2	5%	12.0	6%	14.9	5%
Sorghum (unprocessed)	3.2	3%	2.4	2%	2.1	1%	2.1	1%	4.4	2%
Sorghum (processed)	1.9	2%	1.4	1%	1.6	1%	1.5	1%	0.8	0%
Fonio	0.2	0%	0.2	0%	0.2	0%	0.2	0%	0.5	0%
Local rice	26.5	22%	41.5	26%	43.8	25%	53.0	26%	78.1	27%
Imported rice	34.1	29%	43.7	28%	53.3	30%	58.0	28%	92.2	32%

Source: Ulimwengu et al. 2020.

BOX 2.1—THE ROLE OF MILLET PROCESSING IN SENEGAL

Millet is one of the main cereals grown under rainfed agriculture in Senegal, in addition to sorghum and maize. It is the major agricultural staple in Senegal and covers 42.9 percent of total harvested areas. Millet and sorghum represent 69 percent of the area planted with cereals. They are grown either in continuous pure cultivation in box fields, in rotation with groundnuts, or as a mixed crop with cowpea. The main production regions are in the center (Groundnut Basin) and the south of the country (Casamance, Tambacounda). Millet holds a prominent place in Senegal's food security strategies. It has long been the daily food staple for rural populations, despite a notable breakthrough of rice in dietary habits. However, millet consumption had been in decline, falling from 78.0 kilograms per capita in 1990 to 48.9 kilograms per capita in 2009. The share of millet in cereal consumption thus dropped from 42 percent in 1990 to 25 percent in 2008. However, this share remained above 70 percent in the Groundnut Basin area and in the southeast region of Tambacounda. Despite this downward trend, the introduction of mills and equipment to process small quantities of millet greatly facilitated the preparation of millet-based foods in rural areas and fueled consumption in urban areas, among both wealthier segments of the population and in food-deficit rural towns (Faye and Gueye 2010). Expanded supply and greater accessibility of processed products, both ready-to-cook as well as ready-to-eat, has reversed declining trends in millet consumption.

La Société d'Exploitation des Céréales Africaines du Sénégal (SECAS) (formally La Vivrière) is a Senegalese microprocessing company created in 1992 by a female farmer. All its products, which are marketed under the brand name WIIW ("Bravo" in Wolof), are based on millet, maize, and cowpea, the most widely grown and consumed crops in Senegal and across West Africa. In 1996, due to growing demand for its products, SECAS started mechanizing the processing segment to increase its daily production capacity. In replacing small-scale artisanal milling, which used domestic cooking utensils, family labor, and manual millet processing, 80 percent of the most strenuous tasks were gradually mechanized through the use of dryers and mills. Furthermore, the packaging and labeling of manufactured products were changed significantly, moving from unprinted polyethylene bags to printed, and then multilayered, packaging and product-specific cardboard cases that use barcodes and other commercial information to comply with international trade standards. Initially, products were sold door to door, but now they can be found in supermarkets and at wholesalers and retailers across the country. Some products are also exported to Europe, the United States, and Asia (Malabo Montpellier Panel 2018).

Source: Badiane et al. 2020

exports per year in 2016 (Minten et al. 2016b), suggesting additional opportunities to expand the teff processing sector beyond the domestic market.

Fonio, another traditional staple in West Africa, is also becoming increasingly accessible due to processing technologies. As a reserve crop consumed during hungry seasons, fonio plays an important role in contributing to food security (Vall et al. 2011). It is also a highly nutritious food rich in protein, calcium, and iron, and it does well in low-input conditions and with limited water (Fanou-Fogny et al. 2011). However, fonio is very time consuming to prepare, which limits its consumption. In Burkina Faso and Guinea, urban households interviewed in 1999 were found to eat relatively little fonio; a large majority of households stated that they wished to consume fonio more often but were limited both by its high monetary cost and preparation time (Konkobo-Yaméogo et al. 2004). Although recent quantitative studies on fonio consumption are scarce, anecdotal evidence suggests that fonio consumption in West Africa is rising as processed ready-to-cook forms become more available (Djigo 2019; Sandali 2022).

In addition to traditional supply chain functions that expanded geographic catchment areas and advanced commercialization, a host of new, more complex functions are needed to promote market expansion and facilitate commercialization amid transforming value chains. These new functions are necessary not to bring farm products physically closer to consumers, but rather to bring them closer to the form demanded by consumers. These new functions include a series of operations ranging from cleaning and grading to the various stages of processing, from preprocessed inputs to ready-to-cook and ready-to-consume products. They also include packaging, branding, distribution, and finally, adherence to food safety requirements and other norms and standards demanded by consumers.

The additional demands on supply chains and their expanded functions call for concerted efforts, through policy and investments, to build the capacity of the agro-processing sector and other midstream value chain segments to handle greater volumes and

thus increase smallholder producers' access to consumer markets. Traditional commercialization policy areas, such as transport and market infrastructure, remain essential, but interventions to facilitate the maturation and growth of processing enterprises have increased in importance, in areas including technology acquisition, innovation capacity, access to capital, technical and managerial skills development, norms and standards, intellectual property, and competition policies. Success in developing these areas will determine the processing sector's capacity to serve as a bridge between smallholders and growing consumer markets—and thus its ability to contribute to increased incomes and better livelihoods. The next section looks more closely at strategies to boost the ability of processing firms to play this role.

Agro-industrial Policies and Smallholder Commercialization

The processing sector has become an essential link between producers and consumers, alleviating demand constraints and enabling smallholders' access to markets. Increasingly, urban food demand can only be transmitted to smallholders through the intervention of the processing sector. The processing sector's capacity to acquire and transform agricultural outputs is thus a key bottleneck in advancing commercialization. In this section, we discuss major policy and investment areas to promote the growth and development of processing firms and to strengthen their contribution to smallholder commercialization.

Like the manufacturing sector overall, Africa's food processing sector is characterized by a small number of large firms with relatively high labor productivity and a profusion of lower-productivity informal micro and small firms (Hollinger and Staatz 2015; Snyder et al. 2015; Soderbom 2011). Small firms face significant barriers to formalizing and growing, including a lack of skills, high costs, and limited access to land and capital (Hollinger and Staatz 2015). Despite these challenges, small and medium enterprises (SMEs) often account for the largest market shares of processed products (Tadesse and Badiane 2020). The dominance of SMEs, as well as their important role as a source of employment and income, calls for a strong policy focus on their needs to boost the capacity of processing sectors and contribute to overall growth.

The main strategic challenge is ensuring that the emerging processing sector successfully transitions from a situation with a large and increasing number of small enterprises that produce low-quality goods with low and declining profits to a situation in which enterprises can improve product quality, expand operations, raise profitability, and become more competitive in and capture a larger share of urban markets. SMEs in developing countries have been observed to pass through the phases shown in Table 2.3 (Badiane and McMillan 2015; Sonobe and Otsuka 2011). In the first phase (initiation), local enterprises produce products for domestic markets by using primarily adopted foreign technologies. In the case of the emerging agribusiness enterprise sector, this typically involves introducing new processes, sometimes mechanized, to produce and distribute traditional foods outside of the household setting through specialized enterprises.

TABLE 2.3—PHASES OF INDUSTRIAL DEVELOPMENT AND POLICY PRIORITIES

Phase	Innovation, imitation, and productivity growth	Institutions	Policy priorities and actions
Initiation	Imitation of foreign technology and production of low-quality products	Internal production of parts, components, and final products	1. Incubation hubs to facilitate early-stage experimentation and connection to the private sector and investors 2. Markets to lower transaction costs 3. Vocational training to improve management practices 4. Infrastructure: roads, communication, and electricity to lower operating costs
Quantity expansion	Entry of numerous followers, imitation of imitated technologies, and stagnant productivity	Gradual development of market transactions and formation of industrial cluster	
Quality improvement	Multifaceted innovations, exit of noninnovative enterprises, and increasing productivity and exports	Reputation and brand names, direct sales, subcontracts or vertical integration, and emergence of large enterprises	5. Knowledge transfer from abroad, industrial zones, access to credit, and intellectual property

Source: Based on Sonobe and Otsuka (2011), Badiane and McMillan (2015), and Malabo Montpellier Panel (2019).

Once a new product or business successfully appears in local markets, a large and rapidly growing number of imitators and new entrants copy it, applying the same technology and producing the same goods for these local markets.

Most, if not all, staple food processing value chains are currently in the initiation phase or are about to enter the next phase of quantitative expansion. In quantitative expansion, the number of enterprises and supply of products rapidly increases, leading to a progressive decline in profitability. Without innovation in production technology and improved business practices, the number of enterprises continues to rise and profits decline. This inevitably leads to a large concentration of low-productivity, persistently small enterprises, with no capacity to grow or create well-paying jobs.

If countries fail to escape the trap of the quantity expansion phase and enter the quality improvement phase, the process of successful industrialization—in which some enterprises consistently succeed in improving product quality, raising profitability, and growing in size—grinds to a halt. In this third and last phase of quality improvement, a critical mass of enterprises acquire the required capabilities for multifaceted innovations through adequate investment in capital and human resources. These capabilities involve innovation in product quality, production methods, internal management, sales, and marketing. During the transition to this phase, enterprises that are incapable of innovating will be forced to exit, leading to a reduction in the proliferation of firms, an increase in average firm size, and increased profitability. These are all conditions for sustained enterprise growth, employment generation, wealth creation, and poverty reduction.

As shown in the last column of Table 2.3, key short- and medium-term interventions to promote the growth of processing enterprises include policy and institutional innovations and related investments. These will: (1) help entrepreneurs acquire the required skills and tools to improve product marketing and capture a large share of the urban food demand, and (2) create learning opportunities to improve technical and management practices, particularly including ready access to vocational training. These interventions can help soften the downward pressures on sales, prices, and profits during the quantity expansion phase.

A successful transition into the quality improvement phase will require more targeted policy and regulatory interventions to promote and enforce quality norms and standards, and property rights protections to encourage in-firm innovations. Countries will also have to invest in vocational training infrastructure to mainstream the upgrading and development of skills along the agribusiness value chains, including advanced training in quality control, marketing, accounting, labor management, and basic engineering theory and practice. At the beginning of the quality improvement phase, efforts to facilitate learning from abroad are particularly important, as well as importing and adapting foreign technologies through research and training from more advanced economies (particularly recently industrialized ones). At this stage of the enterprise development process, emerging constraints will include access to credit to finance growth, property rights to stimulate innovation, and access to reliable and cost-effective power supplies.

Strategies to promote enterprise growth and maturation at different stages of industrial development should be tailored to the particular needs of agrifood processing firms in order to strengthen the competitiveness and capacity of the processing sector. Firms operating in emerging domestic or regional food value chains, such as millet, teff, or cassava, are confronted by high marketing costs, rapidly changing diet preferences, and relatively unstructured markets. Policy interventions should seek to increase the capacities of firms to navigate these challenges through skills development and support for collective action. In addition, greater policy attention should be paid to as-yet undeveloped value chains that could potentially grow if efforts were made to create, harness, and transmit demand to producers. Table 2.4 details specific policy priorities for local and regional value chains in Africa at the nascent, emerging, and developed stages.

To empirically verify the effectiveness of proposed policy interventions (Table 2.4), Tadesse and Badiane (2020) assess the impact of these interventions on the performance of secondary processors in Senegal's millet value chain. To do so, they estimate the average treatment effects of several interventions on the level and growth of installed processing capacity. They find that start-up and on-the-job training, as well as participation in collective action, positively affects processors' capacity. However, incentive interventions related to financial support, including commercial and noncommercial loans and gifts, do not show any significant impact. This suggests that for emerging value chains such as millet, institutional interventions are more important and effective than incentive-based interventions.

In terms of impacts on growth, start-up training appears to be more important in boosting capacity and accelerating growth than any other intervention,

TABLE 2.4—POLICY PRIORITIES FOR REGIONAL AGRIFOOD INDUSTRY DEVELOPMENT

Value chain groups	Value chain characteristics	Agro-industrial strategies	Priority policy interventions
Yet-to-develop regional value chains	Value chains that have high potential regional demand, but the demand has not yet been created *Examples: orphaned food staples, traditional beverage crops*	Enhancing upstream production and downstream demand creation through support for small and medium-sized traders	Technical support to producers, incentives for business start-ups, and infrastructure to create demand
Emerging regional value chains	Value chains with regionally and locally specific demand; increasing production/producer price trends; expanding processing and distribution sectors; a growing supply of ready-to-cook and ready-to-eat food products; and increasing exports to expatriate communities *Examples: teff, millet, cassava*	Supporting small and medium-sized midstream processors to help them add value, innovate, and differentiate their products to meet rapidly changing diet preferences and capture a higher share of growing urban demand	Training for product and firm-level process innovation, collective action for market and technology access, and development of safety and quality standards
Developed regional value chains	Regional value chains that are well developed and industrialized, with large, formal cross-border transactions Value chains of this type are still emerging in Africa. *Example: regional dairy value chains in southern Africa*	Supporting integration of the regional value chain through elimination of cross-border barriers, demand creation, and branding	Institutional support for collective action by chain actors, competition policies, and access to regional private service providers

Source: Based on Tadesse and Badiane (2020) and Sonobe and Otsuka (2011).

with more significant impacts from vocational training than training in marketing, product development, or business strategy. This suggests that at the start-up level, vocational training is more effective than other types of skills development interventions. These findings confirm the importance of prioritizing policy interventions according to the value chain transformation trajectory, as well as by the characteristics and growth stages of enterprises in individual value chains. This is because the performance and needs of processing firms vary as these conditions change between value chains.

Efforts to strengthen the competitiveness of processing firms through vocational training, technical support, and other interventions will enable them to be more effective conduits between producers and consumers, thus helping to alleviate the demand constraints limiting smallholder commercialization. Although greater attention to the processing sector is essential, traditional approaches to connecting smallholders to markets through better infrastructure and institutional arrangements remain important, as do efforts to address the supply and productivity constraints that hamper smallholders' ability to engage with markets. While smallholders need the processing sector for their outputs to reach consumers, processing firms also need a consistent and reliable supply from farmers to operate efficiently, profitably, and sustainably.

Policy action is required to increase smallholder productivity through access to inputs, information, and technology; enhance the stability of production through climate-smart varieties; strengthen smallholders' ability to meet product quality standards demanded by consumers or required by retailers; and provide a conducive institutional environment to link smallholders with processors through vertical integration, contract farming, producer cooperatives, or other arrangements. For example, the dominance of smallholder producers in Kenya's dairy industry has been partly enabled by collective action through cooperatives that provide marketing services and facilitate access to inputs, as well as publicly supported initiatives to increase productivity through high-yielding breeds (Njagi 2022). Throughout the continent, efforts to enable smallholders to provide a reliable, sufficient, and high-quality supply will increase the competitiveness of processing firms, which in turn will protect their ability to sustain demand for smallholder produce.

Conclusion

Despite improved economic growth in the 2000s and 2010s, Africa still faces challenges in addressing persistently high rates of poverty and hunger, especially in rural areas. Agricultural commercialization, which increases the participation

of farmers in markets and value chains, provides benefits that include expanded employment opportunities and livelihoods. In turn, this creates incentives to invest in technology and raise productivity, boosts economywide growth, and reduces poverty and hunger. Farmers' incomes are limited by the extent of demand for their produce, and the challenge of commercialization lies in overcoming demand constraints to allow farmers' output to reach consumers.

Traditionally, the demand for smallholder produce has been constrained by the physical distance between producers and consumers. The problem of commercialization was thus largely a matter of removing institutional and infrastructural barriers to moving produce from rural production areas to urban consumption centers. The remoteness of many producers, the distance between production and consumption areas, and the insufficiency of transport infrastructure meant that there was a strong correlation between geography and barriers to markets. Thus, commercialization efforts focused on strategies to overcome geographic limitations and expand market catchment areas.

In recent years, Africa's food systems have begun a transformation that presents new challenges for commercialization. New developments including rapid urbanization, accelerated economic growth, and an expanding middle class have caused fundamental changes in demand patterns, with significant implications for smallholder commercialization strategies. Physical distance is no longer the main barrier separating smallholder producers from urban consumption centers. Rather, the main source of the demand constraint is the difference in the nature of the products produced by smallholders—unprocessed agricultural outputs—and those demanded by a growing share of consumers—more sophisticated, processed, ready-to-cook, or ready-to-eat products. The challenge of commercializing smallholder agriculture has therefore become less about transferring produce from rural production areas to urban consumption markets and more about transforming it into the very products being demanded by urban consumers.

In the past, commercialization policies mainly focused on the performance and competitiveness of the domestic marketing sector, including transport and market infrastructure as well as market information, due to the sector's role in overcoming the constraints presented by physical distance. Today, commercialization policies need to overcome demand constraints differently, by increasing the processing sector's capacity to transform farm produce into the types of products demanded by consumers.

The demand for smallholder produce now derives from the processing sector, and the level of this demand is determined by the processing sector's capacity to meet the needs of urban consumers and capture a growing share of urban food demand. Successful commercialization in this new context depends on the performance and competitiveness of the processing sector. Amid rapidly transforming value chains, agricultural commercialization strategies thus require a paradigm shift in policy design and implementation: policies and strategies to facilitate the growth of processing firms should not be seen as merely beneficial to the processing sector, but rather as essential to enabling smallholder commercialization in the context of transforming food systems. In this chapter, we have highlighted the cases of millet, folio, and teff, though other smallholder sectors face similar commercialization opportunities and challenges. Examples include the pigeon pea sectors in Malawi and Mozambique or the cashew nut sectors in Mozambique and Tanzania.

In order to strengthen the processing sector's capacity to meet its potential as a conduit between smallholders and consumers, policymakers should focus on enabling SMEs to increase innovation and productivity. Strategies should be designed according to stages of sectoral enterprise development and should consider the challenges and needs of individual value chains. In particular, skills development interventions to help managers engage in process and product innovation and support for collective action can help firms in emerging food value chains to overcome growth constraints. In turn, productive and competitive processing sectors with the capacity to fully transmit growing consumer demand will offer increased income and growth opportunities for smallholders.

CHAPTER 3

The Dynamics of Africa's Fruit and Vegetable Processing Sectors

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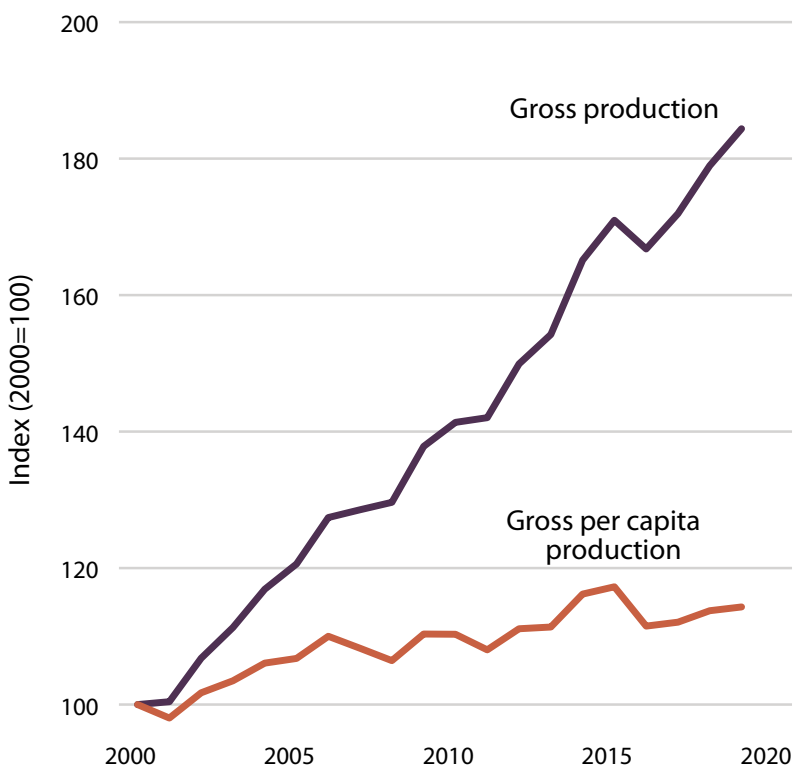
Introduction

The production of fruits and vegetables (F&V) in Africa has increased 3.3 percent annually during the last 20 years, but only 0.7 percent in per capita terms (FAOSTAT 2022; Figure 3.1). Africa has the lowest per capita production and consumption of F&V in the world, although South Africa, Morocco, and Egypt are large producers and exporters.

FIGURE 3.1—INDEX OF GROSS PRIMARY FRUIT AND VEGETABLE PRODUCTION IN AFRICA, 2000–2020



Source: Data from FAOSTAT database (accessed March 20, 2022). http://www.fao.org/faostat/en/#data
Note: 2000 = 100.

Key characteristics of the F&V sector in Africa (and elsewhere) are that production is mostly small-scale (Wakholi et al. 2015) and that most produce is traded while fresh rather than processed. F&V often have specific soil and climate requirements in order to grow, and production therefore tends to be concentrated in the most suitable locations, making trade important. Because produce is highly perishable, domestic and intraregional trade is usually more extensive than international trade, except for the trade of tropical fruits such as bananas and pineapples, for which there is a significant export market.

F&V are high in value and can turn a significant profit for farmers. However, the commercial production of F&V is often not a realistic option for smallholder farmers with inadequate means of production and lack of access to a reliable market outlet (Schreinemachers, Simmons, and Wopereis 2018). Infrastructure is a significant challenge for Africa's F&V trade. Large distances between F&V producers, processors, and consumers, as well as poor road conditions and a lack of refrigerated transportation, result in high transportation costs and losses, in addition to high risk for the traders involved. Postharvest losses for F&V in Africa south of the Sahara amount to 56 ± 25 percent for fruit and 44 ± 17 percent for vegetables. These percentages can be reduced in principle to 25 ± 16 percent and 11 ± 14 percent, respectively, using various types of interventions (Affognon et al. 2015).

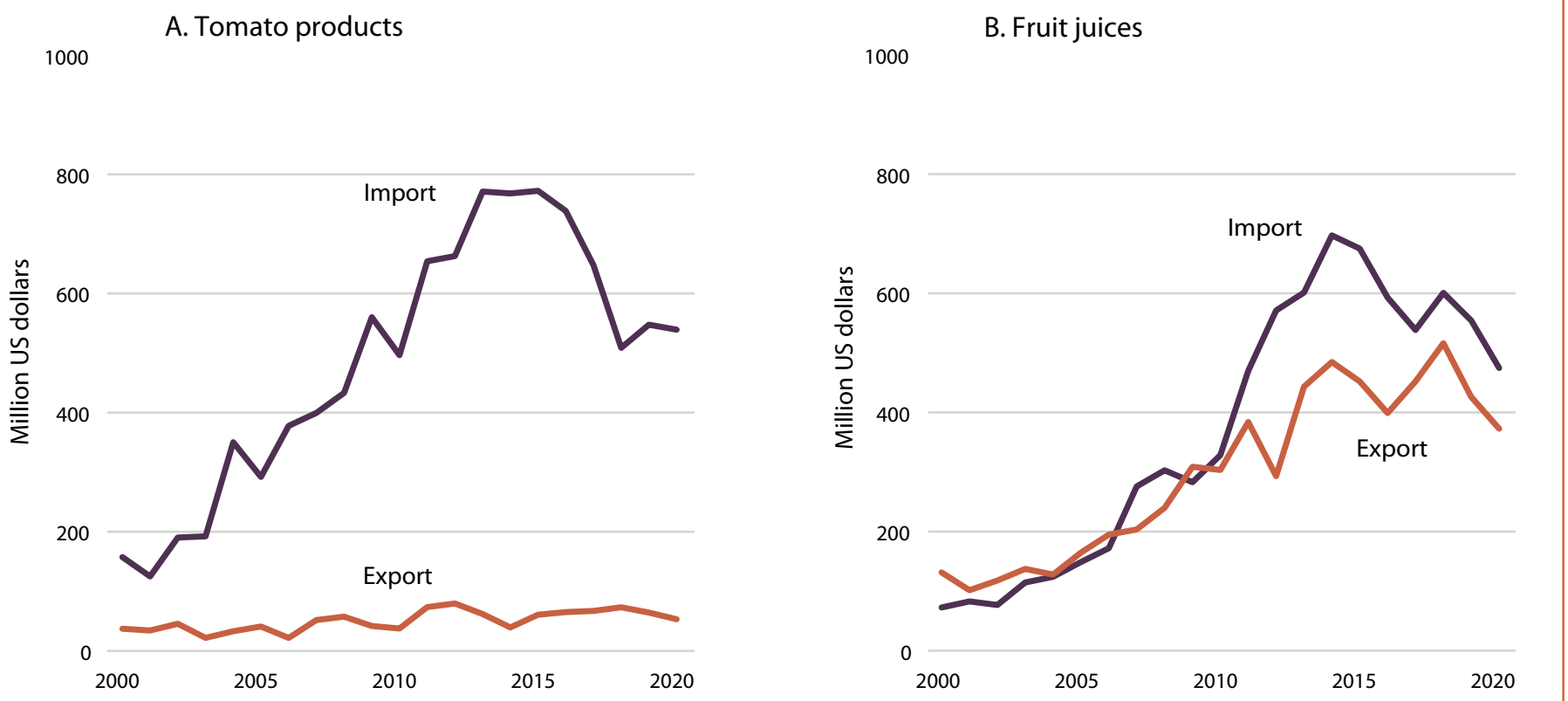
Africa, however, is also the fastest urbanizing continent, and because consumers and markets concentrate in cities, marketing and logistics become easier. Urbanization is associated with shifting behavior in consumer consumption: modern retail (e.g., supermarkets, grocery stores) and packaged foods grow in importance, and there is higher consumer demand for fresh and safe food. These shifting patterns create opportunities for smallholder farmers in peri-urban areas to supply urban markets and to add value through processing and targeting higher-value market segments.

While most F&V are consumed fresh, processing is nevertheless important, and the market for processed products is likely to expand. Processing methods range from artisanal practices such as simple open-air solar drying and fruit juice extraction to the industrial-scale production of fruit juices, jams, and tomato sauces. Many countries in Africa do have a tradition of F&V processing, but most of it is artisanal. Increased industrial processing is likely, as consumers increasingly demand convenience food and food products that meet food safety standards (Reardon et al. 2021).

The market for processed foods is growing rapidly in Africa, but most of it is for ultra-processed snack foods and beverages, while F&V play a minor role (Reardon et al. 2021). The consumption of ultra-processed snack foods and beverages alongside other dietary behaviors and lifestyle factors has contributed to an increase in overweight and obesity, which have increased in Africa from 28 percent of the adult population in 2000 to 42 percent in 2016 (WHO 2018), adding another dimension to Africa's long-standing challenges with hunger and micronutrient deficiencies. To address Africa's nutritional challenges, it will be important to provide consumers with a wider range of healthy food options that combine convenience and hygiene with good nutrition.

In light of these recent trends, the objective of this chapter is to describe the development of Africa's F&V processing sectors. This chapter uses a case study approach, because data are very limited. For instance, FAOSTAT (the statistical database of the Food and Agriculture Organization of the United Nations) has data on primary tomato production, but not on processing, except in the trade domain, which has data on the import and export of tomato products (paste,

FIGURE 3.2—IMPORT AND EXPORT VALUES OF TOMATO PRODUCTS (A) AND FRUIT JUICES (B) FOR COUNTRIES IN AFRICA FROM 2000 TO 2020, IN CURRENT US DOLLARS



Source: Data from FAOSTAT database (accessed March 20, 2022). http://www.fao.org/faostat/en/#data

peeled, juice) and fruit juices (concentrated, single-strength) (FAOSTAT 2022; Figure 3.2) but does not show how much is processed and consumed domestically. These trade data do confirm that Africa imports substantial amounts of tomato products and fruit juice concentrates, although these imports appear to drop after 2015.

We selected four case studies that are relatively well-documented in the literature. These include three formal, relatively structured supply chains—tomato processing in Nigeria and Ghana, fruit juice production across Africa, and pineapple processing in West Africa—and one less formal supply chain—the drying of African leafy vegetables in Kenya and Tanzania. These supply chains are certainly not limited to the countries and regions indicated; for instance, there is also a tomato processing industry in North Africa, and leafy vegetables are commonly processed across Africa, but the focus on specific countries and regions allows for more concrete descriptions of the challenges and opportunities faced. For each case study, we executed rapid literature reviews, focusing on the challenges, opportunities, and policy environment of each supply chain.

Case Studies

Tomato Processing in Ghana and Nigeria

Background: Tomatoes are the fourth most economically valuable food crop produced in low- and middle-income countries, after rice, sugarcane, and wheat (Schreinemachers, Simmons, and Wopereis 2018). Every country in Africa produces and consumes tomatoes. In West Africa, tomatoes (along with onions) are a key ingredient for many local dishes that are consumed daily (Awan et al. 2012). However, mean tomato yields are low in Cameroon, Ghana, and Nigeria, West Africa's largest tomato producers (Table 3.1). Tomato production in Nigeria fell sharply from 2016 to 2017 because of drought and a large-scale infestation

TABLE 3.1—TOMATO PRODUCTION AND TRADE IN TOMATOES AND TOMATO PRODUCTS FOR AFRICA'S 10 LARGEST TOMATO PRODUCERS, MEANS, FROM 2018 TO 2021

Country	Tomato yield (tons/ha)	Tomato production at farmgate value (million US$/year)	Export value (million US$/year)		Import value (million US$/year)	
			Fresh tomatoes	Tomato products	Fresh tomatoes	Tomato products
Nigeria	4.3	1,342.2	0.0	0.4	0.3	71.2
Mozambique	26.3	740.1	0.0	0.0	1.6	1.6
Algeria	60.0	696.5	0.2	0.1	0.0	34.7
Egypt	39.1	664.9	43.7	11.8	0.1	10.3
Cameroon	12.4	640.5	0.1	1.3	0.0	9.5
Kenya	24.1	468.9	0.1	0.1	1.4	2.9
Ghana	7.8	340.3	0.0	8.3	1.2	46.8
Morocco	91.2	314.3	740.0	11.0	0.1	11.9
Malawi	21.7	312.3	—	—	0.1	0.1
Niger	26.3	310.7	0.0	3.1	0.1	7.7
Africa	13.7	6,883.4	854.1	57.4	36.3	516.0

Source: Data from FAOSTAT database (accessed March 20, 2022). http://www.fao.org/faostat/en/#data
Note: — = data not available.

of the invasive South American tomato pinworm (*Phthorimaea absoluta*, also known as *Tuta absoluta*). Tomato production is also highly seasonal, and market gluts are common even in countries that produce too little to satisfy local demand. Processed tomato products are, therefore, economically important, and concentrated tomato paste, as well as canned tomato (peeled, diced, or puree), is an important globally traded commodity. The world's five largest tomato processors are China, Italy, Spain, Turkey, and the United States (California), with China and Italy dominating the international trade in tomato products.

Processed tomato products are not ideal from a nutritional point of view, because they can be high in sugar and salt, and low in micronutrients. However, tomato paste is often used as the basis for preparing a wide range of vegetable and meat dishes in West Africa and elsewhere. Therefore, the availability of tomato (and onion) is important to make other vegetables palatable, and its contribution to a healthy diet should not be underestimated, even though fresh tomatoes have a higher nutritional value than processed.

From 2018 to 2020, Africa produced about US$6.9 billion worth of fresh tomatoes per year (measured at farmgate value), imported $0.6 billion of mostly tomato products, and exported $0.9 billion of mostly fresh tomatoes (nearly all from Egypt, Morocco, and Tunisia) (FAOSTAT 2022). Nigeria and Ghana, along with Libya, are Africa's largest importers of tomato products by value. Both Ghana and Nigeria have large-scale processing plants built with foreign aid in an attempt to replace imported tomato products with locally produced and processed tomatoes.

Challenges: In Ghana and Nigeria, an inadequate and unstable supply of low-cost tomatoes caused by low yields, the seasonal nature of production, and tomato varieties unsuitable for processing due to low Brix values (a measure of total soluble solid content) limit local processing of tomatoes. Tomato production is generally rainfed and small-scale, and tomato farmers prefer to sell to the highest bidder rather than supply a processing plant with tomatoes on contract. Processing plants are therefore unable to acquire enough produce when market prices are high and cannot process tomatoes year-round.

Large processing plants remain idle because they are unable to source the raw material they need; they also face additional challenges, such as access to loans, the high cost of packaging, high operating costs, and unstable power sources (Boamah and Sumberg 2019). In Ghana, the Wenchi and Pwalugu tomato processing and canning factories were built with foreign aid in the 1960s but closed in the 1980s (Robinson and Kolavalli 2010). In Nigeria, the Dangote tomato processing facility is no longer functional because the raw materials that can feed the plant's capacity of 1,200 metric tons per day are not available (*Bloomberg News* 2021). Foreign companies have invested in processing plants that use imported tomato concentrate from Italy and China, to which water, starch, and seasoning are added to produce tomato sauces popular on the local market. Processed tomato products, however, either imported or locally produced, are often of poor nutritional value.

Opportunities: Small-scale processors are often better able to acquire fresh tomatoes from the market than are larger plants, and they are also more flexible in producing a range of processed products in addition to tomato products. In northern Nigeria, women largely control a cottage industry for tomato processing: they take advantage of aggregation and innovation, such as using social media marketing and establishing a network of consumer clients to whom they supply their products, as a unique way of organizing supply and processing. The introduction of improved production practices (improved varieties, irrigation, and protected cultivation) could raise yields substantially and expand tomato production into the off-season, thereby stabilizing supplies. These improved practices would also facilitate the adoption of dual-purpose tomato varieties (i.e., tomatoes with sufficiently high Brix values that are suitable for fresh consumption as well as for processing). For instance, the Tomato Jos company in the state of Kaduna in northern Nigeria produces tomato paste locally and has contracted around 3,000 farmers, for the potential to cultivate 300 hectares of irrigated land (Caleb Ibukun Olanipekun, personal communication with the company).

Policy environment: The value of Nigeria's imports of processed tomato products peaked at $220 million in 2013 (FAOSTAT 2022). In 2017, the government raised import tariffs on tomato concentrate from 5 percent to 50 percent and introduced a levy of $1,500 per ton of tomato concentrate (*Daily Trust* 2021). These measures led to a rapid decline of imports, from $180 million in 2017 to $95 million in 2018 and $48 million in 2020 (FAOSTAT 2022). At the same time, mean tomato yields have not increased over the past 20 years and were just above 4 tons per hectare from 2016 to 2020 (FAOSTAT 2022) because production was heavily affected by an infestation of the South American tomato pinworm. While a tariff may be necessary to prevent foreign companies from dumping excess supplies of tomato concentrate in West Africa, it is also important to promote

the productivity of local farmers and, ideally, the consumption of fresh tomato as well. The issue of imports should be addressed at the level of regional economic communities, as there is extensive regional trade in tomatoes and tomato products.

Fruit Juices Across Africa

Background: Fruit nectars or juices are commonly consumed across Africa (Ogiehor and Nwafor 2004; Ngadze, Verkerk, and Nganga 2017). In West Africa, people prefer to drink traditional juices such as tamarind (*Tamarindus indica*), monkey bread or baobab (*Adansonia* sp.), roselle (*Hibiscus sabdariffa)*, and monkey orange (*Strychnos spinosa*) juice. In southern Africa, traditional juices include sand apple (*Parinari curatellifolia*) and marula (*Sclerocarya caffra*) juice. Data on fruit juice consumption in Africa are very limited, in part because a lot of the production is artisanal. However, the consumption of industrially processed and packaged juices is growing in line with global trends. Worldwide, orange juice is the most consumed juice, accounting for 42 percent of total juice consumption by volume (Tetra Pak 2016).

Artisanal juice production is common in various parts of Africa. For example, in Morocco, an estimated 200 million liters of juice are consumed annually, with 77 percent made by artisanal producers (Sylla 2020). In some rural areas of Zimbabwe, reports show that up to 40 percent of households produce juice as a source of additional income (Ngadze, Verkerk, and Nganga 2017). In Senegal, 70 percent of roselle juice (locally called "bissap") is made by artisanal producers (Cissé 2010), who usually plant roselle to demarcate the borders of their fields. Some larger companies in Senegal, such as Kirène and Laiterie du Berger, produce traditional juices using industrial methods (Cissé 2010). South Africa is Africa's biggest producer of fruit juices, with about 25 percent of all fruit juices imported by African countries originating from South Africa (FAOSTAT 2022). In 2021, the country processed 100 million tons of fruit into juice (South African Fruit Juice Association 2021).

From 2010 to 2020, African countries imported more fruit juices than they exported, although the difference is not large (Figure 3.2B). Only Côte d'Ivoire, Egypt, Kenya, South Africa, Tunisia, and Uganda are net exporters of fruit juice. Pineapple juice concentrate and orange juice (single-strength and concentrate) are the most important exports. South Africa and Kenya together account for 85 percent of the continent's export of pineapple juice concentrate, while South Africa accounts for 70 percent of the continent's export of orange juice concentrate and 52 percent of the export of single-strength juice (followed by Egypt, with 19 percent) (FAOSTAT 2022). In terms of imports, apple and grape juice concentrates represent 25 percent and 20 percent of Africa's import value of fruit juices, respectively. South Africa is the main importer, and some of its imported grape and apple juice is shipped from there to other countries in Africa. However, while Brazil processes 70 percent of its orange production, South Africa and Egypt process just 17 and 10 percent of their production, respectively (Neves, Trombin, and Marques 2020).

Challenges: The global trade in fruit juice concentrates is highly competitive. In Africa, farmgate selling prices for fresh fruits are often too high to make industrial juice production profitable. For instance, according to the Citrus Growers Association of South Africa, the price offered by exporters of fresh oranges was 20 times the price offered by local processors in the 2019/2020 season (CGA 2020). In Morocco, reports show that imported fruit juice is 50 percent cheaper than locally produced fruit juice (Sylla 2020).

Hygiene is very important in juice production, and there can be serious health risks to consumers if processing methods are not hygienic. The use of pasteurization and cold storage is essential to ensure food safety but is often not guaranteed in artisanal fruit juice production. The lack of stable power sources in rural areas is a major challenge for the development of the juice processing industry.

While fruit juice can be an important source of micronutrients, it can also contain high amounts of sugar, and factory-packaged juices may contain only a small fraction of actual fruit juice. High fruit juice consumption can therefore be a contributing factor to overweight and obesity (O'Neil, Nicklas, and Kleinman 2010; Ruxton and Myers 2021).

Opportunities: The African juice market has expanded by more than 65 percent over the past decade. African consumers are also becoming more aware of the importance of food quality and food safety. For small-scale producers able to meet food safety requirements, this growing awareness offers the opportunity to develop specific products for the local market, such as premium juice, freshly squeezed juices, and traditional juices. Small- and medium-sized companies can achieve quality only through training in good hygiene practices and the use of appropriate equipment.

African countries export mostly fresh fruits (as well as fresh tomatoes in Morocco and Egypt), but processing presents an opportunity to increase the value of fresh fruit. It appears essential to introduce specialized varieties suitable for processing in order to develop a fruit juice industry. The organization of farmers into producer groups (clusters or cooperatives) is also important for reducing costs: processors would no longer have to deal with thousands of small-scale producers.

Policy environment: Because most fruit juice processing remains small-scale and artisanal, African countries have not created dedicated policies in an attempt to expand the sector. Morocco is an exception: the Moroccan government has stimulated local processing of citrus fruits through improved access to financing and promotion. Currently, there are a dozen Moroccan producers of fruit juice, of which four use local produce, while the others import fruit juice concentrates (Sylla 2020).

Pineapple Processing in West Africa

Background: Pineapple accounts for about 20 percent of the world's tropical fruit production and is the second most cultivated tropical fruit after banana. Globally, the fresh pineapple industry has grown about 6 percent per year since 2000 (ITC 2019). In 2019, West Africa earned about $66.9 million from fresh pineapple exports to the European Union. Nigeria is the region's largest producer, followed by Ghana, Benin, Côte d'Ivoire, and Togo. Global pineapple markets shifted to the variety MD2 in the late 1990s and early 2000s: this variety is preferred for export because of its long shelf life. Exports from West Africa almost collapsed because growers there produced sweeter but much more perishable varieties (e.g., Smooth Cayenne, Baronne de Rothschild). The MD2 variety accounted for roughly 90 percent of all pineapples grown in the Economic Community of West African States (ECOWAS) in 2014 (ITC 2021), but traditional varieties have regained some popularity in local and regional markets. For instance, Benin produces mostly the *Pain de Sucre* (Sugarloaf) variety, which is popular in West Africa. Processed pineapple products include juice, canned pulp, fruit jellies, marmalades, fruit purees and pastes, and dried pineapple. For these products, juice extraction appears to be the main type of processing.

Challenges: Pineapple, like most other fruit, is highly perishable, and processing is one way to extend its shelf life. Processing is carried out at the artisanal, semi-industrial, and industrial scales. Artisanal processors represent the largest group, but their processing capacity is low. Artisanal and semi-industrial processors are often family-run businesses or village-level cooperatives that buy fresh pineapple directly from farmers or market vendors and target local markets and occasionally regional markets. Industrial-scale processors often produce below their capacity (60 percent below capacity) due to a lack of raw material (European Commission 2020). They target domestic, regional, and international markets.

Regardless of the scale of processing, a key challenge is the lack of fresh product supply throughout the year. Other challenges include the lack of availability of varieties suitable for processing, high production costs and low productivity, a lack of well-organized cooperatives and access to loans, limited market information, and a lack of processing and packaging equipment as well as of refrigerated storage and transportation. Artisanal and semi-industrial processors are usually not certified, which limits their access to regional and international markets (LEADD 2016).

Opportunities: There is increasing demand for fresh pineapple and pineapple products in regional and international markets. There is also a growing market for certified processed foods (von Braun and Pandya-Lorch 2020). Development partners are involved with the pineapple sector in Benin, and processors can tap into this network to upgrade their processing units, develop business networks that include all value-chain actors, get trained and certified, and as a result, seize market opportunities.

Policy environment: There are some current efforts toward product certification in West Africa, but there is still a lot to do in terms of policy and quality standards. Most countries have no dedicated food safety agency that provides oversight to the pineapple processing industry. In Benin, for instance, only a few processing companies have Hazard Analysis and Critical Control Points (HACCP) or International Organization for Standardization (ISO) certifications (Desclee, Sohinto, and Padonou 2021). *Pain de Sucre* pineapple from the Allada Plateau in Benin became the first protected geographical indication at the African Intellectual Property Organization in 2021. This designation is a step in the right direction, but more policy involvement and support along the value chain is required.

Traditional African Vegetables in Kenya and Tanzania

Background: Spider plant (*Chlorophytum comosum*), amaranth (*Amaranthus* spp.), African nightshade (*Solanum nigrum*), African eggplant (*Solanum aethiopicum*), jute mallow (*Corchorus olitorius*), cowpea leaves (*Vigna unguiculata*), slenderleaf (*Crotalaria brevidens*), sweet potato leaves (*Ipomoea batatas*), and pumpkin (*Cucurbita moschata*) are traditional African vegetables (TAVs) commonly grown and consumed in Kenya and Tanzania (Ayenan et al. 2021). In Tanzania, amaranth and sweet potato leaves are the most popular, while in Kenya, the most popular are cowpea and African nightshade leaves. These vegetables are both resilient and nutritious, and have received much interest among health-conscious urban consumers. TAVs also have the potential to improve environmental sustainability by contributing to agrobiodiversity and strengthening climate resilience among farmers (Mwadzingeni et al. 2021). They are generally better adapted to local growing conditions and require fewer external inputs than exotic fruits and vegetables like pineapples and tomatoes, which are usually produced in monocrop systems. However, the production of TAVs can be highly seasonal, and market prices fluctuate greatly.

Processing can reduce such price fluctuations while increasing overall supplies and adding value for smallholder farmers and traders. There is a tradition of processing TAVs in East Africa, but the share that is processed is currently small. Weinberger and Pichop (2009) estimated that 2.1 percent of Kenyan farmers and 14.5 percent of intermediaries process TAVs. Basic processing carried out by farmers and traders includes washing, plucking the leaves from the stalks (destalking), chopping, grading and sorting, and blanching—typically achieved by wrapping the vegetables in a cloth and dipping them in hot water for two to five minutes before rapidly cooling them. According to Okello and colleagues (2015), more than 88 percent of consumers in Kenya are willing to pay more for cleaned, sorted, and graded fresh cowpea leaves, while 35 percent and 25 percent of consumers, respectively, prefer destalked and chopped vegetables over unprocessed vegetables. The use of open-air sun drying is also common across Africa south of the Sahara (Kazosi et al. 2021), as is drying in the shade using passive or active air circulation (Mekhilef, Saidur, and Safari 2011). More recently, solar dryers have been introduced to dry vegetables more efficiently and consistently than shade drying (Wakholi et al. 2015).

More advanced methods of processing can include cooling, fermentation, freezing, and processing into powdered vegetables. Cooling and refrigeration are currently applied only in supermarket value chains. Fermentation using lactic acid is practiced to a small extent, but there are health concerns if not executed properly (Wafula et al. 2016). Freezing involves blanching and vacuum packing the vegetables into polythene bags. There is also a tradition in Kenya and Tanzania of using powdered vegetables to prepare soups or stews (e.g., as a bouillon), or to fortify maize or millet flour. Onyango and Imungi (2007) documented the use of powdered vegetables with sesame (simsim) to make healthy snacks in Kenya, including *simshade* (a mixture of nightshade and sesame), *simco* (cowpea and sesame), and *simama* (amaranth and sesame) snacks. Such processed snacks are still being tested and are not yet widely available, despite evidence that wealthier urban consumers are willing to pay for such products (Tepe, Benali, and Lemken 2021). Ingredients that have minor effects on taste and appearance are regarded more positively than those that alter food products more notably (Wanyama et al. 2019).

Challenges: African leafy vegetables are often considered a poor man's food: people generally prefer starchy staples, meat, and imported vegetables, resulting in low consumer awareness of the nutrition and health benefits associated with local leafy vegetables. This perception has changed among wealthier urban consumers, but consumption of African leafy vegetables nevertheless remains low. Although there is much potential for processing these vegetables, currently most processing remains small-scale and artisanal. The link between producers and consumers is not organized, prices are volatile, and compliance with food safety standards is low. Some processing options have low consumer acceptance; for instance, a study in Kenya showed that 44 percent of consumers were not willing to pay for frozen cowpea leaves, and 70 percent were not interested in frozen vegetables in general (Okello et al. 2015), indicating the need to create awareness of the nutritional value of frozen vegetables.

Opportunities: There is increasing interest in TAVs, particularly among wealthier consumers in cities. Kenya and Tanzania are uniquely placed to take advantage of the domestic and regional markets expanding through their ports and centralized locations. There is great potential to increase the production and processing of TAVs in Kenya and Tanzania, which could improve the use of vegetable processing units. More than 90 percent of agricultural produce in the two countries is sold unprocessed. Value added in TAVs remains largely untapped,

though it is key to remember that from a nutritional point of view, TAVs are best eaten fresh with minimal processing.

Policy environment: Government policy objectives in Kenya and Tanzania are geared toward ensuring that all citizens have an adequate, diverse, and healthy diet through improved storage and processing of food commodities, including vegetables. However, research efforts, extension services, policies, and subsidies largely ignore TAVs, and mainly target staples and F&V meant for export.

Discussion

In Africa, only a small portion of F&V is processed, and fresh produce is clearly the most important part of the market. This is positive from a nutritional point of view since fresh produce is healthier. However, the F&V supply is characterized by seasonality, low productivity, and high postharvest losses, which undermine the potential of F&V to contribute to improved economic and nutrition outcomes. Processing can help to stabilize market supplies, add value, and reduce postharvest losses while creating employment. Processing can also make F&V more acceptable to consumers interested in convenience, though it may compromise the nutritional value of F&V. However, the F&V processing industry in Africa is still largely artisanal, with a few exceptions.

Current policies appear geared toward two main objectives: (1) substituting imports of tomato paste and fruit juice concentrates, and (2) increasing the export of fresh and processed F&V. We found very little evidence of policies geared toward exploiting the potential of processing to improve farmers' incomes and consumers' health. TAVs are particularly low on policymakers' priority lists, despite their nutrition and health benefits, which often exceed those of exotic vegetables; however, processing of TAVs (washing, destalking, chopping, sorting, and blanching) is so limited that it can hardly be considered processing. Data on F&V processing for domestic and regional markets are scarce; therefore, a good overview of how much is currently processed and how this sector is developing is lacking. Better data collection to inform policy decisions in this area is therefore essential.

African consumers are increasingly purchasing processed food (Reardon et al. 2021), and F&V are not an exception. The case study on tomato processing shows that the local processing industry has difficulty taking advantage of this opportunity due to fierce foreign competition and the relatively high cost of local production. Local processing plants use imported tomato concentrate from China and Italy rather than buy fresh tomatoes from local farmers, who are seeing their markets dwindle as a result.[1]

More local tomato processing could have tremendous benefits, including reduced carbon emissions from a shorter value chain, the creation of local jobs, and more income opportunities for farmers. Strong policy support will be necessary to take advantage of these opportunities. The key challenge will be improving the competitiveness of the local processing industry. Nigeria is an interesting example: the Nigerian government has taken some bold steps to improve competitiveness. The effect of the country's restrictions on imported tomato paste on the local processing industry, farmers, and consumers remains to be analyzed. However, such import tariffs must be accompanied by farm-level interventions that help farmers adopt better technologies to increase the stability of the tomato supply and the quantity of tomatoes suitable for processing as well as for fresh consumption.

The case study on TAVs shows that processing of these vegetables is relatively rare and mostly artisanal. From a nutritional point of view, TAVs are best eaten fresh. However, there is increased interest in using TAVs in processed products in East Africa. Given the multiple nutritional and environmental benefits of TAVs, it is important to seize this momentum. Tepe, Benali, and Lemken (2021) showed that while fresh TAVs were consumed mostly among elderly, poorer, and rural populations, processed TAVs enjoyed greater acceptance among younger, wealthier, and urban consumers. They argued that there is a need for carefully designed marketing strategies to ensure that marketing messages also reach the poorest population groups and those most affected by malnutrition. Interestingly, Tepe, Benali, and Lemken (2021) found that graphic information on nutrition and/or shelf life was not helpful in creating additional demand. Women and rural consumers were more reluctant to buy processed products than younger, male, and urban consumers. Promoting a greater diversity of locally processed F&V may enable niche markets to flourish and may provide access to a wider range of nutrients. Ready-to-cook, cut F&V, specifically leafy vegetables, and vegetable

1 Two documentary films on this subject are worth watching: *The Empire of Red Gold* (2017) by Jean-Baptiste Malet and Xavier Deleu, based on a book of the same title by Jean-Baptiste Malet and produced by Java Films; and *Displaced—Tomatoes and Greed—The Exodus of Ghana's Farmers* (2019) by Elke Sasse, produced by Deutsche Welle. Both films are publicly accessible on the Internet.

powders may have a lot of potential in urban markets. However, promoting these products requires an integrated approach focused both on stimulating supply and demand and on guaranteeing traceability and food safety, which is supported by adequate policies and actions.

The reduction of postharvest losses through processing will have direct environmental benefits, but processing may also lead to increased use of plastics for packaging and increased energy use for storage and processing. Renewable packaging materials and energy sources are available but still not always competitively priced.

It is also important to ensure that processing preserves the nutrition and health benefits of F&V. This goal requires adaptive research to evaluate the retention of nutrition and health benefits in various targeted processed products. Tepe, Benali, and Lemken (2021) pointed out that government support of F&V processing should be directed toward preserving nutrients in the final products.

Conclusion

Africa's F&V processing industry is in its infancy, but urbanization and income growth are creating opportunities to add value to F&V through processing. Current policies appear geared toward stimulating exports and substituting imports but should focus on making processing locally produced F&V more competitive in order to target domestic and regional markets for the benefit of local farmers and consumers. For tomatoes in West Africa, the focus has historically been on large-scale, public-sector processing plants, which have not been successful. Smaller-scale processing plants with more flexible production lines may be more suitable for partnering with groups of local farmers to create stable input supplies of tomatoes suitable for processing. In East Africa, current policies are largely silent on TAVs, and all processing is small-scale and artisanal. Given the clear environmental, nutrition, and health benefits of TAVs, it is important to prioritize processing with a focus on the growing urban markets for these products.

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CHAPTER 4

An Overview of Meat Processing in Africa

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Introduction and Scope of Chapter

Relative to the literature on live animal production and trade, research on the meat processing sector in Africa is particularly sparse. This belies a sector that is increasingly dynamic, driven by changing demand patterns, evolving marketing channels, and population growth. This chapter aims to redress some of the research gaps by piecing together available data from countries south of the Sahara, combined with a series of case studies, to illustrate the rapid changes that are taking place within the sector. Our analysis focuses on meat as an end product only and does not consider other products derived from animals, notably dairy, where a significant literature exists (particularly in East Africa), and by-products such as hides and skins. We also highlight many of the important constraints affecting the sector to raise awareness of critical policy issues and draw attention to the integrated nature of animal end products alongside livestock production.

Overview of Production and Trade in Meat Products

Over the last two decades, meat production on the African continent has almost doubled, from 11.59 million metric tons in 2000 to 19.88 million metric tons in 2020 (Figure 4.1a). The continent now accounts for nearly 6 percent of global meat production, up from 4.5 percent in 2000 (Figure 4.1b). This change in global share is due in part to a reduction in the cattle herds of Oceania (mainly Australia), North America, and Europe (in Europe, this has been partly driven by a reduction in meat demand as well). Figure 4.1c disaggregates African meat production in 2020 by different livestock types. Poultry is the largest source of meat production in Africa, with 6.8 million metric tons produced in 2020. Beef and buffalo meat and sheep and goat meat are the second- and third-largest meat categories, with 6.2 million and 3.4 million metric tons produced, respectively.

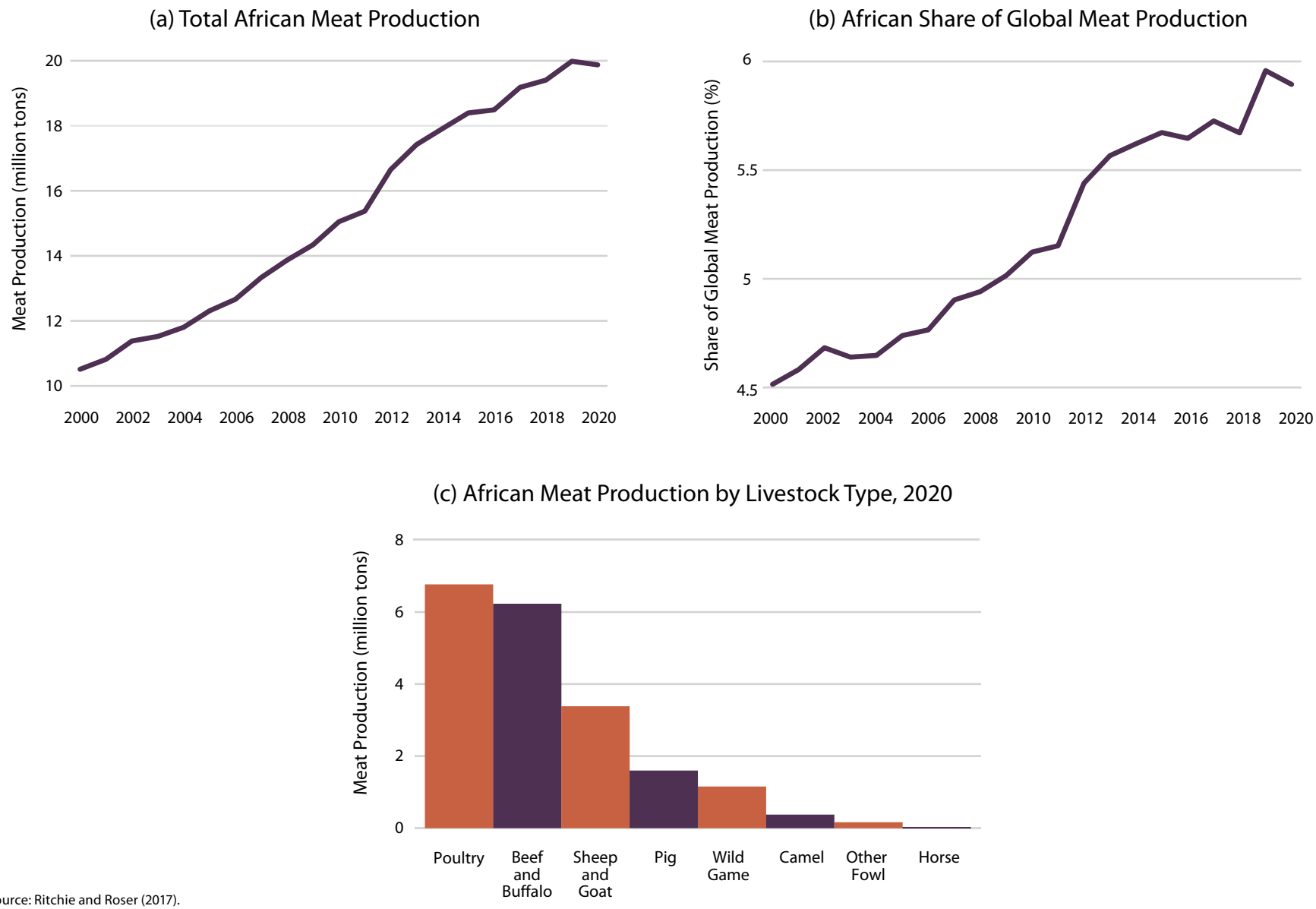
Meat production and productivity vary widely across the continent (Figure 4.2). South Africa is the largest producer of beef and poultry, with 1 million and 1.9 million metric tons of production, respectively. It is the second-largest producer of pig meat, with 0.3 million metric tons of production. South Africa is also the most productive cattle producer, with a yield of 231 kilograms per animal; the most productive pig meat producer, with a yield of 86 kilograms per animal; and one of the most productive poultry producers, with a yield of 1.94 kilograms per bird.

Outside South Africa, other top cattle producers include Egypt and Kenya, with around 0.5 million metric tons of production each and animal yields of 314.6 kilograms per animal and 108.5 kilograms per animal, respectively. Top poultry producers outside South Africa include Egypt, with 1.5 million metric tons of production and meat yields of 1.4 kilograms per bird, and Morocco, with 0.9 million metric tons of production and meat yields of 1.4 kilograms per bird. The two largest pig meat producers are Nigeria and South Africa, with about 0.3 million metric tons of production each. Within this sector, South Africa tends to compete at the intensive margin, with animal yields of 86 kilograms per head. Nigeria is less competitive at the intensive margin, with meat yields of only 45 kilograms per head, but dominates at the extensive margin, with a herd of 8 million animals.

Per capita meat consumption in Africa has risen from 15.65 kilograms per capita in 2000 to 19.01 kilograms per capita as of 2017. However, as of 2017, African meat consumption per capita is still less than half the global level of 43.22 kilograms per capita. On the African continent, meat consumption is highest in Gabon (59.2 kilograms per capita) and South Africa (60.0 kilograms per capita). Ethiopia and Nigeria have the lowest per capita meat consumption, at 5.4 kilograms per capita and 7.1 kilograms per capita, respectively.

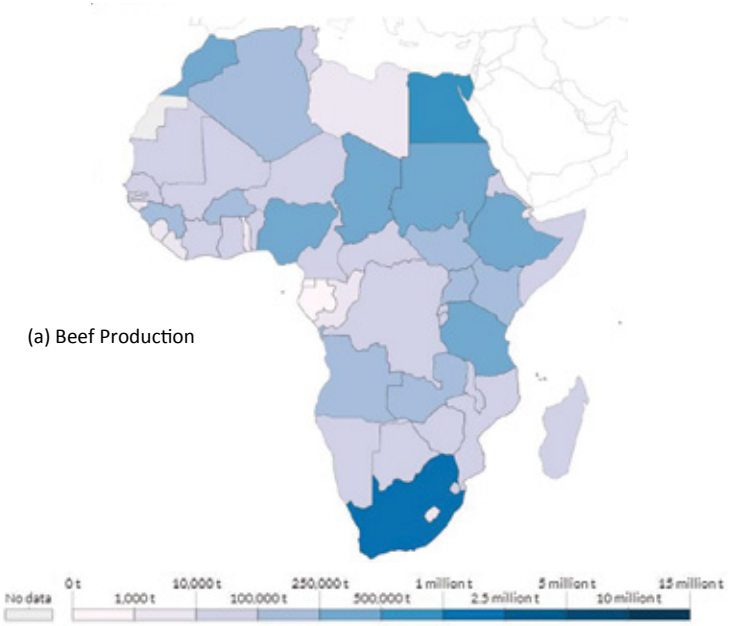
On the trade side, Africa is an increasingly important importer of meat products, particularly beef, from global markets but remains a relatively modest exporter; traditionally, exports have been in live animals, particularly cattle from across the Sahel to coastal West African markets (Rich and Wane 2021) and of sheep and goats from the Horn of Africa to the Middle East (Mtimet et al. 2020). Based on aggregate data from Enahoro and colleagues (2021), the only category of meat in which an African country is a major global exporter is sheep and goat meat, where Namibia ranks 10th globally. As noted in the first case study below, Botswana, Namibia, and Swaziland export modest amounts of beef to high-value markets in the European Union (EU), but most exports of meat tend to be minor regional exports and/or informal trade. However, Africa south of the Sahara is an important importer of both poultry and beef, with imports of nearly 1 million metric tons of beef and more than 2 million metric tons of poultry in 2019 (Enahoro et al. 2021).

FIGURE 4.1—EVOLUTION OF MEAT PRODUCTION ON THE AFRICAN CONTINENT, 2000–2020

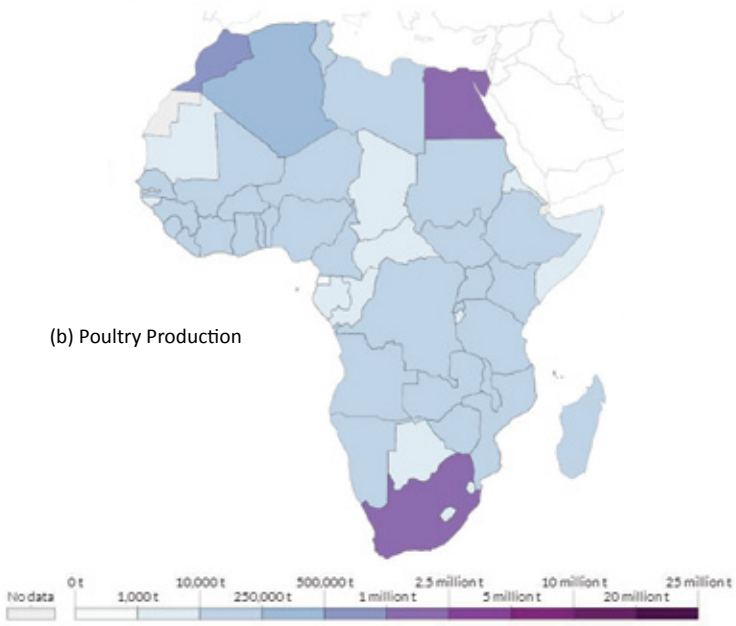


Source: Ritchie and Roser (2017).

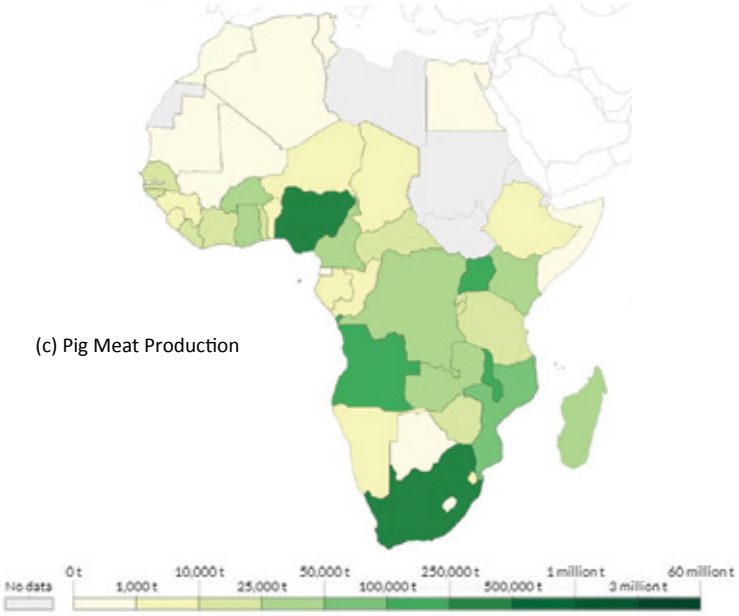
FIGURE 4.2—MEAT PRODUCTION BY COUNTRY, 2020



(a) Beef Production



(b) Poultry Production



(c) Pig Meat Production

Source: Ritchie and Roser (2017).

Africa's relatively modest footprint in global meat production and trade can be explained by a variety of factors that are better illuminated in the case studies that follow. Nonetheless, briefly summarized, these constraints include (1) the use and maintenance of lower-yielding (though often more resilient) traditional breeds over more productive exotic breeds; (2) relatively low and inconsistent levels of offtakes (sales) from traditional systems that are less integrated with formal markets, based on the complex sociocultural and livelihood functions that livestock have in informal markets that obviate transactions on a consistent market basis; (3) the prevalence of a variety of endemic animal diseases that complicate investment, induce production-reducing mortality and morbidity, raise management and animal health costs, and thwart market access to high-value developed-country markets; (4) poor infrastructure, particularly downstream in roads and energy, which raises transaction and transport costs for both inputs (especially feed) and meat outputs, reduces throughput in processing, and prevents economies of scale in cold chains and other innovative technologies; (5) greater competition for grains that can be used for either food or feed purposes, thus raising costs in using more efficient feed sources; (6) a lack of an enabling environment on the policy side, in terms of regulations and tax laws that incentivize processing, and limited funding and support for veterinary services; (7) a general lack of grading systems for meat, resulting in meat being sold largely as an undifferentiated product, with carcass value not maximized on the basis of different cuts; and (8) despite their recent growth from a low base, modest per capita income levels, which have limited demand and consumption relative to other developing countries and hindered the ability of supply-side interventions to competitively capture and derive benefits from improvements and innovations.

Case Study #1:

Beef Exports from Botswana and Namibia—the Benefits and Costs of Investments in Animal Health and Traceability in the Meat Sector[1]

Botswana and Namibia are two of the few countries in Africa that have been able to successfully export beef (and sheep and goat products) to high-value markets, predominantly to Europe. Each country maintains a cattle herd of approximately 2 million animals, though production is spatially bifurcated across the country into zones where foot-and-mouth disease (FMD) is either not present or is endemic. These zones are physically demarcated by a double ring fence, meaning that cattle producers (mainly small-scale ones) outside the FMD-free zone are generally unable to sell their animals out of their region (unless submitted to a rigorous quarantine period), and their meat cannot be exported to high-value markets. This system has maintained FMD-free areas, allowing market access to Europe—which insists that meat exports from either country be derived from animals that are FMD-free without the use of vaccination—but at significant financial and equity costs.

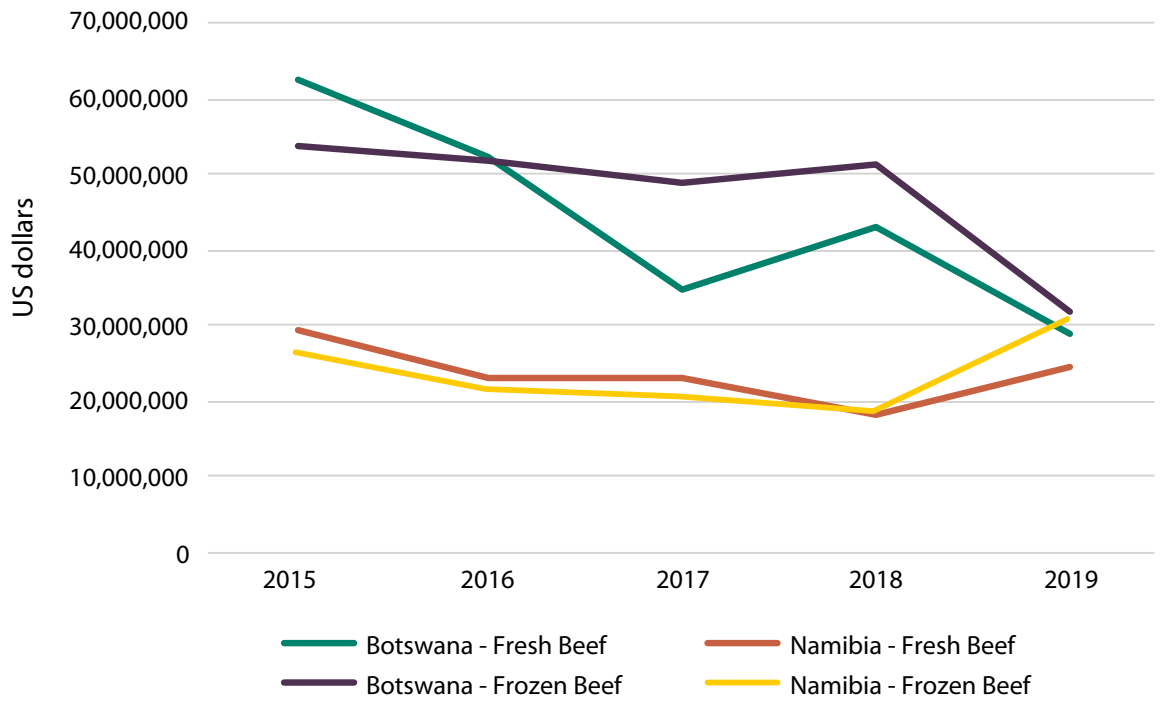
Exports by Botswana and Namibia have been fueled by preferential trade arrangements with the EU and Norway, which are the main destinations for higher-value fresh cuts; lower-value cuts are sold primarily to South Africa and regional markets in Africa. Trade with Norway is particularly lucrative, given the high levels of protection placed on domestic production and both countries' shared access to a duty-free quota of 2,700 metric tons that is a relic of Norway's earlier Generalized Scheme of Preferences. Norway also allocates an additional 500 metric tons to Southern African Customs Union countries. In 2021, Namibia was able to avail itself of the entire duty-free allocation to Norway by virtue of Botswana's inability to fill its share (Ngatjiheue 2022).

As shown in Figure 4.3, each country's total exports of both frozen and fresh beef are sizable, though exports from Botswana have been steadily declining in recent years, as Botswana has faced challenges with FMD outbreaks and difficulties with its parastatal, the Botswana Meat Commission (BMC), procuring animals in sufficient volumes for profitable exports. Both Botswana and Namibia rely on state-run organizations (MeatCo in the case of Namibia) for the export of beef, which has provided stability at the expense of innovation in the sector. However, particularly in the case of Namibia, trade links developed over the past decade with buyers in Europe have helped to improve logistics and add value through branding and other marketing efforts, including a greater focus on selling high-value, fresh cuts to the EU and Norwegian markets. Namibia has made recent inroads into the US market as well (*Africanews* 2020).

While the case of exports from Botswana and Namibia has been largely lauded as a success story and has raised food safety and animal health standards

1 This case draws from Rich and Perry (2011); Naziri, Rich, and Bennett (2015); and Bennett and Rich (2019, 2020).

FIGURE 4.3—EXPORTS OF BEEF FROM BOTSWANA AND NAMIBIA, 2015–2019



Source: Bennett and Rich (2019).

to international levels, several caveats underpin this narrative. First, from an equity standpoint, the use of physical barriers to separate parts of each country into FMD-free and FMD-endemic zones has created a dynamic that has benefited large-scale commercial operations (which represent 75 to 80 percent of national production), to the detriment of communal farms. Namibia has tried to redress this through its pricing mechanism, which provides the same price to farmers (for a given animal grade) countrywide, implicitly subsidizing production in communal areas. However, this has not adequately addressed low offtakes and throughput in communal area abattoirs.

Second, trade has been facilitated by preferential trade arrangements, particularly links with Norway, which have increased prices and production costs relative to other global competitors, especially those in South America. These higher prices have benefited farmers in Namibia. In Botswana, the BMC offers producers prices that are below export parity; this has reduced farmer incentives to sell animals for export, compromising throughput and the viability of the BMC, to the extent that the BMC is currently in the process of privatization (Reuters 2020). These trade arrangements have nevertheless bound these two countries to the European market, making it more difficult to diversify sales and maximize carcass value by selling other cuts at prices that are competitive with other suppliers. Given that EU market access is predicated on FMD-free status, any breakdown in the biosecurity regime of either country would have significant ramifications for the viability of that sector; periodic outbreaks of FMD in Botswana have undermined its ability to use its full share of the export quota, for instance.

Third, while innovation and added value have improved of late, particularly in terms of branding efforts in European markets, there may be limits to these gains, particularly in Norway, where local production is prized over imports for the highest-value products. Diversification of exports to the United States or China may be one way of overcoming these limits, as may further democratization and reforms of governance in the formal and communal sectors to allow greater voice and perspectives from a more diverse set of stakeholders, namely the communal sector, which has not as yet played a major role in decision-making.

Case Study #2:

Dynamics of the Beef Trade in West Africa[2]

West Africa is an important supplier of live animals in Africa, including cattle, sheep, and goats. Trade in West Africa is predominately regional, following pastoral patterns of animal movements across the Sahel and sales of animals from Sahelian markets (Burkina Faso, Mali, and Niger) to growing, dynamic coastal markets (particularly Côte d'Ivoire, Ghana, Nigeria, and Senegal). This trade follows well-defined transhumance routes that have existed for millennia and follow a sociocultural logic relating to the role livestock play in wealth generation and status in local societies. In the last few years, there has been a renewal of policy debates in Sahelian countries about ways to add value to live animal stocks by investing in abattoirs locally and exporting meat, rather than animals, to coastal West African markets.

Recent research by Rich and Wane (2021) explored the prospects of such trade through a case study on the potential of beef sales to Ghana from Burkina Faso. Along this trade corridor, Burkina Faso exports approximately 100,000 head of cattle to Ghana annually. Cattle from Burkina Faso account for roughly a third of Ghanaian consumption. Cattle processing in both countries is dominated (on a volume basis) by large slaughterhouses—some 57 percent of Burkinabe cattle are slaughtered in the main abattoir in Ouagadougou, while 40 percent of daily slaughter in Accra occurs at the main Accra slaughterhouse. These large operations exist in parallel with smaller, informal slaughter points that receive price signals from more formal players.

Much of the trade in beef to coastal West African countries is in the form of offal—nearly 77 percent of all beef imports in volume terms in 2018 were comprised of offal, with the remainder mainly lower-value cuts. This competes with local preferences for "hot-chain meat," where animals are slaughtered with little in the way of product differentiation. An important component of any prospective trade involving exports from Sahelian countries to third countries will be competitiveness in offal and cuts and whether increased value can be generated for high-value cuts in order to make the price of offal more competitive with third-country suppliers.

To assess this potential, Rich and Wane (2021) developed a simulation model of trade in cuts between Burkina Faso and Ghana. The model explored a range of scenarios associated with market segmentation, improved animal productivity, enhanced processing efficiency, and macroeconomic (exchange rate) movements to see whether Burkina Faso could compete with other meat suppliers in Ghana. Simulation results revealed that while Burkina Faso could compete relative to local production in Ghana, it could not offset the price advantages that other suppliers have in offal exports; it is also less clear whether such price differentiation by cut would be valued in local, informal markets. Moreover, such investments in the meat sector (in lieu of live animals) in Burkina Faso would produce only marginal improvements in GDP and employment, based on an assessment of multipliers from a Burkinabe social accounting matrix. The research highlights the logic of current trading patterns and suggests greater investments in the live animal sector to enhance this trade.

Case Study #3:

East Africa's Meat Production and Export Performance—Review of Policies and Practices in Ethiopia and Tanzania

Ethiopia and Tanzania are the two leading livestock-producing countries in Africa south of the Sahara. According to the Central Statistical Agency of Ethiopia (Ethiopia, CSA 2020), Ethiopia has the largest livestock population in Africa, with 70 million cattle, 42.9 million sheep, 52.5 million goats, 8 million camels, and 57 million poultry birds in the country. These estimates include the rural sedentary and pastoral areas of the country and exclude livestock populations in the nonsedentary (nomadic) areas of Afar and Somali regions. Tanzania is estimated to have a livestock population of more than 34 million beef cattle, 25 million goats, 8.9 million sheep, 3.3 million pigs, and 87.7 million poultry birds (Tanzania, NBS 2021). Despite both countries' large inventories of livestock, productivity and commercialization of the livestock sector remains low (Ethiopia, Livestock State Ministry 2014), with exports of meat and other slaughter by-products comprising only 2 percent of overall export commodities in Ethiopia (Eshetie et al. 2018) and less than 1 percent in Tanzania (Tanzania, NBS 2021).

2 This case study draws from Rich and Wane (2021).

According to the Food and Agriculture Organization of the United Nations (FAO 2018), between the years 2004 and 2014, the average meat yield (carcass weight) in Ethiopia was 0.8 kilograms for poultry, 10 kilograms for sheep, 8.5 kilograms for goats, 170 kilograms for camels, and about 109 kilograms for cattle. In Tanzania, between the years 2016 and 2017, beef meat accounted for 82 percent of total red meat production, goats for 14 percent, and mutton for 4 percent (FAO 2015). Meat production in both countries offers the opportunity to serve both regional export markets and domestic markets.

Although Ethiopia has the second-largest human population in Africa, its per capita meat consumption is below the average for countries in Africa south of the Sahara, at about 8 kilograms per year, of which beef consumption accounts for about 5.3 kilograms (Birhanu 2019). The low per capita meat consumption in Ethiopia is primarily due to low per capita income, high domestic meat prices, and the more than 200 religious fasting days per year observed by many in the country (Aleme and Lemma 2015; UNDP 2017). As for Tanzania, its per capita meat consumption is about 11 kilograms per year (FAO 2020) and is dependent on seasonality, urbanization, and agricultural growth (Kaminski, Christiaensen, and Gilbert 2016; Wenban-Smith, Faße, and Grote 2016).

In both countries, large, growing populations and rising incomes have increased domestic demand for animal-based food products, but domestic supply is relatively low due to structural and institutional constraints such as the availability and costs of inputs (feed, for example), equipment, and financial services. Livestock productivity growth is important in boosting market competitiveness in both domestic and foreign markets. However, prevailing factors such as critical shortages (and inadequate quality) of feed, widespread prevalence of pests and diseases, poor slaughtering and flaying processes, limited market linkages, and lack of standards and certifications need to be addressed to increase domestic production and consumption and to succeed in export markets.

With its established comparative advantage in live animals and its strategic geographic location, Ethiopia holds considerably greater potential for increased meat production and export than most African countries (FAO 2015; USAID 2010). Countries currently importing live animals from Ethiopia are Sudan (19.5 percent), Somalia (19.0 percent), Saudi Arabia (18.7 percent), and Djibouti (14.9 percent) (Ahmed 2019; Ethiopia, Ministry of Agriculture and ILRI 2013). Due to Ethiopia's comparative advantage in the Middle East's livestock and meat markets, its exports of chilled small ruminant meat from abattoirs are primarily to the United Arab Emirates and Saudi Arabia, accounting for 60 percent and 38 percent of Ethiopia's exports, respectively (Eshetie et al. 2018).

Both Ethiopia and Tanzania are keen to enhance domestic production to close the projected total national meat production-consumption gap and increase exports of live animals and meat. Recognizing the potential of the livestock sector, governments in both countries have undertaken several strategic initiatives and policies over the years to facilitate and promote diverse incentive and investment interventions. These have included the initiation of Livestock Master Plans in each country to identify best-bet intervention and investment options from the public and private sectors (Shapiro et al. 2015; Michael et al. 2018). Such strategic government policies are poised to transform the meat production sector by boosting productivity and consumption and generating foreign exchange earnings through increased exports.

In Tanzania, market-led reforms introduced since 1986 include a new exchange rate regime, liberalization of trade, and price deregulation (Sharma et al. 2005). Polices to regulate the livestock sector in Tanzania include the Animal Diseases Act of 2003, the Tanzania Veterinary Act of 2003, the Tanzania Meat Industry Act of 2006, the National Livestock Policy of 2006, and the Grazing-Land and Animal Feed Resources Act of 2010. In addition, the Tanzania Livestock Modernization Initiative was established in 2015 to support the transformation of the traditional livestock sector into an economical, sustainable, and environmentally friendly sector (Tanzania, Ministry of Livestock and Fisheries Development 2015).

The Ethiopian government's second Growth and Transformation Program (the 2015–2020 GTP II) has helped to increase the productivity and competitiveness of the key livestock value chains for poultry, red meat, milk, and crossbred dairy cows through improved genetics, feed, and livestock health services (Ethiopia, National Planning Commission 2016). Policies related to livestock marketing and animal health in Ethiopia are also prioritized in the Ministry of Finance and Economic Development's Plan for Accelerated and Sustained Development to End Poverty (PASDEP), while specific programs related to livestock marketing and trade are prioritized in the Ethiopia Sanitary & Phytosanitary Standards and Livestock & Meat Marketing Program (SPS-LMM).

However, despite these reforms, challenges to effective policy implementation persist in both countries. Complementary policy support is required to help meet government-set targets in key livestock value chains (Shapiro et al.

2015). Examples of needed policy support include effective and affordable animal identification and traceability programs, monitoring programs for abattoirs for improved food safety and animal health, land availability for seed and forage production, investment in livestock market facilities and supporting infrastructure, quality-based pricing incentives to support domestic meat demand and supply, and policies that buffer domestic production against surges of imports. Provision of comprehensive veterinary services should also be a priority of public institutions. In addition, investment in high-potential fodder-production zones (Worqlul et al. 2022), in climate-induced risk management for the most vulnerable (Bogale and Temesgen 2021), and in creating an enabling environment to attract private sector investments in the meat value chain should be a policy priority for both countries.

Case Study #4:

Transitioning from Backyard Flocks to Semi-Commercialized and Commercialized Poultry Production—Review of Mozambique's and Ghana's Poultry Industry

While South Africa, Egypt, and Morocco are the largest poultry-producing countries, small-scale poultry production is prevalent across the African continent. In recent years, Mozambique has looked to improve and develop the domestic poultry value chain for its many small-scale producers (Mozambique, Bank of Mozambique 2015). However, imports from South Africa, Zambia, and Zimbabwe have proved to be competitors for Mozambican poultry producers. A ban on poultry imports in 2017 (mainly to prevent Brazilian imports) caused the price of poultry to increase, along with the price of inputs, which was not the intention of the ban (AfDB 2017). The government then loosened the ban to allow for some imports from South Africa and decided to focus more on developing the poultry value chain. Specifically, it sought to support hatcheries, grain producers and feed processors, abattoirs, and distributors (Mozambique, Bank of Mozambique 2015).

Poultry production in Mozambique can be divided into two broad categories: the small-scale village (or scavenging) system, which is the dominant system, and the intensive (or commercial) system. The two systems vary widely with respect to numbers, poultry breeds, biosecurity practices, and management. According to the 2015 national Integrated Agricultural Survey, poultry has mainly been produced for producer consumption or limited sale to nearby local markets. Specifically, about 3.4 million chickens were sold alive (22.19 percent of total production), about 9 million were slaughtered for own consumption (59.44 percent of total production), and only 65,583 were slaughtered for sale (0.43 percent of total production). The majority of the marketed poultry meat comes from broiler chickens produced by cooperatives and large-scale private sector players. The largest producers include General Union of Agricultural and Livestock Cooperatives, Mozambique Farms, Astral Food, Mozambique National Poultry Association, Frangos de Manica, Empresa Avicola Abilio Antunes, Novos Horizontes, Frango King, and Pintainhos Stewart. In 2013, only six poultry slaughterhouses were officially registered (more operate but are not officially recognized) in Mozambique, supplying slaughtered and processed chickens to the main urban centers (FAO 2013).

It is impossible to discuss supply chain issues separately from infrastructure issues in most cases. Many supply chain issues are a result of a lack of infrastructure. Additionally, lack of infrastructure is at times due to existing supply chain issues or insufficient private or public investment that creates missing links in the supply chain. Both infrastructure and supply chain issues impact animal productivity, creating a highly intertwined and complex challenge.

As Mozambique looks to transition more toward semi-commercialized or commercialized production, the poultry value chain will need significant development and support—specifically, veterinary services, hatcheries, feed mills, processing, and storage (Bah and Gajigo 2019). Access to affordable feed remains a significant challenge for producers, given the absence of feed mills. Formal and highly structured hatcheries are necessary to ensure that poultry producers can have access to large quantities of chicks at similar ages to enable them to produce efficiently. Given the sparse population of many regions within Mozambique and the resulting long distances over poor road conditions to urban centers, the absence of processing services prevents access to significant parts of the market (Bah and Gajigo 2019). Access to financing has also proven to be a constraint to the development of the poultry industry, as only about 20 percent of the country's working-age population has access to banking and financial services (McKague and Karnani 2014).

Ghana is similar to Mozambique in terms of the struggle to develop and maintain the poultry supply chain, as well as in how the country combats the

impact of trade on domestic production. From 2000 to 2017, poultry production in Ghana saw significant growth, with a steady increase from 50,895 metric tons in 2011 to 59,653 metric tons in 2017 (Ghana, Ministry of Food and Agriculture 2018). According to the Ghana Poultry Project, there are 29 large-scale commercial poultry farms currently in Ghana, and these farms represent about 20 percent of the total poultry sector. Medium- and small-scale producers comprise 80 percent of the poultry sector and rely on hatcheries for their day-old chicks and feed mills for their feed (Aning 2006). The medium- and small-scale operators practice minimal biosecurity, which exposes the producers to risk of disease outbreaks such as avian influenza (Aning 2006). While there are local hatcheries that produce day-old chicks, the quality is generally low, so most poultry farmers prefer to buy imported day-old chicks, especially day-old layer chicks. In 2018, Ghana imported 511,960 day-old broiler chicks and 7,130,999 day-old layer chicks (GPP 2022). Poultry feed accounts for about 70 percent of total animal feed produced in Ghana. Commercial feed millers supply poultry feed mostly to medium- and small-scale poultry producers, while large-scale poultry producers mostly provide their own feed through vertical integration (Andam et al. 2017). The poultry industry consumes nearly 30 percent of all maize produced in Ghana.

Ghana's poultry imports come mainly from Brazil, the EU, and the United States. To support the local poultry industry, in 2013 the government of Ghana removed customs duties on poultry inputs such as feed, additives, drugs, and vaccines and facilitated improved access to veterinary services. In 2014, the government launched the Broiler Revitalization Project to stimulate local broiler production. As part of the project, a new poultry and livestock import policy was designed to reduce the country's importation of chicken meat. The policy limits imports to 60 percent, meaning that importers must buy 40 percent of their produce from local sources. In 2019, a program titled Rearing for Food and Jobs was launched, aimed at "developing a competitive and more efficient livestock industry that will increase domestic production, reduce importation of livestock products, contribute to employment creation, and improve livelihoods of livestock value chain actors" (Netherlands Enterprise Agency 2019, 11). The focus of this program is on building the appropriate infrastructure to boost local production.

Much like the situation in Mozambique, general bottlenecks in the Ghanaian poultry sector include access to and quality of vaccines, a small hatchery sector, and inadequate maize and soybean production for feed (Kusi et al. 2015). At the production level, the major challenges include inadequate biosecurity systems, low-quality day-old chicks due to poor-quality local hatcheries and lack of hatchery regulations, own on-farm feed production (leading to lower-quality feed), abuse of antibiotics, and poor linkages between input suppliers and marketers (Kusi et al. 2015). Limited processing, the high cost of local poultry production, and competition from imported poultry products are some of the challenges at the processing and marketing level (Kusi et al. 2015).

Conclusion: Key Opportunities and Challenges in the Sector

Demand for and production of meat products have been increasing, to varying degrees, across the African continent. This creates opportunities to expand processing capacity to meet this demand. Yet, the global footprint of Africa's meat production sector has remained modest, due in part to challenges along the value chain, as highlighted in the case studies. When considering meat and livestock products generated by the processing industry, the value chain leading up to the final product is highly complex. Primary inputs include land, feed, labor, intermediate livestock inputs (for example, chicks to poultry producers or feeder cattle to livestock feeding farms), transportation, and veterinary services.

As value chains evolve in a region, actors along that chain find opportunities and challenges. These include market access, costs of compliance, improvements in the availability and quality of feed and forage, animal disease, animal productivity and competitiveness, infrastructure, and other leverage points in the value chain, to name a few. Some of these issues were highlighted in the case studies above, but each region's meat value chain will face challenges and opportunities unique to that region. For example, a study of the red meat sector in South Africa identified infrastructure as the greatest challenge to growing meat production and processing in that country (Spies 2011).

Another challenge is animal losses, which can arise from predation, disease, parasites, and injury, among other causes. Large-scale animal losses threaten farm livelihoods, threaten food security and safety at the community level, and disrupt the ability of processors to meet client delivery expectations—domestically and internationally—at the market level. At the farm level, endemic diseases and parasites can depress annual production, reducing the overall availability of livestock to the processing industry. This is true of both formal and informal farm

types, although the criticality of particular animal health challenges may vary greatly by country and farm type.

Risk of disease outbreaks may vary between formal and informal farm types. Informal farm types may be at higher risk of a listed disease outbreak, since introductions to domestic herds and flocks may result from contact with wildlife carrying the disease (Souley Kouato et al. 2018). Some diseases also have a seasonal component. For example, FMD has been found to peak during March in Ethiopia (Aman et al. 2020). The incidence of animal disease also creates an economic burden of diseases on smallholder farms. For example, in Ethiopia, where FMD is endemic, it is estimated that cattle farmers with mixed crop-livestock farms lost an average US$76 per herd, and pastoralists lost US$174 per herd (Jemberu et al. 2014).

The World Organization for Animal Health recognizes 85 listed diseases of terrestrial species. These diseases can result in sanitary embargoes on exports from countries with outbreaks. In 2021, the largest number of individual listed disease outbreaks were for FMD (35 outbreaks in livestock), highly pathogenic avian influenza (26 outbreaks in livestock), Rift Valley fever (18 outbreaks in livestock), and African swine fever (17 outbreaks in livestock) (World Animal Health Information System 2022). Disease outbreaks can cluster geographically, with higher frequency in particular countries (Calkins and Scasta 2020). For example, from 1996 to 2018 the greatest geographic concentration of Rift Valley fever was in Kenya, Rwanda, and Tanzania, as well as Mauritania and South Africa (Calkins and Scasta 2020).

Rift Valley fever and highly pathogenic avian influenza are zoonotic diseases with the potential to cause adverse health effects in humans as well as animals. Rift Valley fever has the added complexity of being vector borne, namely, transmission can occur via mosquitos carrying contaminated blood from one person or animal to another. A study in Kenya found that the most common transmission routes, however, included the consumption of meat and milk from infected animals as well as contact with blood (Mutua et al. 2017). This disease poses risks not just to consumers but also to abattoir workers. Rift Valley fever further undermines both formal and informal trade in large and small ruminants, particularly in the area extending from the Horn of Africa to the Arabian Peninsula, and simulation analysis has shown that the trade disruption was accentuated by COVID-related shocks (Mtimet et al. 2021).

From a policy standpoint, a number of additional issues emerge from the analysis, many of which are addressed by interventions highlighted in the Livestock Master Plans that have been developed for Ethiopia (Shapiro et al. 2015), Rwanda (Shapiro et al. 2017), and Tanzania (Michael et al. 2018).

First, policies that improve the productivity, safety, health, and resilience of the live animal sector will naturally have positive spillover effects on the meat sector, and in turn can yield incentives for greater investment in formal downstream meat processing activities. Such investment would improve competition in the sector, which is often highly bifurcated between atomistic informal facilities and quasi-parastatal formal-sector abattoirs.

At the same time, it is less clear whether such investments would have significant enough impacts on competitiveness to enable the products of such facilities to compete with imported supplies. While reduced production in certain exporting countries (particularly in Europe) and rising demand from China and other East Asian markets may boost world prices in the future, identifying mechanisms and infrastructure that can reduce costs in processing, distribution, and retail will be essential.

Further to this point, and following the study by Rich and Wane (2021), are the prospective conflicts between animal trading and recipient markets over capturing added value from meat production. In West Africa, increased local production of meat by traditional animal exporters could have knock-on effects on employment in coastal markets that might engender trade conflicts in erstwhile free trade zones. Identifying ways to share the benefits of increased value addition across borders will be critical.

Finally, the question of scaling up semi-commercial production to enable more farmers to engage in formal markets, particularly in poultry, in ways that benefit current smallholder farmers will be an important area for policy engagement. While sectors such as poultry can provide benefits to smallholders, sustainable engagement requires achieving a certain level of scale that may be difficult without investments in, among other things, feed, training, and management. Addressing these challenges will be essential to realize livestock's—and meat's—potential to serve as a true pathway out of poverty.

CHAPTER 5

Agrifood Processing in Africa: Status, Challenges, and Opportunities

Mia Ellis, Jared Fang, and Margaret McMillan

Introduction

A shift from agriculture to manufacturing was one of the hallmarks of job creation, poverty reduction, and rapid growth in low-income countries during the latter half of the 20th century. This experience in earlier decades of structural transformation was characterized by labor-absorbing, productivity-increasing manufacturing. Recent structural change in African countries has been markedly different—productivity gains are realized through reallocation of economic activity away from agriculture without the accompanying within-sector productivity growth in nonagriculture, and manufacturing in particular (Diao, McMillan, and Rodrik 2019; Diao et al., 2021; McMillan and Zeufack 2022). This chapter examines the extent to which agrifood processing follows these trends.

Agrifood processing is made up of activities classified as manufacturing that transform agricultural products postharvest. This can include milling grains, drying coffee, and generally adding value to food products—there is a wide range of potential activities that can require different levels of labor and capital. Agrifood processing is a key element in both food system development and industrialization in Africa. In many countries of Africa south of the Sahara (SSA), agri-industries' share of total manufacturing is significant, accounting for 27 percent of employment and 39 percent of output on average in the formal sector (UNIDO 2021).[1]

Semiprocessed and processed foods have also become increasingly dominant in African food systems. Growing populations, incomes, and rates of urbanization have changed demand for food and increased interest in higher-value-added and processed products, which in turn stimulates agrifood processing production and market activity (FAO 2017). The value of processed foods in intra-African trade grew from equal to the value of unprocessed foods in 2003 to twice their value in 2019 (Bouët, Tadesse, and Zaki 2021). Despite this growth in agrifood processing, the continent remains a net importer of food, suggesting there is room for further growth in local production.[2]

Beyond the creation of opportunities directly within agrifood processing, its development relates to the allocation and use of natural resources, input factors, and labor. By increasing the demand for raw agricultural commodities, This is greater than the contribution of agrifood processing to total manufacturing in Asia (19 percent of employment and 22 percent of output) and Europe (19 percent of both employment and output) but slightly lower than the contribution in Latin America and the Caribbean (39 percent of employment and 38 percent of output). agri-industries can increase farmers' incomes and create more demand for agricultural inputs (FAO and UNIDO 2009); agri-industries also generate demand for ancillary agrifood processing inputs needed for packaging and other downstream activities like transport and services provision. But stagnant agricultural productivity, capital intensity of agrifood processing and automation, and climate change all pose risks to agrifood processing.

This chapter considers the trends and prospects for growth in agrifood processing in Africa. We focus on SSA and exclude discussion of the countries of north Africa, in part due to data limitations and in part because we have not worked on these countries. We also focus almost exclusively on the 21st century, the period during which many African countries experienced rapid labor productivity growth (Diao, McMillan, and Rodrik 2019).

We begin with a description of broad trends, drawing on data from UNIDO's Indstat2 database. Indstat2 is organized at the International Standard Industrial Classification (ISIC) 2-digit level and typically covers only formal manufacturing. [3] Overall, we find that formal agrifood processing in Africa is performing well, expanding in both employment and output during 2000–2018, though output growth is more rapid. Because the UNIDO Indstat2 data are organized at the 2-digit level, we are limited to focusing on food processing and beverages manufacturing. To be consistent, therefore, we focus only on these subsectors in the firm-level analyses of agri-industrialization trends in Ethiopia, Tanzania, and Vietnam. Other components of agri-industry that this definition

1 This is greater than the contribution of agrifood processing to total manufacturing in Asia (19 percent of employment and 22 percent of output) and Europe (19 percent of both employment and output) but slightly lower than the contribution in Latin America and the Caribbean (39 percent of employment and 38 percent of output).

2 Just 20.8 percent of processed foods imported by Africa came from intra-Africa trade in 2019, compared to 17.7 percent of semiprocessed foods and just 9.4 percent of unprocessed items (Bouët, Tadesse, and Zaki 2021).

3 The most common sources for UNIDO Indstat2 data are national enterprise or industrial surveys/censuses. These data most often cover firms with 10 or more workers, which is why we refer to it as formal manufacturing, though for some countries/years the cut-off changes.

does not cover include processing sectors such as cotton ginning and leather and hide processing.

The role of the informal sector in agrifood processing can be large and varies between sectors and countries (Wilkinson and Rocha 2008), and for this reason the next section of the chapter focuses on programs to foster productivity growth in small agri-industry firms. There are limited data available to examine trends in small and informal agrifood processing, but we make use of Ethiopia's Small-Scale Industries (SSI) and Tanzania's Census of Industrial Production (CIP) where possible.[4] The following section discusses opportunities for agrifood processing and also considers small firms to the extent allowed by data. This is followed by a section on major challenges and then the conclusion.

TABLE 5.1—SHARE OF AGRICULTURE IN TOTAL EMPLOYMENT AND FORMAL SECTOR IN MANUFACTURING EMPLOYMENT

Country	Year	Agriculture share in total employment	Dominance of agriculture? (majority, <25–50%, low)	Formal manufacturing share of total manufacturing employment	Formal/informal manufacturing dominant?
Botswana	2018	0.32	<25–50%	1.00	Formal
Ethiopia	2015	0.68	Majority	0.09	Informal
Ghana	2015	0.36	<25–50%	0.17	Informal
Kenya	2018	0.44	<25–50%	0.12	Informal
Malawi	2012	0.67	Majority	0.19	Informal
Mauritius	2018	0.06	Low	0.75	Formal
Senegal	2014	0.35	<25–50%	0.04	Informal
South Africa	2018	0.16	Low	0.69	Formal
Tanzania	2018	0.70	Majority	0.22	Informal

Source: Economic Transformation Database (ETD), Indstat2 (UNIDO).

Note: Agriculture share in total employment is calculated from the Economic Transformation Database (ETD), while the formal manufacturing share of total manufacturing employment comes jointly from the ETD (total manufacturing employment) and Indstat2 (formal manufacturing employment).

Broad Patterns of Agrifood Processing in Africa

This section uses UNIDO's Indstat2 data to summarize output, employment, and labor productivity growth in manufacturing subsectors related to agricultural processing. The Indstat2 database generally covers "formal" manufacturing firms, those that are covered in countries' periodic industrial or enterprise surveys. It is organized at the 2-digit ISIC (revision 3) level, and agrifood processing is defined as sector 15, food products and beverages. We relate these broad patterns in agriculture to the subset of countries for which we have data, using the Economic Transformation Database (ETD). The ETD data come primarily from population censuses and labor force surveys, and so they include informal activity (de Vries et al. 2021). However, we are not able to break manufacturing into subsectors and so are unable to identify agrifood processing within the ETD data. Later in the chapter, we do consider the informal agrifood processing to the extent possible using firm-level data.

We focus in this section on a sample of nine countries for which we have relatively complete data from 2000–2018—Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Senegal, South Africa, and Tanzania.[5] These countries represent different experiences within the African continent with respect to agriculture, industrialization, and agrifood processing. In Table 5.1, we report the share of agriculture in total employment and the share of formal manufacturing in total manufacturing employment. Ethiopia, Malawi, and Tanzania are all dominated by agriculture in terms of employment—the sector accounts for around two-thirds of employment in all three countries. Mauritius and South Africa both have significantly lower shares of agriculture in total employment—6 and 16 percent, respectively. In terms of manufacturing

4 These data sources cover only registered firms, and in the case of Ethiopia SSI cover only firms using power-driven machinery. As such even with these additional data sources, our information does not fully cover the informal sector.

5 The period covered for most countries is 2000–2018. Countries that have slightly different periods covered are Ethiopia (2000–2015), Ghana (2003–2015), Malawi (2004–2012), Senegal (2000–2014), and Tanzania (2003–2018).

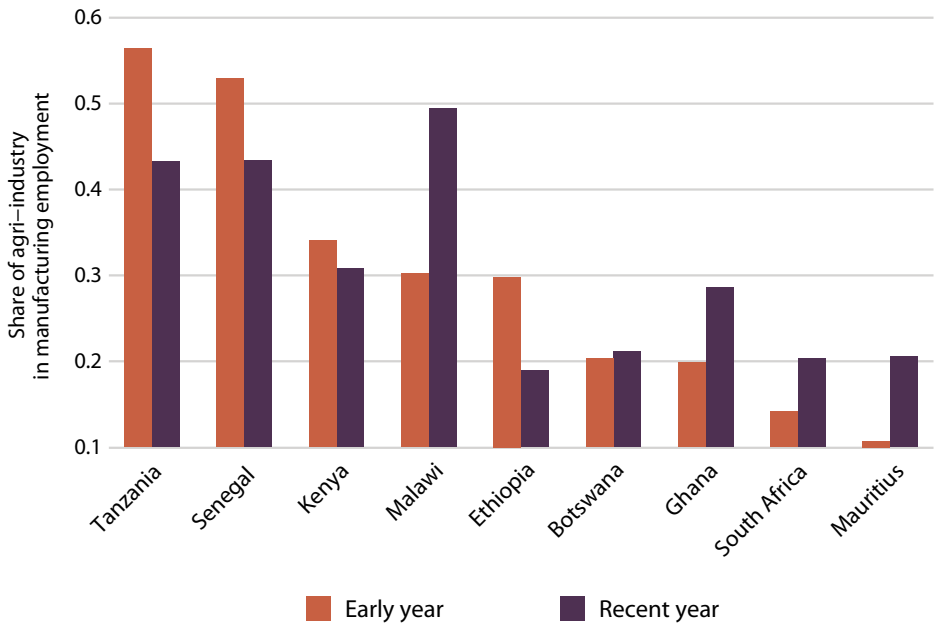
sector formality, Mauritius and South Africa both also have very high rates of formality in manufacturing, along with Botswana. In the other six countries, informal employment dominates manufacturing employment.

Share of Manufacturing Employment in Agri-Processing

In Figure 5.1 we plot the share of agrifood processing employment in total formal manufacturing employment by country, using the first and last years with available data for each country. Ethiopia, Kenya, Senegal, and Tanzania have seen a decline in agrifood processing's share in total manufacturing employment. The declines are likely due to the fact that these four countries had some of the highest initial shares of agrifood processing employment while other subsectors such as textiles have grown. While the share of agrifood processing in total manufacturing employment has declined, in Tanzania and Senegal it remains above 40 percent. Botswana, Ghana, Malawi, Mauritius, and South Africa all had increases in the share of agrifood processing employment—excluding Malawi, these four countries had the lowest initial shares, less than 20 percent.

By 2018, the lowest measured share of agrifood processing in formal manufacturing employment was 19 percent in Ethiopia—overall, in 2018 agrifood processing played a dominant role in formal manufacturing employment in these African countries. Across these nine countries, the share of agrifood processing employment in formal manufacturing employment is positively correlated with agriculture's share in total employment but negatively correlated with the share of formal employment in total manufacturing. Overall, agrifood processing represents a major share of manufacturing employment—31 percent on average.

FIGURE 5.1—SHARE OF AGRI-INDUSTRY EMPLOYMENT IN TOTAL FORMAL MANUFACTURING EMPLOYMENT, OVER TIME BY COUNTRY



Source: UNIDO's (2021) Indstat2.

Note: The period covered for most countries is 2000–2018/2019. Countries that have slightly different periods covered are Ethiopia (2000–2015), Ghana (2003–2015), Malawi (2004–2012), Senegal (2000–2014), and Tanzania (2003–2018).

Growth in Agrifood Processing Employment, Output, and Output Per Worker

In Table 5.2 we report the coefficients from country-industry-level regressions of employment, output, and output per worker (all measured in logs) on a year trend. These coefficients can be interpreted as the continuous growth rate in each variable for each country, over the respective periods covered. The relationship is modeled by the following equation where c denotes country, *s* denotes sector and t year, and y denotes employment and output per worker, respectively, and we control for country-industry fixed effects μ_{cs}:

$$\ln(y_{cst}) = \beta\,(year_t) + \mu_{cs} + \varepsilon_{cst} \quad (1)$$

Employment growth in agrifood processing is positive in all countries except Botswana, where it is close to zero; however, it has been outpaced by output growth in all countries except Ghana and Senegal, resulting in net increases in output per worker in agrifood processing in Botswana, Ethiopia, Kenya, Mauritius, South Africa, and Tanzania. In Senegal employment growth

TABLE 5.2—ESTIMATED GROWTH IN EMPLOYMENT, OUTPUT, AND OUTPUT PER WORKER IN AGRI-INDUSTRY

Country	Employment	Output	Output per worker
Tanzania	0.02	0.09	0.07
Senegal	0.02	0.02	0.00
Kenya	0.01	0.05	0.04
Malawi	0.06	0.13	0.06
Ethiopia	0.07	0.12	0.05
Botswana	0.00	0.05	0.05
Ghana	0.12	–0.01	–0.02
South Africa	0.02	0.04	0.02
Mauritius	0.01	0.02	0.02

Source: Indstat2 (UNIDO).

Note: These estimates of growth come from the UNIDO (2021) Indstat2 database. We regress the log of employment, output, and output per worker on a year trend to get estimates of average long-run growth. The period covered for most countries is 2000–2018/2019. Countries that have slightly different periods covered are Ethiopia (2000–2015), Ghana (2003–2015), Malawi (2004–2012), Senegal (2000–2014), and Tanzania (2003–2018).

is on par with output growth—around 2 percent—resulting in no change in output per worker. Ghana has experienced rapid employment growth in agrifood processing though its output growth has been slightly negative—this is likely due to a rapid expansion of small firms in Ghana's agrifood processing that led to employment growth without much additional output. This is supported by the Indstat2 data, which show an expansion in the number of firms during 2003–2013 from 472 to over 18,000 firms and an associated decline in average employment per firm. The majority-agriculture countries—Ethiopia, Malawi, and Tanzania—reported the highest rates of output growth in agrifood processing, and both Ethiopia and Malawi also report rapid employment growth (7 and 6 percent, respectively). Overall, these results indicate that formal agrifood processing is growing in our nine African countries, albeit from very low bases.

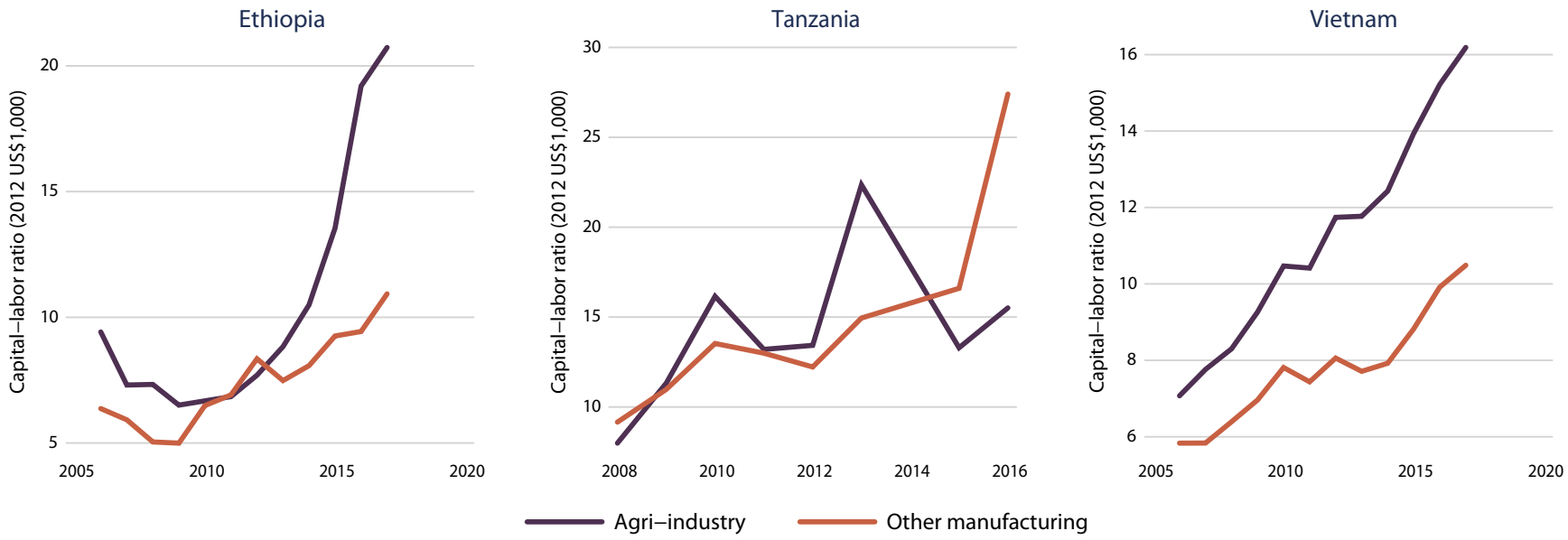
A Closer Look at Agri-industrialization in Ethiopia, Tanzania, and Vietnam

This section will use firm-level manufacturing census data from Ethiopia and Tanzania to assess growth at the level of subsectors in agrifood processing. The Indstat2 database is measured at the 2-digit level, so in the previous section we were not able to break agrifood processing down into its component subsectors. In this section, we use firm-level manufacturing data to examine trends in 4-digit ISIC subsectors of agrifood processing. This analysis will also compare the situation in Ethiopia and Tanzania to that in Vietnam. We begin with a comparison of agrifood processing in the three countries before looking at aggregate agrifood processing trends in capital intensity, which we were not able to measure from the Indstat2 data. We then use the firm-level data to separate 4-digit ISIC subsectors and analyze their growth.

Ethiopia and Tanzania both have high shares of agricultural employment—over two-thirds of the total—and also have high degrees of informality in manufacturing. Ethiopia's formal manufacturing sector accounts for around 9 percent of total manufacturing employment while Tanzania's accounts for around 22 percent, and informality has been increasing over time. Vietnam's case is quite different—agriculture's share in total employment has declined rapidly, from a level similar to Tanzania's and Ethiopia's in 2000 down to 38 percent in 2015. Meanwhile the share of formal employment in manufacturing is high, slightly above 75 percent, and has been rising since 2000. The share of manufacturing employment in agrifood processing is significantly lower in Vietnam, around 8 percent in 2016, down from 16 percent in 2000. This is a more rapid decline than Tanzania or Ethiopia experienced. These differences are consistent with what we expect from our comparison of the nine African countries—the share of agrifood processing employment in formal manufacturing is positively correlated with agriculture's share of total employment and negatively correlated with the rate of formal employment in manufacturing.

In Figure 5.2 we plot agrifood processing and aggregate manufacturing capital intensity, measured as the value of the capital stock per person engaged. Capital intensity has grown in all three countries over time, and the aggregate pattern in agrifood processing has been relatively similar to that of other manufacturing. Though the trend is more variable in Tanzania, this is mostly due to the lower number of firms in each sector. This is consistent with the idea that technology has been evolving in a way that makes agrifood processing more capital intensive. In Ethiopia and Vietnam, agrifood processing is more capital intensive than is aggregate manufacturing. This has implications for the employment generation capacity of the sector.

FIGURE 5.2—CAPITAL INTENSITY IN AGRI-INDUSTRY VERSUS OTHER SECTORS, GROWTH AT AGGREGATE AND FIRM LEVEL, BY COUNTRY



Source: Ethiopia Survey of Large and Medium Scale Manufacturing Industries (2006–2017), Tanzania Annual Survey of Industrial Production (2008–2016), Vietnam Enterprise Survey (2006–2017).

Note: Capital-labor ratio is measured in 2012 US$1,000s. The period covered by Tanzania is 2008–2016, while for Ethiopia and Vietnam it is 2006–2017. Vietnam has capital data only from 2006 onward, and we limit Ethiopia to the same period for consistency. The line graphs plot the total capital-labor ratio for agri-industry in each of the three countries, compared to the capital-labor ratio for all other manufacturing industries.

Employment, Productivity, and Capital-Intensity Growth by ISIC 4-digit Subsector

In both Ethiopia and Tanzania, we use the firm-level data to identify the 4-digit ISIC subsectors of agrifood processing that make up a majority of sales, employment, and capital stock. In Ethiopia, five subsectors account for 80 percent of sales, 75 percent of employment, and 79 percent of capital stock in agricultural processing—grain mill products (1061), bakery products (1071), sugar (1072), malt liquors and malt (1103), and soft drinks and water (1104). In Tanzania there are seven subsectors—fish, crustaceans, and mollusks (1020); vegetable and animal oils and fats (1040); grain mill products (1061); sugar (1072); other food products (1079); malt liquors and malt (1103); and soft drinks and water (1104). These account for 84 percent of sales, 84 percent of employment, and 85 percent of capital stock in Tanzania.

The larger subsectors that Tanzania and Ethiopia have in common are grain mill products, sugar, malt liquors and malt, and soft drinks and water. In Vietnam the sector breakdown is quite different. The largest sectors by a significant margin are (1) fish, crustaceans, and mollusks (1020); (2) fruit and vegetables (1030); and (3) prepared animal feeds (1080). These subsectors account for 60 percent of sales, 65 percent of employment, and 46 percent of capital stock. However, the two beverage subsectors (1103 and 1104) do account for 19 percent of capital stock.

We estimate growth in employment, value added per worker, and capital intensity at the sector level by regressing the natural log of each variable on a

year trend. The resulting estimated coefficients are interpreted as the continuous growth rate of the variable, and these coefficients are plotted in Figures 5.3 through 5.5. Figure 5.3 plots the estimated sector-level employment growth for these key subsectors—overall, employment growth is mostly positive in Ethiopia, while in Tanzania and Vietnam there is more variation between subsectors. Figure 5.4 plots the labor productivity growth rates, and Figure 5.5 plots the growth of capital intensity.

In Ethiopia, both beverages subsectors have a continuous employment growth rate above 5 percent, labor productivity growth between 3 and 5 percent, and the fastest rates of growth in capital intensity (near 5 percent). The trend for these subsectors in Tanzania is slightly different—though the malt and malt liquors sectors have positive employment growth—like Ethiopia—soft drinks and water have slightly negative employment growth. Soft drinks and water have positive labor productivity growth, while in malt and malt liquors it is close to zero, but like in Ethiopia, both subsectors have growth in capital intensity.

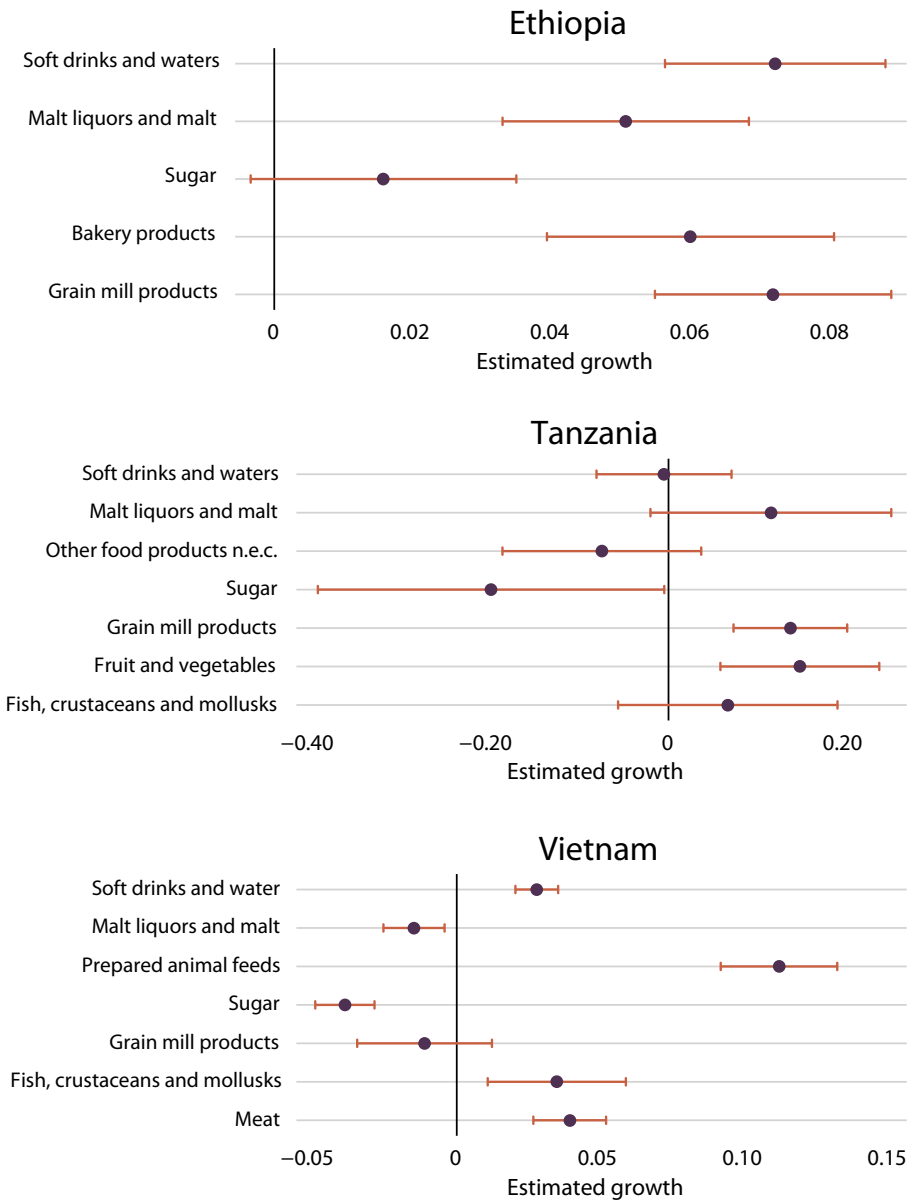
Sugar has the lowest employment growth of Ethiopia's five subsectors, slightly negative labor productivity growth, and the lowest growth in capital intensity—negative 10 percent. Its performance in Tanzania is also somewhat poor—sugar has negative employment growth, close to zero labor productivity growth, and close to zero capital-intensity growth. The final major activity common to both countries, grain mill products, has strong employment and labor productivity growth, but negative growth in capital intensity, in both countries.

Vietnam is quite different in terms of its performance—in its three biggest sectors, employment, labor productivity, and capital-intensity growth are all positive. Moreover, labor productivity and capital-intensity growth are positive in the four subsectors common to Tanzania and Ethiopia—soft drinks and water, malt and malt liquors, sugar, and grain mill products. However, employment growth is negative in malt liquors and malt, sugar, and grain mill products, on average.

Raising Productivity in Small Agrifood Processing Firms

Small and informal firms account for the bulk of agrifood processing firms in African countries (Diao et al. 2021; McMillan and Zeufack 2022). In Ethiopia we have small-firm data available for 2002, 2006, 2008, 2011, and 2014 from the SSI survey, and in Tanzania we have one year of data from its 2013 CIP. From these

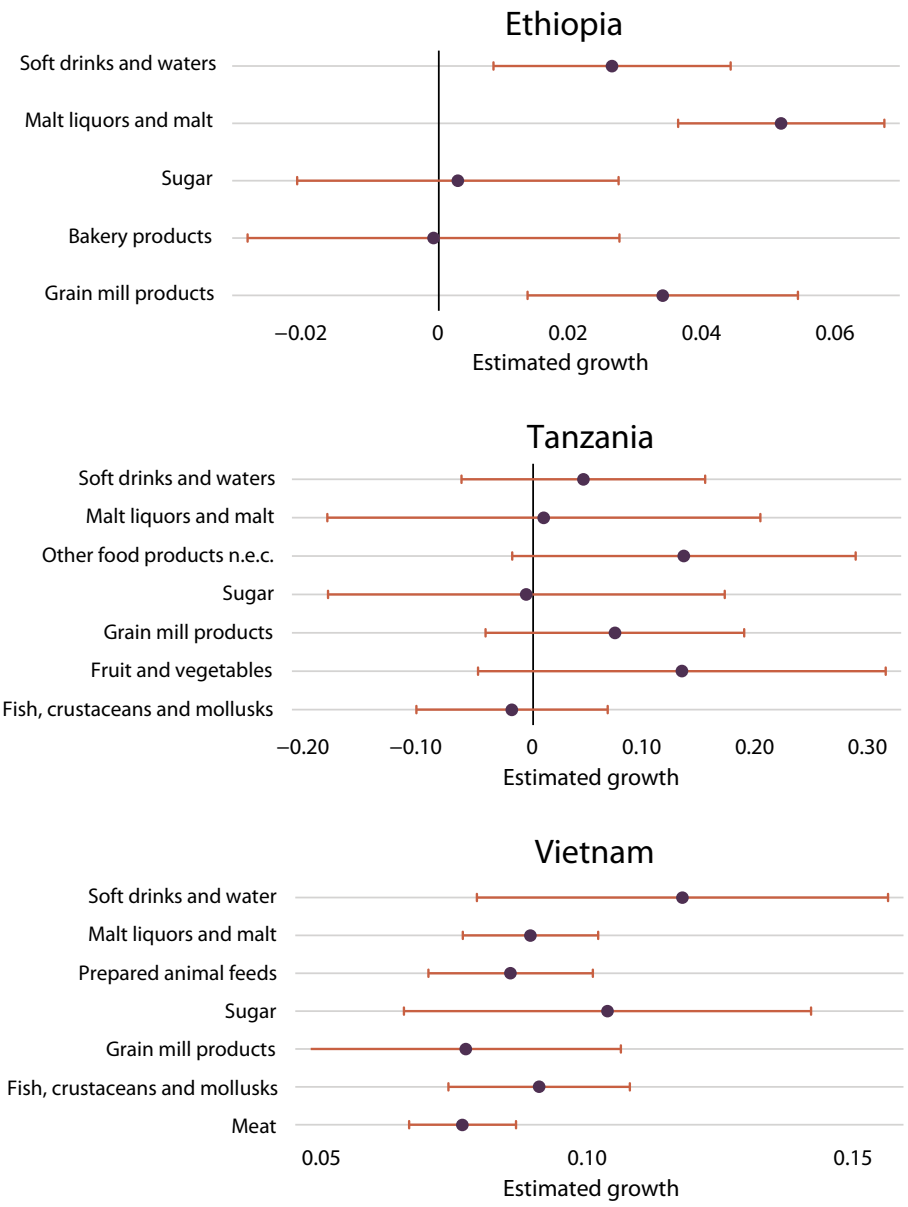
FIGURE 5.3—SECTOR-LEVEL EMPLOYMENT GROWTH, BY COUNTRY



Source: Ethiopia Survey of Large and Medium Scale Manufacturing Industries (1996–2017), Tanzania Annual Survey of Industrial Production (2008–2016), Vietnam Enterprise Survey (2006–2017).

Note: These estimates come from regressions of ln(employment) on a year trend, at the country and 4-digit International Standard Industrial Classification (ISIC) level, with country-industry fixed effects. n.e.c. = not elsewhere classified.

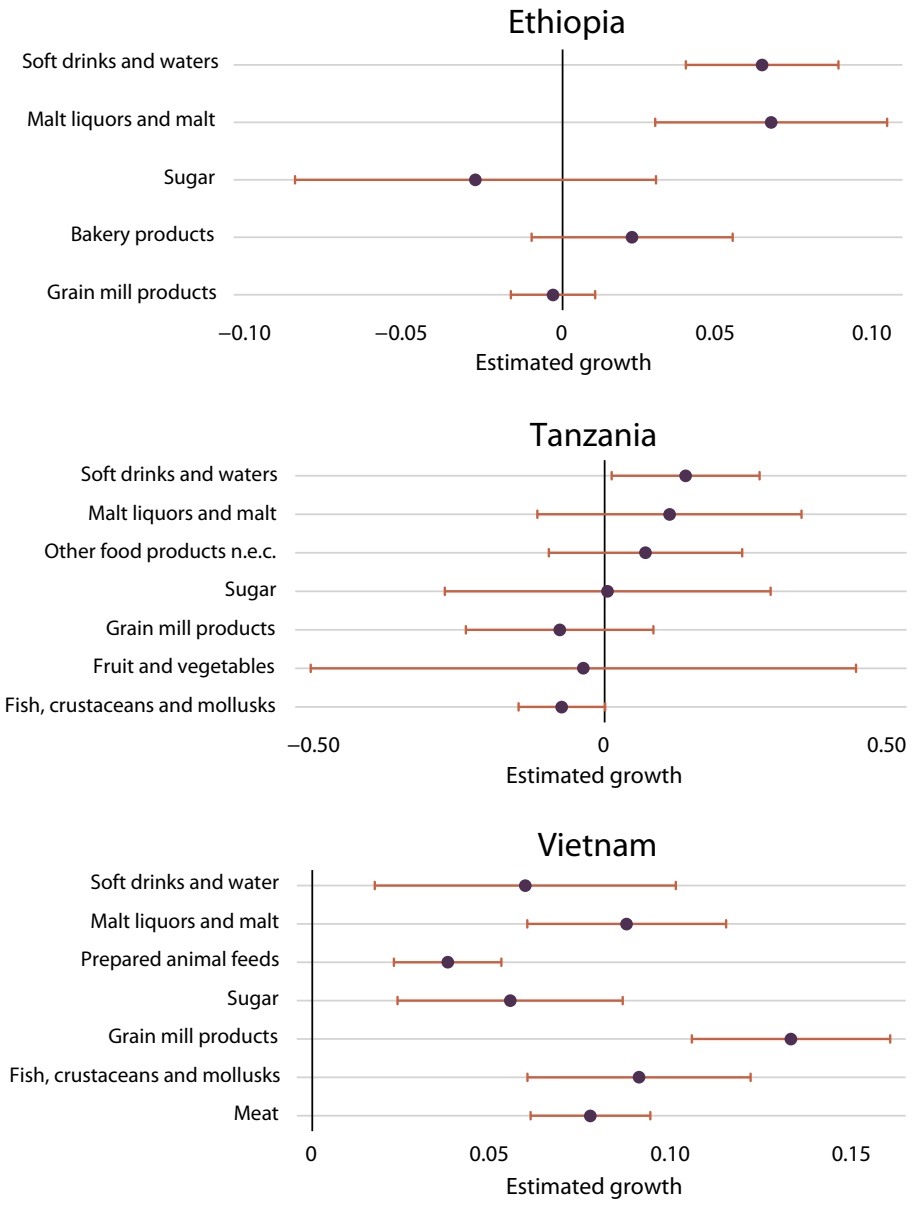
FIGURE 5.4—SECTOR-LEVEL LABOR PRODUCTIVITY GROWTH, BY COUNTRY



Source: Ethiopia Survey of Large and Medium Scale Manufacturing Industries (1996–2017), Tanzania Annual Survey of Industrial Production (2008–2016), Vietnam Enterprise Survey (2006–2017).

Note: These estimates come from regressions of ln(value added per worker) on a year trend, at the country and 4-digit International Standard Industrial Classification (ISIC) level, with country-industry fixed effects. n.e.c. = not elsewhere classified.

FIGURE 5.5—SECTOR-LEVEL CAPITAL-LABOR RATIO GROWTH, BY COUNTRY



Source: Ethiopia Survey of Large and Medium Scale Manufacturing Industries (1996–2017), Tanzania Annual Survey of Industrial Production (2008–2016), Vietnam Enterprise Survey (2006–2017).

Note: These estimates come from regressions of ln(capital/worker) on a year trend, at the country and 4-digit International Standard Industrial Classification (ISIC) level, with country-industry fixed effects. n.e.c. = not elsewhere classified.

data we confirm that total employment in agri-processing is greater in small firms than in the large firms covered by each country's manufacturing census; with the addition of "cottage" firms not covered by the SSI or CIP, a greater majority of total employment is accounted for by the informal sector.

These smaller firms provide employment and supplemental income to the owners of these enterprises, but the evidence to date suggests that productivity in these enterprises is very low. Finding ways to increase the productivity of these enterprises would be a boon to the owners of these businesses and to the economies in which they reside. In this section we describe some of the strategies currently under way for raising productivity in small agrifood processing firms in Africa and beyond.

Small and Medium Enterprise Incubator Program in Ghana

In early 2021, the African Center for Economic Transformation (ACET) launched an incubator program designed to integrate small and medium enterprises (SMEs) in the manufacturing space into local, regional, and global value chains (GVCs). The incubator phase of the program assists firms in all aspects of business from input sourcing to management training; ACET has partnered with firms such as Price Waterhouse Coopers and EVC Africa Ltd to provide this assistance (https://acetforafrica.org/psd/acet-business-transform/). ACET is currently piloting the incubator program with 10 businesses in Ghana with plans to expand (also to other countries) if the pilot is successful. The 10 firms range in size from about 6 to 46 employees and operate in agrifood processing, cosmetics, construction, electric vehicles, and plastic waste recycling (Brown and Odoom 2021). The hope is that by providing intensive technical assistance to these small firms, they will eventually be attractive to equity investors and this type of investment will allow these firms to grow the number of employees they engage and at the same time raise their productivity.

Match Maker Group, Tanzania

Match Maker Group (MMG) is a small private firm located in Arusha, Tanzania. The group has two teams working with small- and medium-size agribusinesses—Business Development Services (BDS) and the SME impact fund. According to MMG, the SME impact fund serves SMEs that are too large to access microloans but have limited access to the formal banking sector. The fund currently has around 40 businesses in its investment portfolio across Tanzania. Almost all these firms operate in 12 different agrifood processing subsectors: maize, rice, meat, baked goods, coffee, spices, nuts, seeds, banana wine, groundnuts, cashew nuts, and dairy.

An important part of the work done by MMG is the business development services it offers to SMEs. These services are designed to enhance the management capabilities of the SMEs in order to make them investment ready. The services offered include

- analyzing the past performance of the company,
- setting up (tailor-made) basic books of accounts,
- developing a medium-term business plan,
- projecting multiannual profit and loss account and balance sheets,
- collecting impact baseline data and agreeing on benchmarks, and
- supporting compliance of the business with Tanzanian laws and regulations.

The BDS business consultants spend time at the premises of the SMEs, working closely with the SME owners for several days to gain firsthand knowledge of the business operations. This work is followed by intensive coaching by phone and email as well as follow up visits.

Impact of Business Consulting Services on Small Firm Outcomes

Recognition of the role of management practices in firm outcomes has grown over the last several decades (Bloom et al. 2014). The prevalence of practices such as monitoring, targets, and incentives has been linked to organizational performance across disparate sectors. For example, Bloom, Sadun, and Van Reenen (2016) find a positive relationship between management and total factor productivity, while Meagher and Strachan (2013) suggest that there is complementarity between multiple managerial practices. Additionally, evidence from randomized controlled trials (RCTs) reveals a causal impact of management on productivity; Bloom et al. (2013) provided free management consulting to textile plants in Mumbai and found that adoption of the management practices led to large increases in productivity over a period of several months.

However, the evidence on the role of management and management training in small firms is somewhat more ambiguous (Bloom et al. 2014; Karlan, Knight, and Udry 2012). Some studies find positive effects of management practices on profits in SSA (Mano et al. 2012), Peru (Valdivia 2015), and Mexico (Bruhn, Karlan, and Schoar 2018; Calderon, Cunha, and De Giorgi 2020). Others find negative effects, including Giné and Mansuri (2014) and Drexler, Fisher, and Schoar (2014).

The ACET initiative is in its infancy, and it is therefore too early to assess its effectiveness; designed as a pilot, if its approach is efficacious then it may be scaled at a later stage. As far as we know, the MMG initiative has not been evaluated for its effectiveness. Moreover, the small number of firms served by MMG make a meaningful impact evaluation difficult. It is clear though that both approaches are costly due to the time- and labor-intensive nature of the services provided and the relatively poor management practices of the small firms being served. To assess the impact and cost-effectiveness of this type of service we turn instead to two recent randomized controlled trials that assess the impact of business consulting services in Mexico and Colombia.

The first intervention described in Bruhn, Karlan, and Schoar (2018) took place in Mexico. A total of 432 SMEs participated in a study where access to business consulting designed to improve management practices was randomized. The authors find that one year of management consulting services raised total factor productivity, return on assets, and "entrepreneurial spirit" where entrepreneurial spirit is an index that measures entrepreneurial confidence and goal setting. Using Mexican social security data, the authors also find a persistent and large increase of the treatment on the number of employees and the total wage bill five years postintervention. Finally, they document significant heterogeneity in the specific managerial practices that improved as a result of the consulting, with the most prominent being marketing, financial accounting, and long-term business planning. However, this management consulting was costly at a little under US$12,000 for a year of services. While the authors' calculations indicate that the benefits outweigh the costs for the treated firms, this does raise questions about the widespread use of this type of intervention in much poorer countries.

A second intervention—in Colombia (Iacovone, Maloney, and McKenzie 2022)—targeted at auto parts firms takes the issue of cost seriously and adds a treatment arm in which management consulting is provided to small groups of firms at roughly one-third the cost of individual consulting. Specifically, the study tests two different approaches to improving management in Colombian auto parts firms. The first approach uses intensive and "expensive" one-on-one consulting, while according to the authors, the second approach draws on agricultural extension approaches to provide consulting to small groups of firms. Both interventions lead to an 8 to 10 percentage point improvement in management practices. The group-based approach seems to lead to significant improvements in firm performance, although the one-on-one results appear stronger. The authors interpret this evidence as suggestive of the potential for group-based approaches as a pathway to scaling up interventions that improve management improvements.

Opportunities

Intra-African Trade

Global agrifood trade reached almost 10 percent of total global trade in 2020, and exports to the Global North often receive focus as a source of big opportunity for agrifood processing exports (Mizik 2021). To date, however, African exports make up a small share of this trade (Bouët, Tadesse, and Zaki 2021). Notably, the share of African agrifood exports to the European Union declined during 2005–2018, but exports to economies such as Brazil, China, India, and Russia grew. Technical barriers to trade and quality standards imposed by importing countries as well as customs procedures within the continent and poor infrastructure limit African countries' ability to further break into the global agrifood market. The African Continental Free Trade Area may help address some of these barriers for trade within the continent, and in this section we therefore focus on the potential of intraregional trade.

Intra-African trade in processed agricultural products has almost tripled in value over the last two decades and rapidly increased its share in total intra-African agricultural trade (Bouët, Tadesse, and Zaki 2021). The African Continental Free Trade Area was founded as a free trade area in 2018 with 54 of the 55 African Union nations as signatories (the exception being Eritrea). To date, 36 states have ratified the agreement, and trade under the agreement officially commenced at the start of 2021. Its key functions include progressively eliminating tariffs on intra-African trade (with alternate timelines for implementation based on countries' income status); implementing rules of origin; monitoring and eliminating nontariff barriers; and establishing an online

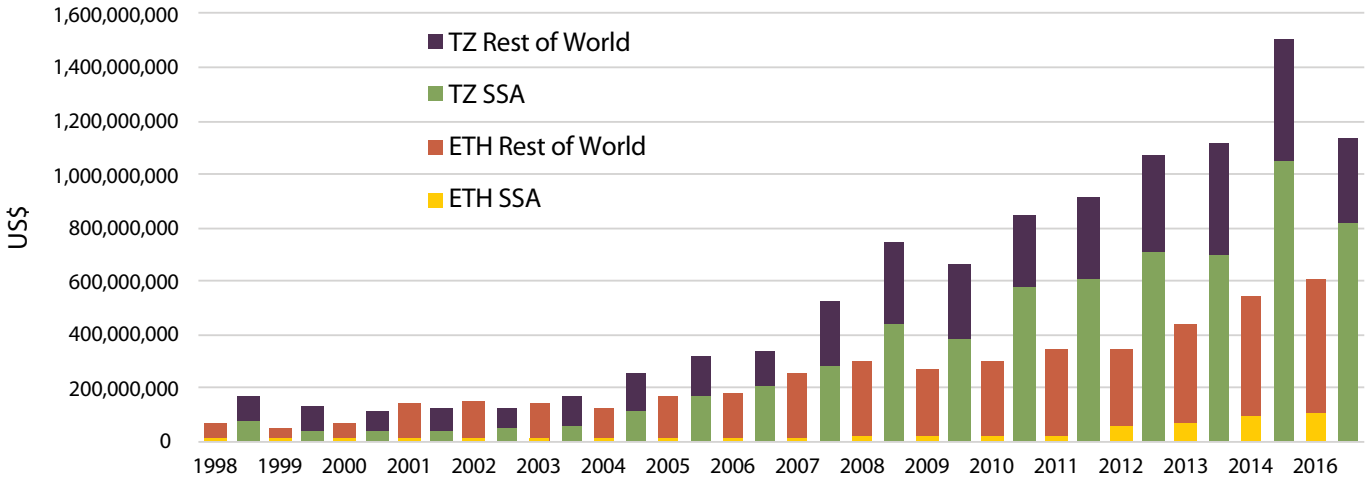
negotiating forum, the digital Pan-African Payments and Settlements System (launched in January 2022), and the African Trade Observatory. Arguably, the largest potential gains of the African Continental Free Trade Area are dynamic and arise mainly from access to larger markets and economies of scale in production. Another less tangible but potentially important benefit of the agreement is political. Most of Africa's economies are relatively small; this limits their bargaining power vis-à-vis the rest of the world in international forums such as the World Trade Organization. Regional integration has the potential to change this dynamic.

To what extent might the African Continental Free Trade Area catalyze the development of agrifood processing in Africa? A comparison between Ethiopia and Tanzania is instructive (based on Diao and McMillan 2019). Figure 5.6 shows that both countries experienced a steady upward trend in the value of exports in the two decades leading up to the pandemic. However, Ethiopia's exports go almost exclusively to countries outside of Africa, which is consistent with what we know about the Ethiopian government's push to include Ethiopia in GVCs. By contrast, a large majority of Tanzania's manufacturing exports go to other countries in Africa.

What is perhaps surprising is that Tanzania's export volume and growth from 1998 through 2017 are more than double those of Ethiopia. After all, the government of Ethiopia has aggressively incentivized manufacturing for export with its industrial parks and tax incentives, while as far as we can tell, the Tanzanian government has been much more laissez-faire.

One reason for the differential export performance is that exports from Ethiopia and Tanzania are very different. The top 50 products exported from Ethiopia account for 65 percent of Ethiopia's manufacturing exports; 84 percent of the top 50 products are classified as textiles including leather and footwear. In Tanzania, 85 percent of the country's export products are resource intensive, with 50 percent classified as agri-processed goods and another 35 percent classified as material-intensive products. The agri-processed goods consist of items like bottled juices, cooking oils, and packaged flour, while the resource-intensive products consist of items such as wood products and furniture; household articles made from plastic materials such as buckets, washbasins, chairs, and clothing hangers; and construction materials such as cement, glass, and ceramic products. In sum, agri-processed and resource-intensive goods account for 68 percent of total manufacturing exports from Tanzania (Diao and McMillan 2019). Intra-African trade in manufactured exports, like that occurring in Tanzania, has also been documented elsewhere (Hallward-Driemeier and Nayyar 2017). In many ways, this trend bodes well for the African free trade area. African countries still import much of their food;

FIGURE 5.6—GLOBAL VALUE CHAINS VERSUS INTRA-AFRICAN TRADE



Source: Diao and McMillan (2019).
Note: TZ = Tanzania; SSA = Africa south of the Sahara; ETH = Ethiopia.

the evidence from Tanzania suggests that some of this demand could be met by Africa-based agri-processors.

But while Tanzania's export performance is impressive, there has been little employment growth in Tanzania's formal manufacturing sector. One issue is the high capital intensity of resource-based manufacturing. Nonetheless, agri-processing has the potential to create jobs and wealth indirectly for logistics and packaging companies, restaurants and hotels, agricultural input suppliers, and so on (Sexton, Azura, and Saitone 2015).

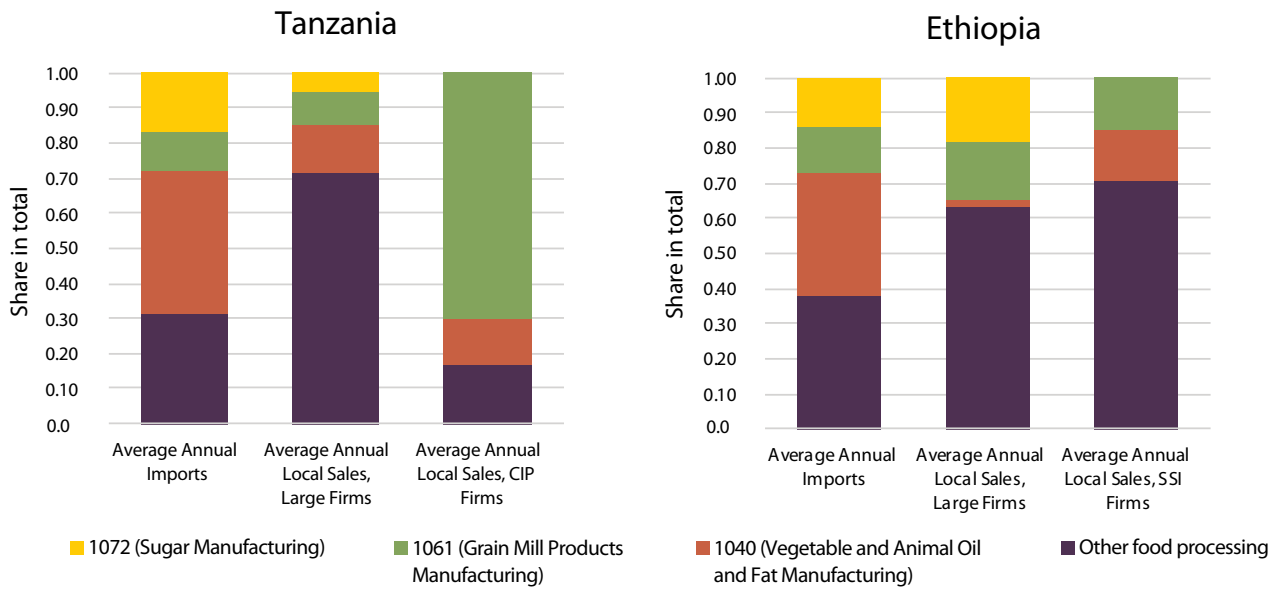
Scope for Import Substitution

This section compares the growth of processed food imports and local processed food manufacturing. For imports, we analyzed the size and growth of different processed food categories using Broad Economic Categories (BEC) trade data from the Database for International Trade Analysis, known as the Base pour l'Analyse du Commerce International (BACI) dataset. This involved mapping HS6 categories to ISIC 4-digit groups before collapsing the data to the ISIC 4-digit level. Sales come from our firm-level manufacturing censuses. Note that the data for local production numbers comprise only large, formal-sector firms, and annual import data are available from 1998 to 2018 for both countries. Therefore, we consider 2008–2016 for Tanzania and 1998–2017 for Ethiopia, the years for which we have both census and BACI data.

The firm census data in Ethiopia and Tanzania cover only firms with 10 or more workers; data availability is more limited for firms with fewer than 10 workers, but we have Ethiopia's SSI survey for 2002, 2006, 2008, 2011, and 2014 and Tanzania's 2013 CIP. We use these sources in this section to measure small-firm activity; because there is only one year for the Tanzania CIP, we are not able to use those data to look at changes over time.

Figure 5.7 breaks down the shares of processed agricultural imports accounted for by the biggest subsectors, compared with the share of local sales. For local sales, we show the breakdown for large firms (10 or more workers) using the census data and for small firms (fewer than 10 workers) using the small-scale data. The three biggest import categories in terms of processed foods in both countries are (1) vegetable and animal oils and fats (ISIC 1040), (2) grain mill products (ISIC 1061), and (3) sugar (ISIC 1072). By examining these three categories in terms of local production, we seek to ascertain whether there is potential for domestic growth in these industries.

FIGURE 5.7—AVERAGE ANNUAL IMPORTS VERSUS AVERAGE LOCAL SALES, ETHIOPIA AND TANZANIA



Source: Base pour l'Analyse du Commerce International (BACI) (1998–2017), Ethiopia Survey of Large and Medium Scale Manufacturing Industries (1998–2017), Ethiopia SSI (2002–2014), Tanzania Annual Survey of Industrial Production (2008–2016), Tanzania CIP (2013).

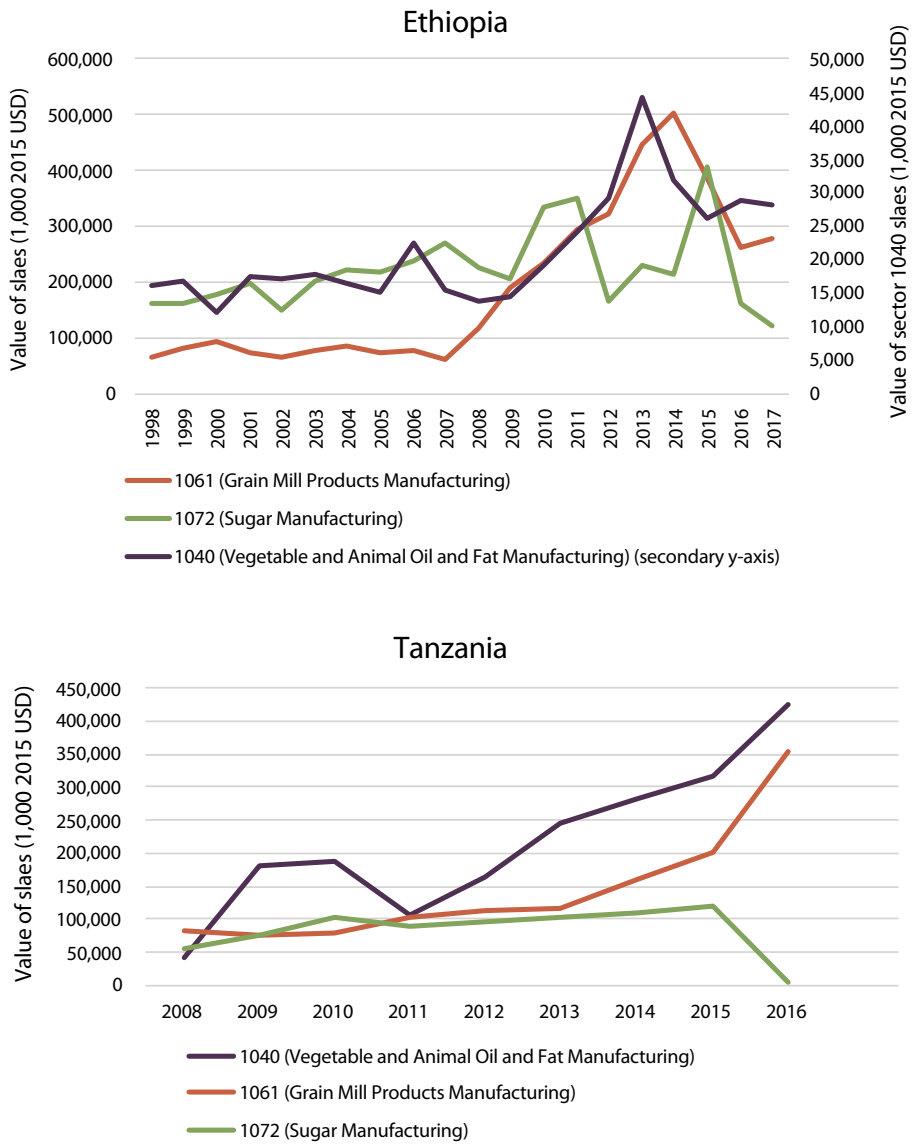
Note: These figures display the breakdown of agri-processing imports and local sales by share into the three biggest import subsectors. We break down local sales for large firms (10 or more workers) and small firms (fewer than 10 workers). CIP = Census of Industrial Production; SSI = Small-Scale Industries.

In Tanzania these product categories account for 65 percent of the value of processed agricultural imports, and in Ethiopia 62 percent. In both countries, vegetable and animal oils and fats are the biggest category, accounting for 47 and 35 percent of imports in Tanzania and Ethiopia, respectively. Sugar imports make up a slightly larger share than grain mill products in both countries as well, accounting for 17 and 11 percent of imports in Tanzania and 15 and 13 percent in Ethiopia.

These three categories do not represent a majority of local sales from domestic production, and they do not follow similar patterns in the two countries either. In Tanzania vegetable and animal oils and fats represent 14 percent of local sales, while grain mill products account for 9 percent and sugar just 5 percent. Among firms with fewer than 10 workers, however, grain mills account for 70 percent of sales in 2013—the share accounted for by vegetable and animal oils and fats is similar to large firms at 13 percent, while there is no measured activity in sugar. In Ethiopia grain mills and sugar are larger sectors, representing 16 and 19 percent of local sales, respectively, while vegetable and animal oils and fats make up just 2 percent. At the small-scale level, grain mill activity makes up about 15 percent of sales (similar to large firms), while vegetable and animal oils and fats is relatively larger at 14 percent, and similar to Tanzania, there is no measured activity in sugar processing among small firms.

Deviation in local sales proportions between the three categories can be attributed to differences in resources and manufacturing infrastructure between the two countries. However, if we consider that their share of imports in these three categories is remarkably similar, there might be an avenue for exploration regarding at least one of these nations having underutilized potential for growth domestically in one such industry. To explore this idea further, we can examine local trends in production for the three categories, which are shown in Figure 5.8, while Figure 5.9 shows the same results for firms with fewer than 10 workers in Ethiopia, using the SSI data. In both countries (and in Ethiopia, for both small and large firms), we find that the value of local sales has been growing consistently in both vegetable and animal oil and fats and grain mill products, while growth in sugar processing has seen comparatively little growth. This may indicate that there is greater scope for growth in sugar processing in the future.

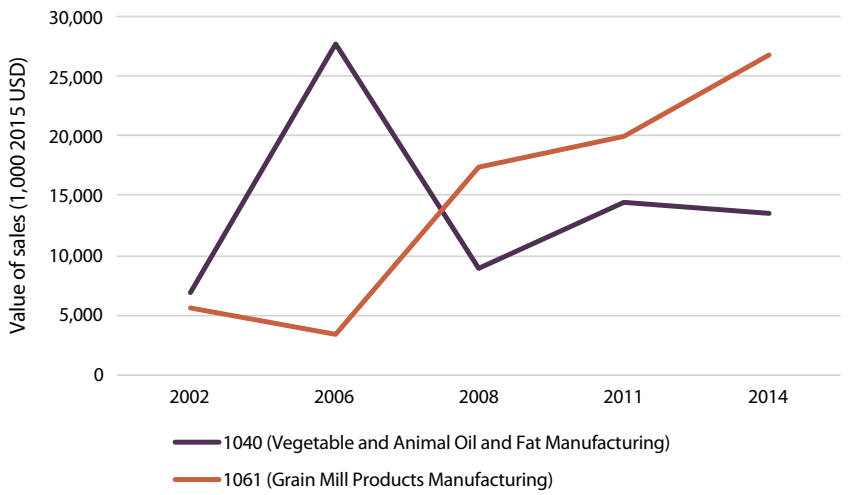
FIGURE 5.8—TRENDS IN LOCAL PRODUCTION, ETHIOPIA AND TANZANIA



Source: Ethiopia Survey of Large and Medium Scale Manufacturing Industries (1998–2017), Tanzania Annual Survey of Industrial Production (2008–2016).

Note: These figures display trends in the value of local sales of the three biggest import subsectors for both Ethiopia and Tanzania.

FIGURE 5.9—TRENDS IN LOCAL PRODUCTION, ETHIOPIA SMALL FIRMS (2002–2014)



Source: Ethiopia Small Scale Industries (SSI) (2002–2014).

Note: These figures display trends in the value of local sales of the two biggest import subsectors for Ethiopia—sector 1072 (sugar) is not included because there is no activity among SSI firms in that sector.

Challenges

Capital Intensity of Agrifood Processing

We have a lot of evidence indicating that technological innovation in manufacturing has favored capital over labor. At the same time, the spread of GVCs and increased openness to trade have had the effect of homogenizing technology around the world (Rodrik 2018). Sen (2019) reports that trade integration reduces the employment intensity of manufacturing production in developing countries. Pahl and Timmer (2020) find that participation in GVCs tends to increase labor productivity but not employment. And Pahl et al. (2019) show that technological change in formal manufacturing has led to employment declines in Kenya, Senegal, and South Africa. This confluence of events makes it more difficult for low-income African countries to gain a foothold in formal manufacturing—even for domestic markets.

Using firm-level data, Diao et al. (2021) show that the capital intensity of formal manufacturing in both Ethiopia and Tanzania far exceeds economywide capital intensity. This is especially true of the larger, most productive firms, where capital intensity approaches (or exceeds) levels observed in the Czech Republic, a country that is around 20 times richer. High levels of capital intensity (and possibly of skill intensity as well, though they do not measure that) appear to be an important reason behind the poor employment performance of larger formal-sector firms. They argue that unlike earlier waves of developing nations, Tanzania and Ethiopia joined the world economy at a point where technical change and globalization were already established trends. Like many low-income countries in Africa, Ethiopia and Tanzania are still poor and have very low relative capital endowments. This creates a conundrum: competing with established producers on world markets is possible only by adopting technologies that make it harder to generate significant employment.

Formal-sector agrifood processing is not an exception. As we showed in the firm-level analyses, capital-labor ratios in this sector are greater than those in manufacturing as a whole in Ethiopia and on par with manufacturing as a whole in Tanzania. This raises an important question about the employment potential of agrifood processing in Africa. It is clear that agrifood processing creates jobs indirectly through its strong backward linkages to agriculture, but as far as we know, we do not have good evidence for this potential in the African context. Instead, we rely on evidence from California in the United States presented in McMillan and Zeufack (2022) to make this argument.

Agrifood processing has the potential to create jobs and wealth indirectly for logistics and packaging companies, restaurants and hotels, agricultural input suppliers, and so on. For perspective, Sexton, Azura, and Saitone (2015) estimate using input-output tables that in 2012, California's food and beverage processing sector directly accounted for around $25 billion in value added and 198,000 jobs. However, the indirect benefits associated with the food and beverage industry were far greater and include an additional $57 billion in value added and another 562,000 jobs. The extent to which these sorts of linkages can generate large-scale job creation in Africa is an open question.

Agricultural Productivity

The productivity of the agricultural sector is key to the performance of agrifood processing in African countries. According to Jayne and Sanchez (2021), over the last 20 years countries in SSA experienced the most rapid agricultural production growth rate of any region of the world. Jayne and Sanchez argue that these trends

reflect positive changes for SSA, but they caution that many challenges remain. Among the most important of these challenges, Jayne and Sanchez argue, is the need for more rapid agricultural productivity growth. In particular, they show that increases in agricultural production have been driven by the expansion of cultivated land, not by improvements to productivity. They argue that mounting land pressures and environmental damage caused by continued agricultural area expansion underscore the urgent need for increasing the productivity of the region's land already under cultivation.

The need for raising yields in agriculture is echoed in Suri and Udry (2022). They discuss recent trends in agricultural productivity in Africa and highlight how technological progress in agriculture has stagnated on the continent. They review the literature that tries to explain this stagnation through the lens of constraints to technology adoption and find that on their own, these constraints cannot explain the stagnation in yields across Africa. They showcase new research that highlights pervasive heterogeneity in the gross and net returns to agricultural technologies across Africa. They argue that this heterogeneity makes the adoption process more challenging, limits the scope of many innovations, and contributes to the stagnation in technology use.

Although neither of these articles explicitly examines agrifood processing, it is clear from the evidence presented in both pieces that raising yields in African agriculture is critical for the success of the agrifood processing industry. As pointed out by Suri and Udry (2022), doing this is complicated and context specific. Both sets of authors allude to the idea that encouraging private investment in agrifood processing may be part of the answer. Suri and Udry (2022) conclude their piece by asking what it will take to raise yields in African agriculture. Like us, they note that a lot of urban food production comes from imports, so there may be a role for the demand side and better market integration in driving technology adoption to replace these imports with locally produced goods (for a review, see de Janvry and Sadoulet 2020). Creating market incentives that remunerate quality, especially for high-value crops, may be one step toward sparking this demand side (Bernard et al. 2017).

Infrastructure development is also likely to play an important role in agricultural productivity growth (Llanto 2012). For some crops, transport from the farm to processing centers is time or climate sensitive. Electrical grid reliability may have an impact on many processing sectors. Bureaucratic and institutional infrastructure also matters; for example, there may be quality constraints such as a lack of a trusted food safety system that push consumers to look for higher quality products from foreign producers.

Conclusion

Agri-processing accounts for a large share of employment and value added in African countries' formal manufacturing sectors. Overall, the performance of formal firms in the agri-business sector appears strong, with both employment and labor productivity growing. At the same time, African countries import considerable (and growing) amounts of processed food. The evidence presented here indicates that some of that food could be produced domestically. Moreover, the case of Tanzania shows that there is a strong and growing market for food processed in Africa and that this intraregional trade can be a source of growth for agrifood processing. There is also a very large share of informal-sector employment engaged in agri-processing across much of Africa. Finding ways to increase the productivity of these small businesses could have large payoffs.

CHAPTER 6

Transforming the Agrifood Processing Sector in Africa: The Role of Industrial Clusters

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Introduction

Agriculture and the agrifood processing sector play an important role in many African economies. Agriculture accounted for approximately 53 percent of total employment in Africa south of the Sahara in 2019 while agricultural value added as a percentage of GDP stood at 17.2 percent in 2021 (World Bank 2022). The agrifood processing sector, which forms part of the wider agro-industrial sector,[2] is also a key component in the manufacturing sector in many African economies (UNIDO 2012). For example, in Ghana, food manufacturing accounted for more than 33 percent of manufacturing value added in 2015. Moreover, food manufacturing's share of total manufacturing stood at 14 percent in Egypt in 2018, and 58 percent in Zimbabwe in 2017 (UNIDO INDSTAT 2021). This underscores the fact that although the contribution of agrifood processing to total manufacturing may vary across countries, it remains a significant contributor to many African economies, and to meeting the food security needs of the population.

In recent years, factors such as rapid urbanization and patterns of dietary changes have led to a shift beyond grains to non-grain foods (such as dairy and meat) and a rise in demand for processed foods in both rural and urban areas (Reardon et al. 2019a). This presents both a challenge and an opportunity for the agrifood processing sector in Africa. The challenge is that although the agrifood processing sector in Africa is an important one, it is relatively underdeveloped. For instance, while the continent produces approximately 70 percent of the world's raw cocoa, it only produces 16 percent of intermediate cocoa products, which are worth two to three times more per ton than the raw cocoa beans (AfDB 2016). Situations of this kind also represent a significant loss to African economies in terms of employment, lost revenue, and cost of importing processed food products. The opportunity, however, lies in the fact that the increased demand for processed food products offers a ready market for a well-developed agrifood processing sector. Therefore, the ability of the sector to develop and market innovative products will prove essential in tapping into these markets.

Industrial cluster is a general term for an agglomeration of firms that operate in a particular sector at a specific geographical location (Schmitz 1999). In the agricultural sector these clusters can be grouped into three broad categories: (1) special economic zones (SEZs); (2) agro-industrial parks; and (3) agri-clusters (Ulimwengu and Jenane 2019). These categories of clusters can be formed through a managed process often initiated by deliberate government intervention as a means of promoting economic growth, formed organically without or with limited government intervention, or formed through a combination of these measures.

Within this context, and in relation to agrifood processing firms, we can define an agrifood cluster as a concentration of producers, agribusinesses, and institutions in the same agrifood subsector that come together to build value networks while addressing common challenges and pursuing common opportunities (Nogales 2010). The development of agrifood processing clusters involves building sustainable agrifood value chains that are supported by related industries (FAO 2017). Ulimwengu and Jenane (2019) noted that clustering among agrifood processing firms has the potential to facilitate coordination among various actors along the agrifood value chain and can help reduce costs, increase profits, and facilitate market access. Therefore, creating an enabling environment for the development of clusters is crucial for enhancing value chain investment and ensuring inclusive transformation for firms in the agrifood processing sector (Reardon et al. 2019b). In the context of developing countries, clusters can help to compensate for the small size of firms by facilitating access to markets and upgrading of technology, as well as improving efficiency and productivity (McCormick 1999).

Applying the concept of industrial clustering to the agrifood processing sector therefore offers the potential to facilitate the development of agrifood processing capacity in Africa by tapping into the previously cited benefits. In addition, the development of subsidiary industries would supply various intermediate inputs, create a hub of specialized labor used by firms within the cluster, reduce the cost of employing and training labor, improve efficiency, enhance the competitiveness of firms, and drive innovation (Krugman 1991;

2 Agro-industry can be defined as manufacturing activities that involve the processing of raw materials and of intermediate agricultural, forestry, and fishery products. It provides linkages such that agriculture is the primary source of input and industry as the producer of consumer goods (UNIDO 2012).

Marshall 1920; Porter 1990; 1998; Audretsch and Feldman 1996), which is crucial for sustaining the success of such clusters. For instance, recent empirical studies on industrial clusters in Africa have emphasized that these clusters can contribute to firm growth and performance by promoting innovation and enhancing access to international markets (Oyelaran-Oyeyinka and McCormick 2007; World Bank 2011; Zeng 2008). Also, apart from facilitating knowledge spillovers, it is relatively easier and more cost effective for governments to provide fundamental infrastructure to clustered firms than to firms that are dispersed (Oyelaran-Oyeyinka and McCormick 2007). The existence of such infrastructure can enable firms to adopt the advanced technologies needed to sustain themselves and become more competitive.

Notwithstanding the aforementioned benefits of agrifood clusters, the sustainability of these benefits remains a challenge, especially for clusters in developing countries. For instance, Mayneris and colleagues (2010) stressed that although gains from clusters do exist, over-clustering of firms can lead to congestion that may offset the potential gains. Also, Zhang and Hu (2014), in their study on the evolution of potato clusters in China, noted that the ability of clusters to contribute to the economic development of developing countries will depend on how industrial policies are targeted at the local level by providing the enabling environment for these clusters to thrive. A similar argument was raised in low-income countries by Otsuka and Sonobe (2011), who emphasized the need for investment in managerial human capital and the provision of credit, among other things, to such clusters to ensure their sustainability.

There is therefore an important insight we can gather from Otsuka and Sonobe's emphasis on managerial skills and capacity development. Although the external environment of clustered firms offers certain advantages, firm-level characteristics still play an important role in cluster development. Training programs that draw from successes of similar agrifood processing industries in developed and developing countries can be used to bolster the knowledge, exposure, and capacity of managers in agrifood processing clusters. Better trained managers will then be able to effectively spearhead the implementation of innovation in various aspects of the firms' operations. The goal of this chapter is to dive into the opportunities that industrial clusters offer for enhancing the contribution of the agrifood processing sector in the context of African countries.

Literature Review

UNIDO defines industrial clusters as "geographical concentrations of interconnected enterprises and associated institutions that face common challenges and opportunities" (UNIDO 2020, 18). Generally, studies that focus on industrial clusters in the agrifood processing sector are relatively scant, with studies on agrifood processing clusters[3] in Africa being even rarer. The aim of this section is therefore to draw on existing literature on industrial clusters to highlight some advantages of industrial clusters and ways in which agrifood processing clusters can thrive and contribute to the development of the agrifood sector in Africa. We further use two case studies to highlight some of the challenges and opportunities of the agrifood processing sector in Africa.

Theoretical Linkages and Empirical Evidence

The ideas that provided the framework for much of the thinking on industrial clusters were first identified by Marshall (1920). He suggested a number of reasons to explain the origins of such industrial clusters. First, he noted that physical conditions, such as climate and the nature of the soil, could set the conditions for the localization of an industry. He further noted that clusters could be initiated at the instance of some wealthy families who intentionally invite and settle certain artisans in a particular location to produce some product that they highly demand. Marshall noted that the ultimate condition for the formation of such clusters was the presence of social and political institutions that support the growth of these industries once they are initiated. In addition, he recognized the role of improved and cheaper means of communication, as well as technologies that facilitate the sharing of ideas across long distances, by noting that ease of transportation provides an incentive for firms to localize in a place conducive to

3 We consider agrifood processing clusters as geographical concentrations of interconnected agrifood processing firms and associated institutions that face common challenges and pursue common opportunities.

their production. However, the same forces can also motivate firms to locate near their customer base.

The favorable conditions that characterize industrial clusters provide a useful framework for looking at the development of agrifood processing clusters in Africa. As the African Development Bank (AfDB 2019) noted, about 65 percent of the world's remaining arable land is in Africa, where a large number of crops, from cocoa and cashew to coffee and pineapples, are already domestically cultivated in a vast number of countries. There is, however, room for private sector and government involvement to initiate and develop agrifood clusters that will further enhance the contribution of processing to the agrifood value chain. Because industrial clusters drive innovations, innovation within agrifood processing clusters is key for the contribution of the processing sector to the agrifood value chain in Africa. With increasing concerns about the climate across the globe, it is important that agrifood processing firms be able to develop and adopt innovative production technologies and processes that reduce their footprint on the environment and cut down on waste (FAO et al. 2020). Marshall's work further highlights a key role for infrastructural development, as it makes it easier for firms to localize. Whether firms cluster in an area to meet demand from customers located far away, or choose to localize close to their customers, the presence of adequate infrastructure, such as roads, electricity, and water, is an important force that shapes industrial clusters. A corollary, however, is that agrifood processing firms in Africa may not necessarily need to be located close to the raw material, unlike farms or mining companies. Rather, firms can localize in areas where they can take advantage of other key existing facilities, such as electricity, water, and storage facilities.

Building on some of the ideas of Marshall (1920), Porter (1990, 1998) shaped most modern studies on industrial clusters. According to Porter, in the modern globalized economy, input costs are largely mitigated by rapid transportation and communication channels as well as accessible markets. Consequently, a country's competitive advantage lies not necessarily in its natural endowments but rather in the productivity of factors of production as well as the innovation capabilities of these factors. To him, industrial clusters form the engine of the productivity and innovation that deliver the competitive advantage of nations (Porter 1998, 2000). Clustered firms' productivity growth and innovation capabilities provide insights for the development of agrifood processing clusters. Interestingly, Porter's theory makes it quite clear that the presence of arable land and the cultivation of a number of food crops with international demand on the continent does not guarantee that African countries will gain a competitive advantage in agrifood processing. Rather, it will take the deliberate effort of developing industrial clustering systems that leverage these natural endowments to enhance productivity and innovation in the agrifood processing sector. Agrifood processing clusters can bring together not just agrifood processing firms but also providers of specialized inputs and infrastructure as well as institutions such as research institutions and trade associations. It is these specialized factors of production that give countries a true competitive edge in international markets. Also, as Porter noted, "simply having a general work force that is high school or even college educated represents no competitive advantage"; rather, "a factor must be highly specialized to an industry's particular needs" (1998, 79). These are much rarer forms of input. In the context of Africa's agrifood processing industry, this may involve, for instance, the development of programs in universities that will promote research into innovative food products, as well as produce highly skilled labor to work in the sector. The creation of such specialized factors will no doubt demand considerable and sustained investment. However, when such inputs are made available in the cluster setting, there is the potential for much greater returns.

Otsuka and Sonobe (2011) made an equally important contribution by considering industrial clusters as characterized by different growth stages that are crucial in helping to reduce market failures that increase the cost of doing business in developing countries. The authors described a cluster-based approach to industrial development in Africa by drawing on lessons from some East Asian countries. They indicated that clusters form in three phases: the initiation phase, the quantity expansion phase, and the quality improvement phase. In the initiation phase, pioneering entrepreneurs set up enterprises that mainly produce low-cost imitations of foreign products. At this stage, large domestic demand contributes to considerable levels of profit that attract more entrepreneurs, who largely imitate the pioneer without necessarily making improvements to the product. This is the quantity expansion phase, wherein firms begin to realize the agglomeration economies indicated by Marshall (1920): knowledge spillovers, development of subsidiary industries (input suppliers), and access to skilled labor. The influx of firms, however, leads to excess supply, which drives down prices and profits. Finally, at the quality

improvement phase, the declining profits spark competition to improve on product quality. This growth-stages approach to cluster development therefore proposes that government intervene to provide the needed support for entrepreneurs to build managerial human capital and also the infrastructures needed to sustain the cluster.

On the empirical side, McCormick (1999) used the collective efficiency model to study six industrial clusters from Ghana, Kenya, and South Africa. She noted that the clusters fall broadly into three categories: groundwork clusters, industrializing clusters, and complex clusters. While the groundwork cluster pioneers cluster development and helps to establish access to markets, the industrializing cluster builds on market access and engages in specialization and product differentiation. Complex clusters are more developed and are able to tap into international markets. She found groundwork clusters and industrializing clusters to be more popular in Africa, with only a few complex clusters, and concluded that clusters offer significant potential to advance industrialization in Africa. However, beyond collective efficiency, the institutional environments (economic, social, and political) are key in determining the success of clusters. Zeng (2008) conducted a study of 11 clusters across seven countries in Africa (Ghana, Kenya, Mauritius, Nigeria, South Africa, Tanzania, and Uganda). In shedding light on how these clusters form, he notes some of their common characteristics are their proximity to major cities or the capital city and a focus on meeting the needs of the local market, among others. He further notes that clustering enables small firms to overcome constraints in access to credit, technology, and markets, thus enhancing their contribution to employment and economic growth. However, they continue to face many challenges, such as low levels of innovation, low levels of skills and education, inadequate institutional support, and difficulties in meeting international quality standards. In a related study, the World Bank (2011) emphasized that industrial clusters provide a powerful tool that can be leveraged to surmount the challenges posed by the small size of domestically owned firms. Using case studies from light manufacturing clusters in five African countries (Cameroon, Ghana, Kenya, Mauritius, and Rwanda), this study revealed that firms within clusters had better performance in terms of sales and access to foreign markets. The performance gap between the clustered and nonclustered firms was explained largely by higher capital intensity (the ratio of physical capital to labor in production) within clusters.

Agrifood Processing Clusters in Africa

Much of the existing literature on industrial clusters in Africa has touted clusters as a means for small firms to overcome the challenges they face to their growth. A number of studies have indicated that clusters have the potential to ease growth constraints for small firms and thus promote industrialization in Africa (McCormick 1999; Oyelaran-Oyeyinka and McCormick 2007). Interestingly, the organization of economic activity in clusters is already a well-established phenomenon in a number of African countries. These clusters tend to form due to factors such as limited infrastructure and a culture of strong social capital (McCormick 1999; Zhang 2017). However, agriculture-related clusters form only a small percentage of the clusters studied. The agrifood processing sector has the potential to enhance the contribution of the industrial sector to many African economies.

While agrifood processing clusters are similar to clusters in other industries, they are distinct from other clusters in some key features. FAO (2017) noted that perishability, political sensitivity, and government interference, along with coordination issues related to systemic risk, are major issues affecting agrifood processing clusters. These clusters deal with raw materials that are highly perishable. Fish and other seafood, as well as fruits and vegetables, can spoil and become unsafe to consume in a relatively short period of time. Agrifood processing clusters therefore require a relatively higher level of coordination in terms of storing, transporting, and retailing products. Furthermore, the agricultural sector, due to its link with food security, is often subject to high governmental involvement. Food crises, especially those involving local staple foods, can engender social unrest. Finally, agrifood clusters deal with products whose supply is usually highly sensitive to factors such as variations in weather and the planting choices of farmers. This can present significant challenges in coordination between producers and agrifood processing firms.

The contribution of the agrifood processing industry is essential to economic survival and food security in Africa. In what follows, we look at two case studies of selected agrifood processing clusters in Africa—the fish processing cluster in Uganda and the wine cluster in South Africa—by highlighting their characteristics, successes, and challenges, and the lessons that can be drawn for the successful development of agrifood processing clusters

in Africa. These clusters were chosen based on the availability of relevant information from the literature. There are, however, other important factors that motivate the choice of these two case studies. For instance, South Africa is Africa's largest producer and exporter of wine, accounting for more than 90 percent of the US$658.1 million of wine exported from Africa in 2020. South Africa was also among the top 10 exporters of wine globally in 2020, placing 8th—above Germany and Portugal. Uganda is among eight countries accounting for more than 90 percent of aquaculture in Africa and was also the third-largest contributor to total fish production from Africa in 2019 (Chan et al. 2021). While this leaves out some agrifood processing firms whose existence and operations are not well documented, it does help to provide some idea on the nature and challenges of agrifood processing clusters in Africa.

The development of the fish processing cluster in Uganda began with the British government's establishment of the Uganda Fish Marketing Corporation in 1948, which produced both frozen and salted fish products for Europeans in East Africa at the time (Kiggundu 2008; Hammerle et al. 2010). Fish processing is an important industry in Uganda, providing employment to more than 32,000 Ugandans. It contributes an average of US$116 million in export revenue, being Uganda's second-largest source of foreign exchange (UFPEA 2022). There are a total of 17 fish processing and exporting plants in Uganda, forming clusters in different subregions along Lake Victoria. Kiggundu (2007) shows that there are five each in the major cities of Kampala and Jinja. The Wakiso district has three plants, while the Masaka-Kyotera sub-region has four. Because fish is a highly perishable food, it is important for firms to be able to process their products in a cold chain in order to ensure its marketable shelf-life. As a result, although market access is important, access to infrastructure is an equally crucial locational advantage for these firms.

As already highlighted in the literature (McCormick 1999; World Bank 2011), access to a pool of skilled, industry-relevant labor is one of the key external economies that clusters provide. In the Ugandan fish processing clusters, firms have had to train their workers in factory-based handling of fish, helping to create a pool of skilled workers. However, there is still a lack of workers with highly technical skills related to the fish processing industry (Kiggundu 2008). This has been attributed to a general lack of technicians, food scientists, industrial engineers, and other highly specialized technical labor (Kiggundu 2007). According to Kiggundu (2007), firms usually rely on in-house training of plant workers with limited formal education. Complex tasks, such as product development, still have to be outsourced, due to the lack of such skills locally (Chandra 2006). Similarly, linkages between research institutes and clustered firms to promote industry upgrading and innovation is also an important benefit of clusters. In the Ugandan fish processing industry, however, this linkage is extremely weak. For instance, the National Fisheries Resources Research Institute and the Lake Victoria Fisheries Research Project are two major research institutes that are near the Jinja cluster. However, according to Kiggundu (2007), this proximity has not yielded any industry-commissioned research that would have provided solutions to problems faced by the fish processing firms within the cluster. This outcome might be due to the limited capacity of these institutes and a skills gap in their ability to provide actual market-based solutions.

The Ugandan fish processing industry underwent radical transformation when a directive from the European Union (EU) went into force in 1991 (Council Directive 91/493/EEC), which required the enforcement of strict sanitary and phytosanitary regulations (Chandra 2006). This led to extensive upgrades in various aspects of the processing value chain. Fish processing firms could be approved only if they met plant layout, operations, and hazard analysis and critical control points requirements. Despite the requirements, there was no strict monitoring from the EU on compliance until 1997, when salmonella bacteria were found in Ugandan fish exports to Spain. The upshot of this was an EU ban on fish imports from Uganda. Due to the importance of fish exports to Uganda's economy, the government, along with development agencies and the fisheries clusters themselves, moved swiftly to restore the country's reputation with its European trading partners. This involved mainly improvements in the production process. For instance, some facilities introduced computer-assisted procedures for monitoring yield and storage temperatures. Overall, the standards imposed by a demanding buyer (the EU) helped the fish processing clusters in Uganda make important upgrades in the production process.

The wine cluster in South Africa is over three centuries old, established in 1659 by Dutch settlers. Davidson and colleagues (2009) gave an excellent review of how crop varieties and associated institutions have evolved since that period. South Africa is the world's eighth largest producer of wine, and

its wine industry employs close to 270,000 people directly and indirectly (WoSA 2022). Wine exports have also grown significantly, from 177 million liters in 2002 to 319 million liters in 2020 (WoSA 2022). The cluster is located around the Western Cape, with more than 4,000 farmers cultivating about 108,000 hectares of land. The wine cluster in South Africa has four segments: established producers, new producers, cooperative producers, and wholesalers (Wood and Kaplan 2007).

The end of apartheid between 1993 and 1994 gave way to a boost in the number of small wineries due to the abolishing of the quota system (Wood and Kaplan 2005). Wood and Kaplan (2007) noted that the cluster has benefited significantly from institutional support in terms of marketing along with technical support. The latter has mainly come from the Nietvoorbij Institute for Viticulture and Oenology of the Agricultural Research Council (ARC). The ARC carries out research in a variety of areas related to wine production, including pest and disease management, soil science, postharvest practices, and technology transfer. The Wine Industry Network for Expertise and Technology coordinates the activities of researchers and technicians from the ARC and universities. It also helps in funding and disseminating research to the wine producers within the cluster. Also, the Elsenburg Agricultural College and the Department of Viticulture and Oenology at Stellenbosch University offer courses and programs in viticulture, oenology, and wine biotechnology that train the relevant labor force for the wine industry. In terms of marketing, WoSA has a mandate of promoting South African wines on international markets. As part of its mandate, WoSA is responsible for coordinating wine exports from South Africa, and it promotes the participation of South African wine companies at international trade exhibits. In 2010, WoSA introduced a seal for South African wines that traces the wine from farm to bottle—a seal that authenticates the integrity and sustainability of the wine (WoSA 2022).

These two case studies highlight the importance of institutions in the development of successful agrifood processing clusters. Both of these are exporting clusters, with their exports contributing significantly to their respective countries' economies. However, the Ugandan fish processing cluster, having benefited from strict measures imposed by a demanding buyer, has largely failed to develop institutions that will promote innovation and help improve competitiveness on the global market. The South African wine cluster, on the other hand, has well-developed institutions that provide technical and marketing support. This has contributed to South Africa's position as both a producer and an exporter of wine. Drawing on this literature, Momoh and Alutu (2017) argued that ensuring properly functioning institutions is key to fully harnessing the potential of the industrial sector in Africa. They indicated that the primary mechanism through which institutions can unlock the potential of the industrial sector is through incentives. Institutions help to provide incentives for key economic actors, influencing investments in physical capital and technology, as well as human capital (Acemoglu and Robinson 2008). In the context of developing agrifood processing clusters in Africa, this may require the development of institutions that govern the relationship between farmers and industries, institutions that facilitate the development of human capital for agrifood processing clusters, and institutions that assist in marketing the products of these clusters both on the continent and beyond. This will help to make clusters an effective tool for enhancing the agrifood sector in Africa.

Data Analysis

In this section, we use the World Bank Enterprise Survey (WBES) to study the behavior of agrifood processing firms in Africa. The WBES does not necessarily collect data based on geographical concentrations of firms in a particular industry but rather brings together firms in different industrial clusters (Sonobe, Suzuki, and Otsuka 2011). Nonetheless, understanding the characteristics of the firms that make up the clusters can provide us with valuable insights into key features of the clusters in Africa, as compared with other industrial clusters. The WBES is designed to ensure that the sample of firms is representative of the private sector in each economy surveyed and is therefore a useful way of establishing the position of the agrifood processing sector relative to nonfood manufacturing. This allows us to draw distinctions between agrifood processing firms and nonfood manufacturing firms in Africa in order to highlight the importance of paying more attention to the agrifood processing sector, given its contribution to African economies.

We use the most recent round of the WBES for nine African countries, selecting at least two countries each from North Africa, West Africa, East Africa, and Southern Africa. We employ descriptive statistics and histograms to highlight differences and similarities between agrifood processing firms in

Africa and firms in nonfood manufacturing. We also explore the various types of agrifood processing firms operating in the countries in our sample. Doing so helps us to provide some insight into the potential of and the challenges to the development of agrifood processing clusters in Africa.

Data

The WBES incorporates data from firms in the manufacturing and service sectors of economies around the world. The survey focuses exclusively on firms in the nonagricultural sector. It does, however, include firms that add value to agricultural products or process them into final products for sale. As part of the survey, managers are requested to specify the main product or activity of the firm. Based on the description given, a sector code is assigned to the firm using the four-digit industry classification code from the United Nations International Standard Industrial Classification (ISIC) Revision 3.1.[4] The ISIC enables us to distinguish among various types of agrifood processing firms. With the use of WBES data from nine African countries, we have a total of 8,970 firms surveyed across these countries. Table 6.1 shows the countries surveyed, the survey year, and the number of firms surveyed for each country. We acknowledge that using data from different years may affect our ability to compare different countries.

Food Processing Versus Nonfood Manufacturing

Table 6.2 shows the distribution of firms across the various industries in our sample. We see from the table that compared with nonfood manufacturing, which makes up about 40 percent of firms in the sample, agrifood processing firms form a relatively small percentage (11.81 percent). Food processing firms also form about 23 percent of total manufacturing firms in the sample. The relatively large number of firms involved in nonfood manufacturing may explain why clusters of firms in this sector tend to dominate the debate on industrial clusters in Africa.

Table 6.3 gives a breakdown of the firms that make up the food processing sector in our sample, based on the WBES. We see from the table that food processing firms in our sample are dominated by firms that produce baked products, those that produce grain mill products, and those involved in soft drink and mineral water production.

TABLE 6.1—COUNTRIES USED IN THE STUDY

Country (Survey year)	Frequency	Percentage
Egypt (2016)	1,791	19.97
Ghana (2013)	708	7.89
Kenya (2018)	985	10.98
Nigeria (2014)	2,153	24.00
Rwanda (2019)	360	4.01
South Africa (2020)	1,068	11.91
Tunisia (2020)	607	6.77
Uganda (2013)	708	7.89
Zambia (2019)	590	6.58
Total	**8,970**	**100.00**

Source: Authors' computation with data from WBES.

TABLE 6.2—DISTRIBUTION OF FIRMS ACROSS INDUSTRY

Industry	Frequency	Percentage
Food processing	1,059	11.81
Nonfood manufacturing	3,523	39.28
Construction	449	5.01
Trade (retail and wholesale)	1,898	21.16
Transport and communication	412	4.59
Hospitality (hotel, restaurants)	1,012	11.28
Other services	617	6.88
Total	**8,970**	**100.00**

Source: Authors' computation with data from WBES.

4 https://unstats.un.org/unsd/statcom/doc02/isic.pdf

It is important to note, however, that the food processing industry might play a more or less prominent role in the manufacturing sector in individual countries. Table 6A.1 in the appendix shows the value added from food and beverage firms as a percentage of total manufacturing value added in selected African countries. In the appendix, we also show the value of output of the food and beverage subsector as a percentage of the value of output of the manufacturing sector overall (Table 6A.2).

TABLE 6.3—CATEGORIES OF AGRIFOOD PROCESSING FIRMS

Category	Frequency	Percentage
Meat and meat products	39	3.67
Fish and fish products	15	1.41
Processing and preserving of fruit and vegetables	65	6.11
Vegetable and animal oils and fats	55	5.17
Dairy products	36	3.39
Grain mill products	148	13.92
Starches and starch products	3	0.28
Prepared animal feeds	46	4.33
Bakery products	254	23.89
Manufacture of sugar	7	0.66
Cocoa, chocolate, and sugar confectionery	50	4.70
Coffee processing	59	5.55
Tea processing	15	1.41
Pasta	22	2.07
Distilling, rectifying, and blending of spirits	18	1.69
Manufacture of wine	21	1.98
Malt liquors and malt	5	0.47
Manufacture of soft drinks, production of mineral waters	102	9.60
Tobacco products	8	0.75
Other food processing	95	8.94
Total	**1,063**	**100.00**

Source: Authors' computation with data from WBES.

Size and Age of Agrifood Processing Firms

Several studies have emphasized the dominance of small and medium enterprises (SMEs) in the private sector in Africa and other developing regions (Dinh and Clarke 2012; Ndiaye et al. 2018). Based on this outcome, we further our analysis by examining the difference between the agrifood processing and the nonfood manufacturing sectors in terms of firm size. In Table 6.4, we show the distribution of firms by size in agrifood processing and nonfood manufacturing as well as other industries in our sample. We see from the table that about 80 percent of firms in the sample are SMEs. Also, the agrifood processing sector is similar, in terms of firm size, to the nonfood manufacturing industry, with about 75 percent

TABLE 6.4—AVERAGE FIRM SIZE ACROSS INDUSTRIES

Industry	Micro (fewer than 5 employees)	Small (5–19 employees)	Medium (20–99 employees)	Large (100+ employees)
Food processing	1.32	40.23	35.88	22.57
Nonfood manufacturing	1.05	46.01	30.66	22.28
Construction	0.22	38.75	35.63	25.39
Trade (retail and wholesale)	2.27	59.01	28.50	10.22
Transport and communication	1.21	37.86	38.11	22.82
Hospitality (hotel, restaurants)	1.28	49.31	37.55	11.86
Other services	1.13	50.08	34.68	14.10
Percentage of firms in each category	**1.34**	**47.99**	**32.46**	**18.21**

Source: Authors' computation with data from WBES.

of firms in both industries being SMEs. Again, it is likely that one would find significant differences among the nine selected countries.

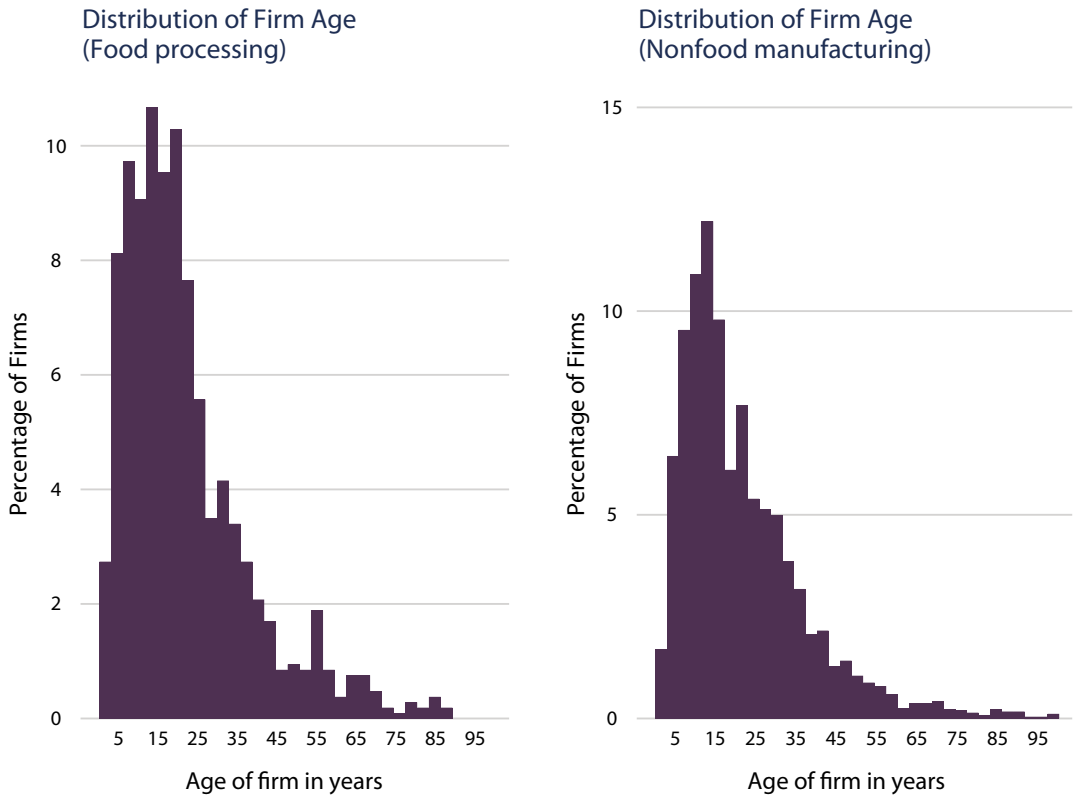
We further distinguish between agrifood processing and other firms by age. In Figure 6.1, we see the distribution of firm age for food processing and nonfood manufacturing firms. The figure shows a generally similar distribution. About 90 percent of firms in both sectors are less than 40 years old. This shows another important similarity. Even though nonfood manufacturing firms far outnumber food processing firms, we see from the current section and the previous one that they are largely similar in terms of both size and age.

Discussion

Our analysis in this section highlights a number of important points. First, the contribution of the agrifood processing sector to the overall output of the manufacturing sector varies significantly across African countries. Generally, however, the nonfood manufacturing industry dominates in most African countries. This offers at least some tentative evidence to explain why several studies on industrial clusters in Africa have focused on firms in the light manufacturing area of the nonfood sector. Furthermore, examining age and size for agrifood processing versus nonfood manufacturing firms shows striking similarities. Thus, the large number of nonfood manufacturing firms is not due to the advantage of age. Moreover, it does not seem to be the case that the agrifood processing sector is dominated by a small number of large firms while small firms dominate the nonfood manufacturing sector. What, then, is the advantage of the nonfood manufacturing sector?

Otsuka and Sonobe (2011) noted that nonfood manufacturing clusters are usually initiated by the production of low-cost imitations of foreign products. The relatively crude technologies used in such production tend to spread quickly, enabling the development of a large number of producers within a relatively short period. Clusters, therefore, form easily and naturally among firms in the nonfood manufacturing sector. With respect to food products, however, it is possible that an initial focus on subsistence agriculture and the export of raw food products has left the domestic agrifood processing sector in many African countries relatively underdeveloped. This may have contributed to the limited investment in agrifood processing in many African countries.

FIGURE 6.1—FIRM AGE DISTRIBUTION FOR AGRIFOOD AND NONFOOD FIRMS



Source: Authors' computation with data from WBES.

We have seen in this section the position of the agrifood processing sector relative to the nonfood manufacturing sector in Africa. Agrifood processing firms tend to be outnumbered by nonfood manufacturing firms, even though the distribution of firms by age and size is roughly similar in both sectors. In order to promote industrial clusters in the agrifood industry, it may therefore be important to consider ways to ensure a large and consistent supply of agricultural raw materials for agrifood processing firms. This could be achieved by developing a system for aggregating output from smallholder farmers. Furthermore, governments could partner with the private sector to expedite the shift from subsistence agriculture to large-scale production, including fruits and vegetables, fish, and meat products. The private sector is already showing great potential in helping to develop the agrifood processing industry in Africa, with the proliferation of SMEs in the various subsectors (AGRA 2019). As emphasized by Otsuka and Sonobe (2011, 6), an "entrepreneur-led and government-backed" approach may be very useful in helping to encourage the formation of successful, dynamic, and globally competitive agrifood processing clusters.

Conclusion and Policy Recommendations

This chapter has relied on the available literature and firm-level data to stress the importance of industrial clusters in the agrifood processing sectors from an African perspective. Although limitations exist, the theoretical literature is explicit on the potential gains of such clusters, especially for the African countries, if they are to reap the full benefits of the African Continental Free Trade Area (AfCFTA) initiative. Nevertheless, and as several authors have revealed especially in the context of African countries (see Abdelaziz, Ellis, and Zhang 2021; Abdelaziz et al. 2021), bottlenecks are often associated with industrial clusters that experience a decline in external demand due to a loss of international competitiveness and supply-side constraints, including limited infrastructure, labor supply shortages, limited innovation, and value addition, among others. These constraints require the collective effort of both public and private sector stakeholders, such as the local government and business associations. We therefore provide the following recommendations.

The Role of Government

The work of Marshall (1920), Porter (1998), and Otsuka and Sonobe (2011) highlights the importance of government intervention in the development of clusters. However, it is important to understand that although some of the most successful industrial clusters, such as the garment industry in Bangladesh, were government-initiated, government can play a significant role in cluster development by facilitating and providing an enabling environment for the organic development of clusters, as the literature suggests. The provision of infrastructure such as roads and electricity is a major area where the government can contribute to providing an enabling environment for cluster growth and development. As noted earlier, agrifood processing firms have to deal with perishable goods. It is therefore important that a transportation infrastructure be developed to link farms to storage facilities and processing firms. Reliable electricity supply is also essential for the production and storage of both plant and animal products. In the area of policy, it is also important to have sound and clear guidelines for the operation of agro-industrial firms. The case studies also underscore the importance of institutions. Government plays a particularly key role in this respect. By providing the appropriate institutional frameworks, such as legal structures and policies, government can provide the right signals and incentives to encourage the participation of private sector actors, thus helping to grow and strengthen agrifood processing clusters. As noted by Oyelaran-Oyeyinka and McCormick (2007), it is relatively easier and more cost-effective for government to provide a conducive institutional environment and fundamental infrastructure to clustered firms than to dispersed ones. Also, as suggested by McArthur and Sacks (2019) concerning agricultural development and economic growth in Uganda, similar arguments can be made for targeted overseas development assistance in the agriculture sector that can bring about the needed structural transformation by providing the infrastructure required to sustain the industrial clusters.

The Role of Research and Training Institutions

As emphasized in Porter's (1998) model of industrial clusters, innovation and input productivity are the main drivers of cluster development. Public and private research institutions have a part to play in helping to develop new products and

production processes. Innovation helps to enhance product quality and improve efficiency in production, thus helping to make products more competitive on the global market. The creation of specialized inputs can also improve output. As shown in our case studies, having university departments and institutions dedicated to the development of human capital for the wine industry has contributed to the success of the South African wine cluster, while the lack of such human capital in the fish processing industry in Uganda has stifled the potential of the cluster.

Export-Oriented Clusters

It is important that the development of agrifood processing clusters have an export-oriented focus. For instance, the fish processing cluster in Uganda mainly exports to the EU, while the wine cluster in South Africa has Germany, the Netherlands, and the United Kingdom among its biggest export destinations in recent years (WoSA 2022). FAO (2017) noted that while domestic industries can develop successful clusters, those that are export-oriented tend to be more profitable. This is due to less sophisticated demand in domestic markets as well as a lack of intra-cluster cooperation in dealing with common challenges (Nogales 2010). It is equally important to note that export-oriented agro-processing seems rather easy for African economies. For example, the Everything But Arms initiative of the EU allows duty-free and quota-free imports from all least developed countries. In practice, however, nontariff measures such as hygiene standards, among other red tape, present high barriers to market entry for most firms from Africa. Also, apart from exporting to Europe or other developed regions, the ratification of the AfCFTA presents the prospect of a single market with more than a billion consumers and more than US$2 trillion in GDP (AGRA 2021). This attractive prospect highlights the importance of developing agrifood processing clusters both as a means of achieving the Feed Africa initiative of the African Development Bank (AfDB 2019), as well as boosting economic growth and development by promoting intra-African trade. This is not a call to shift focus entirely to existing sectors, such as coffee, cocoa, or fish. Rather, it emphasizes the need in the medium to long term to also develop and market new and improved products that can compete on global markets.

Focus on SME Development

Generally, the business environment in Africa suffers from such challenges as limited access to credit, weak institutions, and a lack of infrastructure. This partly explains why SMEs dominate in the private sector. The collective efficiency framework of Schmitz (1999) showed that the externalities generated by clustering enable small firms to enjoy large-firm benefits through the pooling of resources and collaboration with other firms. These include, among others, access to market information, technological spillovers, and skilled labor. Developing successful agrifood processing clusters in Africa will therefore benefit from encouraging the development of small firms. Thus, instead of spending on large state-owned factories, which may collapse due to the lack of managerial ability and other inefficiencies, government initiatives facilitating the training of SME entrepreneurs in the agrifood processing sector should be supported. These entrepreneurs can form the nucleus for the development of a thriving agrifood sector, as they gather experience and expertise in the sector over time. This is consistent with Otsuka and Sonobe's (2011, 6) "entrepreneur-led and government-backed" approach to cluster development in Africa. As noted by Schmitz and Nadvi (1999), eventually, successful clusters will not be dominated exclusively by small firms. However, it is important to leverage the limitations of the environment in order to build successful agrifood processing clusters by taking advantage of the existence of small firms.

Appendix

TABLE 6A.1—NUMBER OF FOOD AND BEVERAGE INDUSTRIAL ESTABLISHMENTS AS A PERCENTAGE OF TOTAL MANUFACTURING ESTABLISHMENTS

Country	2013	2014	2015	2016	2017	2018
Algeria	25.31	25.13	24.66	NA	NA	NA
Angola	NA	56.40	51.24	NA	NA	NA
Cabo Verde	32.28	33.16	33.33	32.74	31.59	NA
Egypt	55.63	56.29	58.80	58.85	NA	NA
Eritrea	33.33	26.01	29.87	33.77	37.25	34.80
Eswatini	19.49	19.28	18.64	18.91	19.44	18.18
Ethiopia	25.88	NA	NA	NA	NA	NA
Ghana	18.56	NA	NA	NA	NA	NA
Mauritius	19.97	20.26	20.13	20.37	20.74	21.80
Morocco	NA	NA	NA	27.12	NA	NA
Niger	29.20	29.24	29.28	30.08	NA	NA
Rwanda	NA	29.24	NA	NA	32.31	NA
South Africa	10.46	10.51	NA	NA	NA	NA
Tunisia	16.69	16.75	16.81	17.02	17.23	17.58
Tanzania	43.09	42.99	43.17	43.03	NA	NA
Zimbabwe	17.40	18.42	18.70	18.38	18.34	NA

Source: Authors' computation with data from UNIDO INDSTAT Database (2021).
Note: NA=data not available.

TABLE 6A.2—OUTPUT OF FOOD AND BEVERAGE SUBSECTOR AS A PERCENTAGE OF TOTAL MANUFACTURING OUTPUT

Country	2013	2014	2015	2016	2017	2018	2019
Algeria	13.21	14.45	18.71	18.71	18.71	NA	NA
Angola	NA	21.83	16.65	16.65	16.65	NA	NA
Botswana	20.11	18.26	18.67	18.35	17.90	17.84	19.07
Burundi	89.20	89.20	89.20	NA	NA	NA	NA
Cabo Verde	NA	NA	NA	71.78	66.74	NA	NA
Egypt	18.36	18.59	22.72	20.79	20.79	20.79	NA
Eritrea	46.84	45.25	54.85	55.45	63.58	64.13	NA
Ethiopia	33.71	33.68	33.68	NA	NA	NA	NA
Ghana	35.34	35.34	35.34	NA	NA	NA	NA
Kenya	47.84	48.07	49.17	50.19	51.84	51.70	49.80
Mauritius	47.46	47.13	43.02	42.68	43.92	43.92	43.92
Morocco	31.12	29.87	25.45	27.30	27.87	18.75	18.75
Namibia	50.57	50.57	50.57	NA	NA	NA	NA
Niger	21.45	35.77	41.14	43.29	43.29	43.29	NA
Rwanda	NA	69.76	66.58	66.88	69.84	66.30	NA
Senegal	34.68	34.68	NA	NA	NA	NA	NA
South Africa	NA	18.29	18.29	21.26	24.29	21.68	21.68
Tunisia	27.90	27.10	31.53	32.28	32.28	32.28	32.28
Tanzania	55.20	55.20	55.20	55.20	55.20	55.20	NA
Zambia	31.66	36.40	34.66	NA	NA	NA	NA
Zimbabwe	28.79	52.39	53.68	52.64	61.16	NA	NA

Source: Authors' computation with data from UNIDO INDSTAT Database (2021).
Note: NA=data not available.

CHAPTER 7

Innovation in African Food Processing Enterprises: Patterns and Drivers

Getaw Tadesse and Florence Gachango

Introduction

The need for industrial development in Africa has become more pressing than ever. Industrial development is key for structural transformation, which many African countries are struggling with, to sustain and deepen the observed solid economic growth of the last two decades (Newfarmer, Page, and Tarp 2019; Newman et al. 2016). It has also become a key strategy to tap into growing opportunities such as the high rates of urbanization, the growing labor force and its level of qualification, a high proportion of young people in the population structure, a growing domestic market, an increasing relative size of the middle class, the decrease in the severity of internal political confrontations and attenuation of intercountry armed conflicts, and the development of digital technologies (Ledeneva et al. 2020). Despite the wider narrative of "premature deindustrialization" associated with COVID-19,[1] recent data show that deindustrialization is not the common experience for the majority of African countries and industrial sectors (Lopes and te Velde 2021). This creates another opportunity to renew efforts and refocus policy to promote industrialization.

Industrialization is exceptionally crucial for African countries to create jobs. According to Brookings' 2017 Foresight Africa report, Africa south of the Sahara (SSA) had the world's highest unemployment rate (7.5 percent, compared with the global average of 5.7 percent) and lowest labor force participation rate (70.4 percent) in 2017 (Sow 2017; Bhorat, Naidoo, and Ewinyu 2017). The industrial sector is generally deemed more profitable than other sectors, and it has the capacity to employ large numbers of unskilled workers. However, it employs the smallest share of SSA's labor force. In most African countries, the manufacturing and services sectors employ an average of 46 percent of the working population, while the remaining 54 percent are still employed in the agricultural sector. Employment prospects in SSA are presently stagnating due to low overall productivity, attributed to the region's lack of economic diversification and innovation (Sow 2017).

An element central to boosting productivity in the industrial sector is increasing investment in knowledge capital and innovation activities at the firm level (Cirera and Cusolito 2019; Dohnert, Crespi, and Maffioli 2017; McMillan and Zeufack, 2022). These innovations are expected to affect firm performance in different ways. First, successful innovations are likely to increase firm-level total factor productivity by improving the capacity to transform factors of production into more and better products. Second, the increase in total factor productivity is expected to increase the marginal productivity of labor and, as a result, increase the quality (productivity) of jobs. Third, more productive firms are expected to push less productive firms out of the market, thereby increasing the overall efficiency of the economy. This will improve allocative efficiency. All of this, however, depends on the quality of the innovation and the ability of firms to translate innovation outcomes into improved firm performance (Cirera 2015). It also depends on the type of industries that matter for the specific context of Africa. According to Newfarmer, Page, and Tarp (2019), industrial sectors such as tourism, information and communications technologies (ICT), and other services, as well as the food processing and horticulture sectors, play a role analogous to the role played by manufacturing in East Asia.

In this chapter, we assess the pattern and drivers of firm-level innovation in the African food processing sector using a mix of methods that qualitatively explain concepts and conceptual relations, and quantitatively explore evidence using World Bank Enterprise Surveys (WBES) data. The chapter aims to incite policy and research discussion about enhancing firm-level innovation in the African food processing sector that could help to accelerate and deepen the growth of emerging food processing enterprises on the continent.

Definition and Measurement of Firm-Level Innovation

The definition and measurement of innovation has considerably evolved over the years (Hussen and Çokgezen 2020; González, Miles-Touya, and Pazó 2016; Dohnert, Crespi, and Maffioli 2017; Regasa et al. 2020). Generally, scholars agree that in the past, both the definition and scope of innovation were quite narrow (Trigo 2013; O'Brien 2016; Hussen and Çokgezen 2020). For many years, policy and academic research on firm-level innovations narrowly focused on modes of innovation driven by research and development (R&D) (Trigo 2013) and were also biased toward high-capability technological innovations (O'Brien 2016). This approach not only overlooked nontechnological innovations and the role played

1 The narrative on premature deindustrialization explains the adverse effect of COVID-19 on African industrialization, which is not yet mature enough to absorb shocks. It was a widely discussed presumption that COVID-19 would adversely affect the immature industries in Africa.

by nonformal R&D activities (such as experience, trainings, and the like) in innovative outcomes, but it also limited the understanding of innovative performance, especially among firms in the low-technology sectors (Trigo 2013; O'Brien 2016). According to O'Brien (2016), a bias toward high-capability technological innovation undermines other potentially significant impacts that could arise from low-capability innovations, such as low-novelty products or processes and those from organizational or marketing innovations. Furthermore, the narrow conceptualization in the past limited research on firm-level innovation to mostly the developed world (Hussen and Çokgezen 2019). Since innovation was largely understood as the introduction of a new product, and new products are mainly invented through formal R&D, the measurement of firm-level innovation focused mainly on the countries with the ability to finance R&D activities. However, as pointed out by Younas and Rehman (2021), the institutional advances of the firms in most developing countries fall outside these formal R&D models.

In recent years, however, there has been a revolution from this narrow conceptualization to a broader perspective that emphasizes the importance of other initiatives beyond R&D through which firms achieve innovation (González, Miles-Touya, and Pazó 2016; Trigo 2013; Hussen and Çokgezen 2020). This shift has been deemed important especially when assessing the innovation of firms in developing countries, where imitating preexisting products and processes is as important as creating original innovations (Hussen and Çokgezen 2020). Over time, therefore, the conceptualization of firm-level innovation has expanded, and it now captures the importance of imitation in these countries, representing innovations that could be new to a firm but not necessarily new in the market. This means that firms either imitate what is available in the market or invent through strategic investment in R&D. However, imitation could also depend on firms' ability to invest in human resources; depending on the knowledge intensity of the innovation, some innovations could be easier than others to imitate. In extreme cases, imitation is possible only through skill transfer from the original inventor. It also takes place through technology transfer from foreign companies through formal licensing agreements. Unfortunately, imitation creates gaps between an innovation and its private and social benefits, and it inhibits private investments in innovation (Sonobe and Otsuka 2006, 2011, 2014). In this case, innovation is often carried out by producer cooperatives to internalize its benefits in many dynamically growing industrial clusters (Hashino and Otsuka 2016). Imitation that takes place by buying new equipment that comes with embedded innovation may not affect the returns of the innovator and incentivize innovation.

Additionally, the broadened understanding of firm-level innovation has also shifted from its narrow focus on only product innovation to include other types of innovation, such as process, marketing, and organization methods (Hussen and Çokgezen 2020). Thus, a comprehensive measurement of innovation should include both imitation and invention in four types of innovations: ***product***, ***process***, ***marketing***, and ***organization*** innovations. However, in most empirical studies, firms' response on the adoption of new products or processes and firms' expenditure on R&D continue to be the most dominant measures of firm-level innovation, and hence these are referred to as "core" innovations (Cirera 2015). Marketing and organizational innovations are considered nontechnological innovations and are essential to optimize the gains from technological (product and process) innovations. Simple marketing and organizational practices, for example new packaging or introduction of *kaizen* (continuous improvement), help to accompany new products and processes and increase the benefits of these innovations. Therefore, in recent studies, the adoption of new marketing and organizational practices is used as a measure of innovation (Tadesse, Gachango, and Gwatidzo 2022). Other measures, though less applicable to the African context, include the number of applications for patents by firms (Fagerberg, Sholes, and Verspagen 2010; Fang 2019).

Others conceptualize innovation as a process that passes through from inputs to outputs of innovation. For example, the Global Innovation Index broadly classifies innovations as innovation inputs and innovation outputs to compare and rank countries, and hence it is less pertinent than some others to understand firm-level innovation (Aubert 2010). Similarly, the Oslo Manual of the Organisation for Economic Co-operation and Development (OECD) distinguishes two types of innovations: innovation inputs, such as investing in R&D, providing training to employees, and investing in fixed assets, and innovation outputs, such as the production of new products and processes for producing and delivering goods and services (OECD and Eurostat 2018).

Unlike that of other manufacturing industries, innovation in the food industry has been described as a complex process touching on different parts of the entire food system with a range of activities and institutions for

"development of new ingredients, formulation of new food products, improvement of methods of food preservation, and new ways of packaging" (Capitanio, Coppola, and Pascucci 2010, 3). In trying to understand the complex innovation process in the food industry, three key components need to be considered: (1) the production of totally new products or services, (2) the process of developing or modifying new products and services, and (3) the process of new product/service diffusion. Amidst this complexity, food firms are seen to display two distinct characteristics with respect to innovation: first, firms are process innovation–oriented, with equipment and capital goods investment taking the lead, and second, they innovate in an incremental manner, perhaps attributable to conservative consumer behavior (Capitanio, Coppola, and Pascucci 2010).

In line with the evolving broader definitions, Fagerberg, Sholes, and Verspagen defined innovation as "the attempt to try out new or improved products, processes, or ways to do things" (2010, 5). In this definition, implicitly, the following elements are critically important: (1) practical implementation of ideas or technologies, (2) newness or improvement of ideas or technologies, and (3) production of new or improved goods or services or improvement in delivering them. Therefore, we may alternatively define innovation as a practical use of ideas or technologies for the production or distribution of new or improved goods or services. The most formal and comprehensive definition is the one given by the OECD and Eurostat in a publication usually referred to as the Oslo Manual, which defines a business innovation as "a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm" (2018, 18).

Data

This paper applies a mixed-methods approach to explore the patterns and drivers of firm-level innovation in Africa's food processing sector. Whereas the conceptual analysis is guided by the existing dense literature in innovation at both the firm and the national levels, the empirical tests are carried out based on previous empirical work as well as descriptive analysis using the WBES data for African countries.

The WBES consists of several sets of data for many countries in the world, over multiple years. The survey covers two broadly defined sectors: manufacturing and service. We used the manufacturing survey data of African countries. The data include 47 countries in Africa and have been collected from different rounds across a total of 22,547 manufacturing enterprises since 2006. However, firm-level innovation data are available for a total 14,953 manufacturing firms in 37 countries, of which only 14 countries have both food and nonfood firms with innovation data. Table 7.1 lists these countries, the years of their surveys, and the number of samples from all manufacturing and food processing sectors. A total of 2,778 food processing firms have been surveyed

TABLE 7.1—NUMBER OF SAMPLE FIRMS WITH INNOVATION DATA AND USED FOR THE EMPIRICAL ANALYSIS IN THIS CHAPTER

Country	Years of survey	Sample size having innovation data	
		All manufacturing sectors	Food processing
Egypt	2103, 2016, 2020	5,187	969
Ethiopia	2011, 2015	704	89
Ghana	2013	377	57
Kenya	2013, 2018	869	306
Morocco	2013, 2019	650	168
Mozambique	2018	287	83
Nigeria	2014	1,416	183
Senegal	2014	249	126
South Africa	2020	344	47
Tanzania	2013	440	91
Tunisia	2013, 2020	695	195
Uganda	2013	378	118
Zambia	2013, 2019	544	136
Zimbabwe	2011, 2016	665	210
Total	**n.a.**	**12,805**	**2,778**

Source: Authors' estimation based on the data described in the methodology.
Note: n.a. = not applicable.

with innovation questions since 2011. Of the total 14 countries used for the analyses presented in this report, 6 have been surveyed for at least two years, and 1 (Egypt) for three years.

The specific number of samples might be different depending on the type of analysis. For example, the entire manufacturing sample is used to compare innovation levels between food and nonfood sectors, while only the 2,778 food processing sample firms are used to compare innovation levels across countries and over time and for all other analyses, including the role of innovation in trade and value addition, and the association of drivers with levels of innovation. The number of observations may be slightly lower for some of the analyses due to missing observations for a particular variable. It is important to note that these countries are not randomly selected to represent food processing firms in Africa. They are chosen based on data availability. Therefore, the results presented in this paper are case studies (results) and hence they help only to inform us on the likely importance of patterns, trends, and drivers of innovation in African food processing firms.

Patterns and Trends of Innovation in African Food Processing Firms

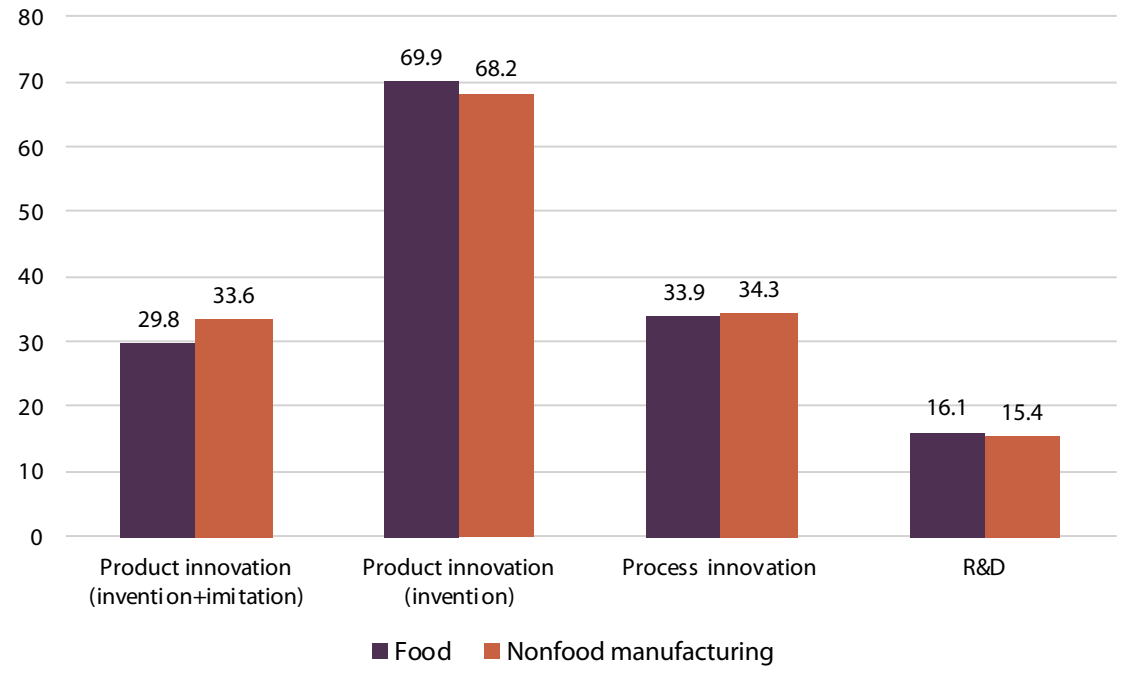
Patterns

Using the pooled data described above, we estimate the percentage of firms that adopted the four innovation indicators in the agrifood and nonfood manufacturing sectors (Figure 7.1). The four indicators are as follows:

1. Whether the firm has developed or adopted a product new to the firm in the last three years. This includes both imitation and invention of a product innovation, referred to as H1 in the WBES.
2. Whether the firm has developed a product new to the firm's market in the last three years. This includes only invention, referred to as H2 in the WBES.
3. Whether the firm has developed or adopted a process new to the firm in the last three years. This includes both imitation and invention of a process innovation, referred to as H5 in the WBES.
4. Whether the firm has invested in R&D, which is the major option for invention, referred to as H8 in the WBES.

The results, presented in Figure 7.1, indicate several lessons. First, the data on H2, representing the percentage of firms inventing new product innovations, are unexpectedly high compared with H1, which includes both inventing new innovations and adopting existing ones. By definition, the percentage of firms inventing new innovations (H2) should be less than the percentage of firms inventing or imitating (H1). However, the opposite is the case in the dataset. Moreover, the values for H2 are also exceptionally high compared with values

FIGURE 7.1—THE RATE OF INNOVATION IN FOOD AND NONFOOD PROCESSING FIRMS IN AFRICA



Source: Authors' estimation based on the data described in the methodology.

reported in other studies (such as Paus, Robinson, and Tregenna 2022). Therefore, all subsequent analyses are made based on H1 rather than H2.

Second, the difference between food and nonfood firms is not significant. Despite growing sector-specific opportunities for food processing firms in African markets, economywide constraints related to the business-enabling environment (for example, access to finance, support services, access to quality raw products and technologies, and so on) might have limited their ability to innovate to the extent that nonfood manufacturing firms have. Moreover, though food manufacturing firms invest a little more in R&D than do nonfood manufacturing firms, the actual level of innovation of food processing firms is slightly lower than that of nonfood processing firms. This is particularly the case for product innovation. The percentage of food processing firms that have adopted new products is 4 percentage points lower than that of nonfood manufacturing firms.

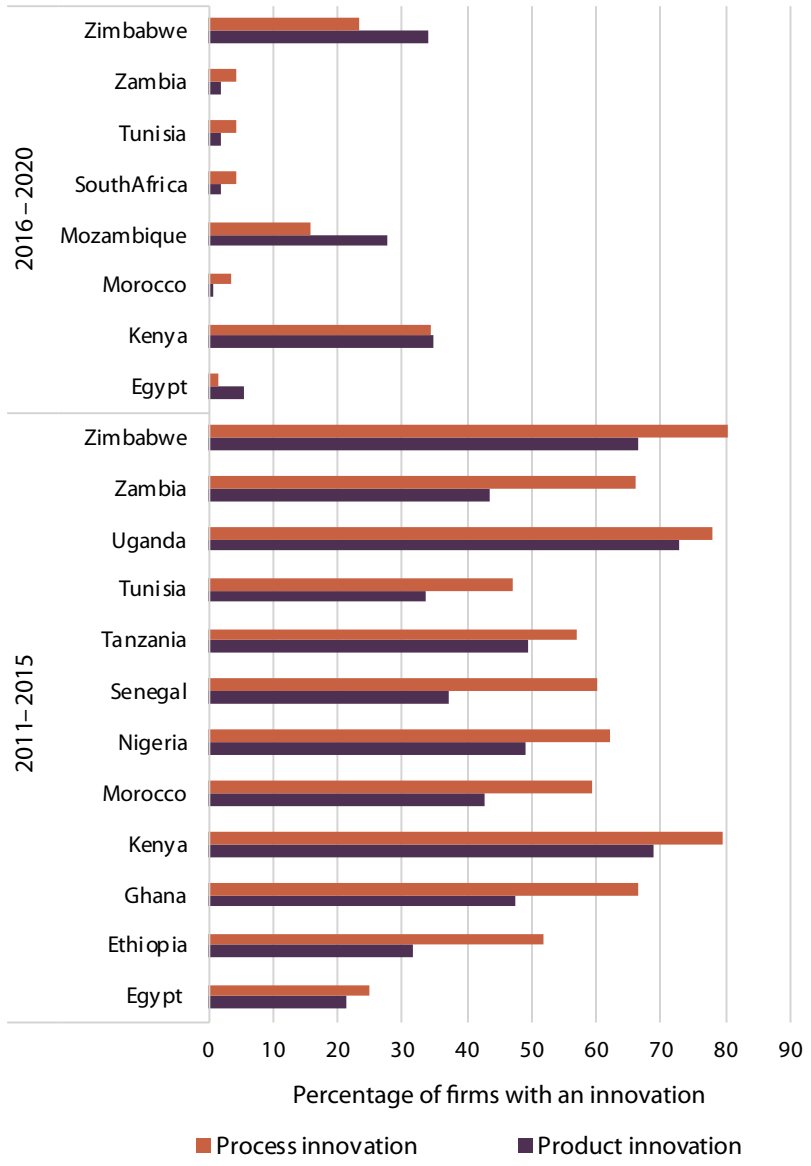
Third, the level of innovation in the African manufacturing sector is generally very low. Using H1, H5, and H8 as indicators, less than 35 percent of the firms have reported innovation and less than 20 percent of them have invested in R&D. These are formal firms, engaged in industrial food production to serve the rising African economies and middle-class consumers, and are expected to compete with global imports from Asia, Europe, and the United States. But they are not innovating enough to realize these expectations and opportunities. However, it should be noted that the level of firms' innovation varies across countries and sectors and over time.

Trends

Figure 7.2 shows the patterns of firms' innovation across 14 African countries, which are selected based merely on data availability and cover two periods of surveys. The figure presents the percentage of firms that adopted product and process innovations, as reported in the surveys conducted during the periods 2011–2015 and 2016–2020. The results show that the levels of both product and process innovations vary across countries and periods. Based on the first-period surveys, food processing firms in Kenya, Uganda, and Zimbabwe were more innovative than others. More than two-thirds of the firms in these countries reported the adoption of new products or processes—that is by far larger than the average of all firms' innovation, presented in Figure 7.1.

A more insightful observation from Figure 7.2 is that the level of innovation is declining markedly over time. Though the countries included in the two periods don't exactly match, we see a significant decline in the percentage of firms adopting

FIGURE 7.2—TRENDS IN INNOVATION IN AFRICAN FOOD PROCESSING FIRMS



Source: Authors' estimation based on the data described in the methodology.

new products and processes in the second period. A comparison of specific case countries reaffirms this assertion. For example, in all six countries (Egypt, Kenya, Morocco, Tunisia, Zambia, and Zimbabwe) for which we have two periods' data, the percentage of innovating firms has sharply declined. This is consistent with research by the African Center for Economic Transformation, which finds that the pace of technological upgrading has decreased in Africa each year since the early 2010s (Adhikary and Floyd 2021).

One possible reason for the declining of innovation over time could be the history of firms' entry. According to Sonobe and Otsuka (2011), when firms start new businesses, they adopt the best available innovation and then they keep using or producing the same innovation afterwards. Thus, the high rate of innovation in previous years, associated with the high level of economic growth witnessed in Africa, could be associated with the high rate of firms' entry in those years, and the lower rate of innovation in recent years could be associated with the lower rate of firms' entry in these years.

The Importance of Firm-Level Innovation in the Food Processing Sector

Innovations are key drivers of productivity and competitiveness (Cirera and Cusolito 2019; Dohnert, Crespi, and Maffioli 2017; McMillan and Zeufack, 2022). They help to improve value addition and expand markets. In this section we explore the role of product innovation for increasing the value added by processing firms and expanding markets through participation in international trade.

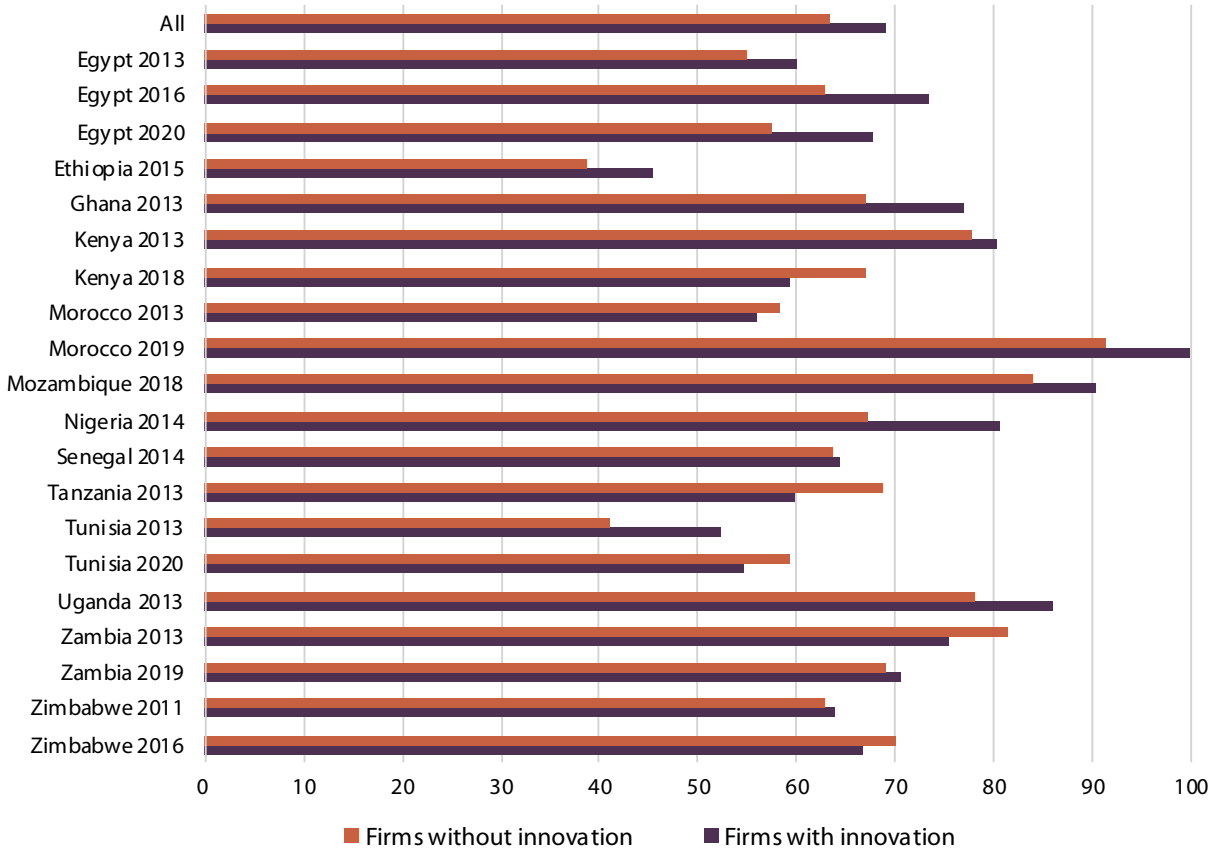
Firms' Value Addition

The role of innovation in firms' value addition is addressed here. The WBES includes questions related to total annual sales (TAS) and costs of raw materials and intermediate goods (CRI). Using these variables, the share of value addition (SVA) for a firm is calculated as

$$SVA_i = \frac{(TAS_i - CRI_i)}{TAS_i} 100$$

The average shares of value addition for firms with and without product innovations are shown in Figure 7.3. Of the 20 cases (by country and year), the average share of value addition is higher with innovation than without

FIGURE 7.3—THE AVERAGE SHARE OF VALUE ADDITION, PERCENTAGE



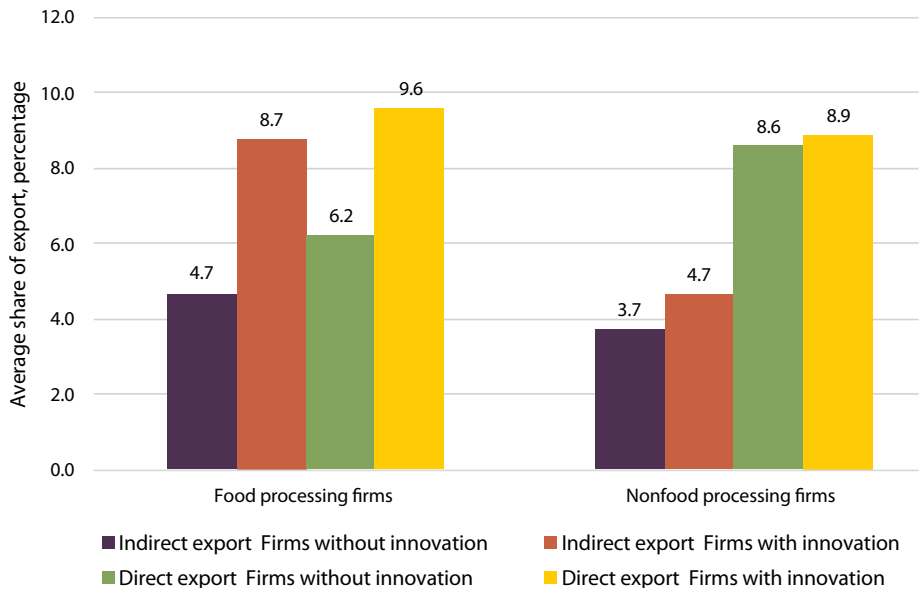
Source: Authors' estimation based on the data described in the methodology.

innovation in 14 cases. In total, firms with innovation add 5 percentage points more value than firms without innovation. In some countries, such as Egypt, Ghana, Nigeria, and Tunisia, the difference between the two exceeds 10 percentage points. In other countries, such as Ethiopia, Morocco, Mozambique, and Uganda, the differences range from 6 to 9 percentage points. All of these observations indicate the importance of firms' innovation for increasing value addition, which is usually positively associated with increased employment and competitiveness (Aiginger, Bärenthaler-Sieber, and Vogel 2013). The value addition effect of innovation may come either from a higher price premium or from a reduced cost of production for the new product.

Participation in Trade

To shed light on the impact of African food processing firms' innovation on trade competitiveness, we compare the average share of exports across food and nonfood firms (Figure 7.4). Firms export either directly or indirectly, the latter through contributing to the exports of other firms. The dataset has captured both possibilities. As shown in Figure 7.4, unlike the nonfood processing sector, the export share of firms with innovation is much higher than that of firms without innovation in the food processing sector. This is the case for both direct and indirect exports. While firms with innovation in the food processing sector exported 3.4 percentage points more than firms without innovation, firms with innovation in the nonfood processing sector exported only 0.3 percentage points more than firms without innovation. This finding suggests that firm-level innovation is more important in enhancing exports in the food processing sector than in the nonfood processing sector. Since most African countries' exports depend on agrifood products, it is not surprising to observe that innovation is critical for exports in this sector.

FIGURE 7.4—THE AVERAGE SHARE OF DIRECT AND INDIRECT EXPORT OF FIRMS WITH AND WITHOUT INNOVATION IN AFRICA

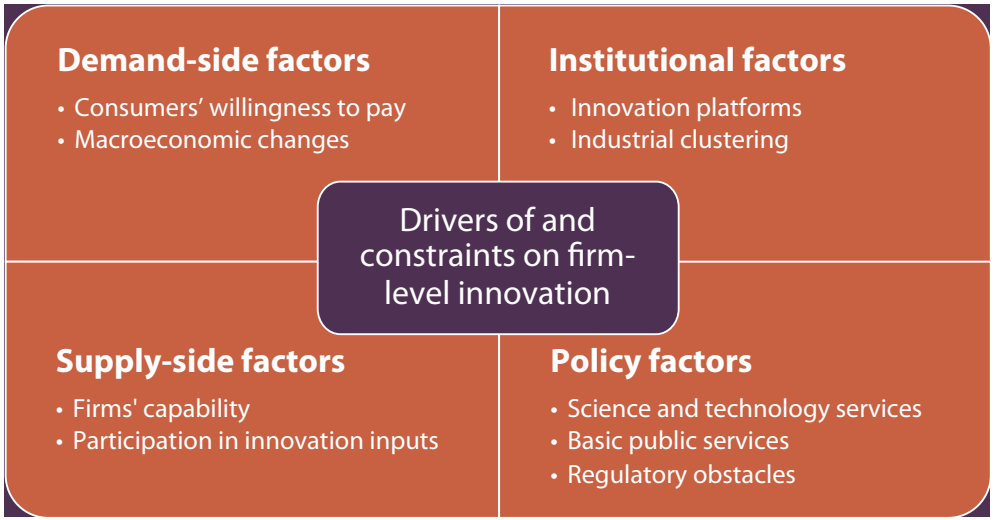


Source: Authors' estimation based on the data described in the methodology.

Drivers of and Constraints on Firms' Innovation

African firms face a variety of challenges that inhibit their innovativeness. Existing studies and practices define drivers of firms' innovation in less exhaustive ways, and hence they are unable to guide detailed and comprehensive analysis. The most widely used classification broadly categorizes drivers into internal and external factors (Hussen and Çokgezen 2020). Similarly, where innovation is looked at from a system perspective, drivers of innovation are distinguished based on whether they originate within or outside the firm's boundaries. More recent studies classify drivers as either firm capabilities or country characteristics (Paus, Robinson, and Tregenna 2022). Firm capabilities are represented by the firms' characteristics (size, age, ownership, and so on) as well as their participation in innovation inputs (investment in R&D, training, and assets), while the country characteristics are represented by macro-level performance indicators related to income level, GDP growth rate, investment ratio, and the like. Based on these and other dense conceptual and empirical literature (for example, Ayalew et al. 2020; Hussen and Çokgezen 2020) that looked at both internal and external factors as well as firm- and country-level factors, we propose a comprehensive typology that classifies innovation drivers into four broad categories (Figure 7.5). These categories capture internal as well as external factors, economywide as well as firm-level factors, and institutional as well as policy-level

FIGURE 7.5—DRIVERS OF AND CONSTRAINTS ON FIRMS' INNOVATION



Source: Authors.

factors. Three of the four categories are market-based drivers related to demand- and supply-side factors and the innovation system. The other category relates to government policy, which includes both public investments and regulations. Whereas the supply-side drivers mainly constitute factors internal to the firm, others constitute external factors.

Demand-side Factors

Demand-side drivers are economywide or country-level factors that create market opportunities for firms to invest and innovate. The demand for new products and services may arise from domestic or global consumers. However, since external trade in the African food processing sector is very limited, the demand for innovation should be derived from domestic consumers' demand for food quality, safety, convenience, and affordability. Therefore, the willingness of consumers to pay for these products and services is critical for firms to innovate. Consumers' willingness to pay (WTP) depends on several factors, including consumers' income and other macroeconomic structural changes, such as economic growth, urbanization, demography, literacy, and so on.

Consumer aversion to innovations in the industry could be a recipe for low consumer acceptance of innovation, and subsequently low WTP for innovation. Several empirical studies assessing the consumer WTP for innovations in the food processing sector exist. Food consumers are generally reluctant to accept substantially different new products, but acceptance depends on the product's attributes.

In Kenya, a study conducted to examine consumers' WTP for more advanced value addition in African indigenous vegetables also indicated that several socioeconomic factors and varietal attributes determine the WTP for value addition (Okello et al. 2015). Besides consumer age, gender, education, awareness of the selected value-addition techniques, and self-reported likelihood of purchasing value-added vegetables, WTP is affected by the vegetables' color, tenderness of leaves, and the washing off of soil.

Supply-side Factors

Supply-side drivers are firm-level factors related to firms' characteristics and business strategies. Characteristics such as the size of the firm, its age, leadership, and so on are critical drivers as they determine the capacity of the firm to innovate. Besides the firm's characteristics, its strategic choice to participate in innovation inputs (investment in R&D, training, technology transfers, building assets, and the like) is an important factor affecting its innovation.

Whether a firm is small or big, it sets strategies for producing and marketing its products and services. This strategic choice may create an opportunity or a challenge to innovate. Strategic choices that are important for innovation include investment in R&D, business openness, firms' specialization, and others. However, a firm's participation in innovation inputs is endogenous—that is, the probability of investing in R&D, using ICT, and so on may depend on the firm's characteristics (size, age, leadership, and others). Nevertheless, since innovation is a means to meet strategic objectives, participation in innovation inputs is critical for firms to innovate, second only to characteristics, which are widely discussed in many other studies.

Institutional Factors

With growing developments in innovation studies, a shift in the conceptualization of the drivers of firm-level innovation has been observed, with the current literature on firm-level innovations emphasizing the need to focus on the environment or system within which the firm operates. This has led to incorporating innovation drivers that are external, or outside the firm's boundaries. These drivers could be looked at from the perspective of the firm's interactions and collaborations with system or network actors and could be generally referred to as innovation systems that facilitate collaboration, learning, information sharing, and competition among firms and encourage them to either invent or imitate. They affect innovativeness through either reducing the cost of innovation or increasing the benefits of innovation. Innovation systems and industrial clustering are the two broadly defined institutional factors that are crucially important for driving firms' innovation.

The flow of technology and information among people, enterprises, and institutions is key for inventing as well as imitating innovations (Freeman 1995). Interactions between actors help to generate ideas and turn ideas into processes, products, or services. The easier the flow of information among consumers, traders, and other actors, the higher the probability that firms will understand the needs and demands of their potential customers. However, institutional platforms are needed for actors to meet or interact. Thus, the institutional structure of the economy, both formal and informal, has also been pointed to as a key driver of firm-level innovation (Hussen and Çokgezen 2020; Barasa et al. 2016). The innovation system is one of these institutional structures that would act as a system whereby actors interact to generate and share knowledge and experiences, and to create partnerships for innovation.

Edquist defined an innovation system as "a complexity of elements or components that work together, mutually condition and contract other complexes, each element having well-defined functions" (1997, 27). As there are diverse definitions of innovation systems, different types of innovation systems have also emerged over the years and include national, regional, and sectoral or technological innovation systems. A more practical and contemporary definition is given by the World Bank, which refers to the concept as a "network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect the system's behavior and performance" (World Bank 2006, 16).

All the definitions and theoretical explanations presented above imply the importance of networking and interactions for an effective innovation system. Therefore, an innovation system within the context of the food processing sector could be defined as the linkages (interactions) of processing enterprises with research centers, knowledge centers (such as universities and technical and vocational education and training institutions), raw material suppliers (such as farmers), product and service consumers, providers of services (such as banking, logistics, and so on), and quality and standards regulators. These interactions take place through innovation platforms, formal agreements with foreign companies for technology transfer, and (usually) industrial clusters and agro-industrial parks.

Industrial clustering helps not only innovation systems but also firms to be more innovative. According to Marshall (1920), industrial clusters have three advantages: (1) the ease of transaction among firms, (2) the development of a skilled labor market, and (3) the information spillover or the ease of imitation. All of these advantages affect firms' innovativeness in different ways. However, sometimes the direction of causality between industrial clustering and innovation becomes very subtle. Based on the works of Sonobe and Otsuka (2006, 2011, 2014), using roughly 20 case studies of industrial clusters in Asia and Africa, the association between clustering and innovation exhibits a sort of nonlinear relationship along industrial growth stages. These authors argued that industries usually pass through three stages: initiation, quantity expansion, and quality improvement.

At the initiation stage, when the industry is not yet set up, only innovative entrepreneurs start businesses in an industry. There is no cluster; only a few firms start to emerge as innovators. This is the stage in which demand is being created and hence only innovators appear in the industry, often referred as "pioneers." Hence, innovation happens without industrial clustering.

At the quantity expansion stage, firms are not yet clustered, and innovations are not very important to generate profit. Since the number of firms is few, new entrants can easily make a profit by producing the same product—that is, by imitating the products and services of the pioneers. This is the stage when clustering starts to emerge, but there is no innovation.

At the quality improvement stage, firms have to innovate to survive because this is the stage when the industry has a large number of firms and suppliers that drag profits down. Thus, firms must innovate to generate price premiums and profit for growth. If firms are able to innovate, the industry grows to the next stage. If firms fail to innovate, the industry remains stagnant. At this stage, the direction of causality between innovation and clustering is less clear. It is likely that they feed each other to maintain a well-developed and efficient industry.

On one hand, innovation helps to develop successful industrial clusters. Since the new, improved products are differentiated products, innovative firms must order product-specific parts and materials that have new ideas embedded in them. To protect new ideas, innovative firms must establish long-term subcontracts with dependable input suppliers, which will subsequently lead to the formation and growth of industrial clusters. On the other hand, clusters can help to encourage or discourage firms' innovation. Clustering affects innovation in different ways. First, the growing cluster leads to competition, and, amid limited industry profit, firms are subsequently forced to innovate. Second, clustering eases transactions between firms and leads to specialization. Specialization leads to innovation. Third, clustering leads to development of skilled labor markets, which creates opportunities for firms to access innovative workers. Fourth, clustering facilitates information spillover that leads to imitation. Imitation, however, may discourage innovation, and hence clustering may have negative effects on innovation (Sonobe and Otsuka 2011).

Through feedback between innovation and clustering, the industry continues to grow and maintains efficiency and competitiveness. Innovative firms will continue to form clusters. However, at this industrial growth stage the industrial cluster is characterized by vertical integrations of firms, each specialized with specific parts of a product (Sonobe and Otsuka 2011).

Policy Factors

Government policies are the fourth category of innovation drivers. Policies create incentives as well as disincentives for firms to innovate. Depending on their intentions and market friendliness, governments act on two types of policies, which might have varying effects on innovativeness. These are public services (investments) that aim to reduce transaction costs and promote firms' productivity and competitiveness, and government regulations that are critical to ensure that firms obtain the returns from and protection of their investments. Since public services aim at creating access for market services, they are more market friendly than regulatory policies, as the latter impose restrictions on markets. However, some regulatory policies (for instance, patent rights) could also improve market functioning, especially in areas where market failures are rampant. The effects of public services and regulations on firms' innovation are also different (Lundvall 2008).

Public services are soft and hard infrastructures that create a business-enabling environment for firms to innovate. Depending on the relevance for firms' innovation, they can be distinguished as services that have direct or indirect effects. Public services such as access to science and technology, innovation grants, access to skilled labor, and others are those that directly affect firms' innovativeness. The second type of public services are those indirectly related to innovation through creating access to services for the production and marketing of firms' inputs and outputs. Examples of public services that may indirectly affect firms' innovation include access to energy, finance, land, and so on. However, the importance of these public services is often overlooked in innovation analyses (Lundvall 2008).

Like public services, there are a number of regulatory policies that affect firms' innovation directly or indirectly. Regulations related to patent rights protection and licensing directly affect firms' investment to innovate. In areas where copying or imitation is widespread, firms may refrain from investing in R&D. Other regulations related to restriction of pricing and mark-ups, as well as labor regulations, indirectly limit firms' interest in efficiency and innovation. In areas where price mark-up is restricted, firms will have less incentive to invest in innovation. Likewise, in areas where firing and hiring of employees is structurally regulated, firms may not reward or punish employees based on their productivity and innovativeness (Cirera and Maloney 2017).

Public investment in science and technology that generates public knowledge and information is one of the critical policy instruments that many governments use to incentivize firms' innovation. Knowledge and information exchange is a key component of the innovation system approach, which stipulates the flow of knowledge and information as a key driver of the innovative process and outlines four types of such flows: interactions among business enterprises, interactions between enterprises and research and public institutions, diffusion of information and technology to enterprises, and movement

of personnel within and between private and public sectors. A combination of these knowledge and information flows in any industry is expected to result in high levels of technical collaboration, technology diffusion, and personnel mobility, thereby increasing the innovative capabilities of the firms in the system (OECD 1997). The seminal work of Cohen and Levinthal (1990) illustrated that knowledge accumulation increases the ability of firms to identify and integrate new ideas, as well as their ability to convert this knowledge into further innovations. One avenue for knowledge accumulation and dissemination is through public investment in science and technology.

A study by Cohen, Nelson, and Walsh (2002) assessed how public research influences the R&D of manufacturing firms in the United States. The study found that research findings from public institutions contribute to the development of new R&D projects in industry as well as completion of existing projects (demonstrating both novel and incremental innovation). The study further identified published papers and reports, public conferences and meetings, informal information exchange, and consultations as the key channels through which information flows between these two innovation system actors. A study by Toselli (2017) analyzed the determinants of product and process innovation in relation to knowledge sources for Spanish agrifood manufacturing firms, finding that associate firms have an elevated probability of engaging in process innovation because of knowledge spillover from parent companies. In the developing countries context, Gorgoni and Pietrobelli (2010) reported an increase in the probability of innovation in Chilean meat sector firms with an increase in knowledge flows.

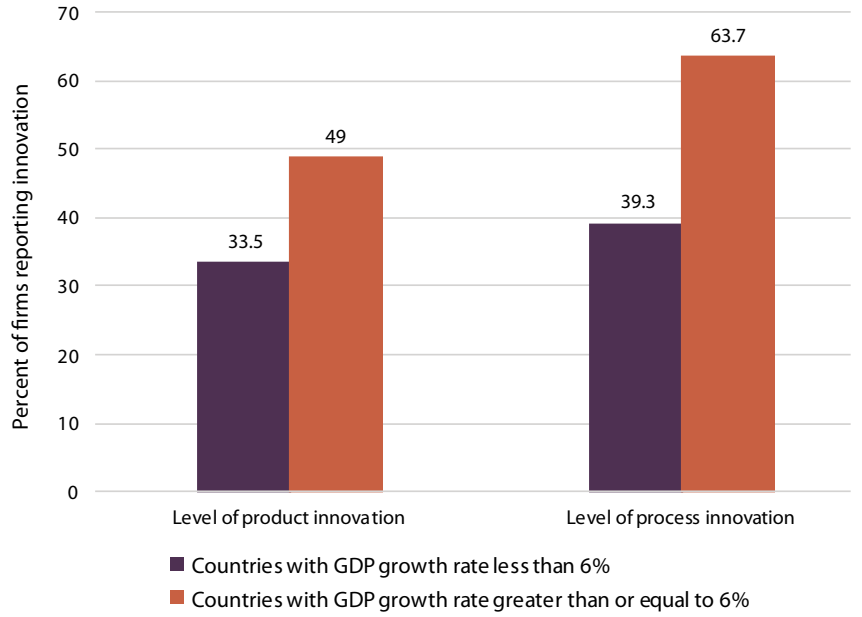
Empirical Evidence on Selected Drivers of Innovation

Economic Growth and Innovation

In addition to consumers' WTP, some macroeconomic structural changes, such as urbanization, demographic changes, economic growth, and others, may create opportunities for firms to innovate. Besides increasing consumers' WTP, such structural changes create additional demand for high-quality and convenient food products. Sustained economic growth, for example, may induce changes in food consumption behaviors and livelihoods that demand new products and services. This is particularly the case for food products whose major markets are domestic consumers. Our exploration of available firm-level innovation and national GDP growth data confirms the presence of an association between economic growth and firms' innovation in the African food processing sector (Figure 7.6).

Figure 7.6 presents the average economic growth rate and the level of firms' innovation in selected African countries. The average growth rate is estimated based on the five-year average growth rate of a country prior to the enterprise survey if firms respond to observed (lagged) income changes. The figure shows that those countries with higher economic growth in the past five years showed higher levels of firm-level innovation than countries with lower economic growth. On average, countries that had GDP growth rates of 6 percent or higher had 15- to 25-percentage-point higher shares of firms that adopted innovations than countries that had less than 6 percent growth rates. The difference is more

FIGURE 7.6—ECONOMIC GROWTH AND FIRM-LEVEL INNOVATION IN THE AFRICAN FOOD PROCESSING SECTOR



Source: Authors' estimation based on the data described in the methodology.

significant in process innovation than product innovation, consistent with the fact that unlike nonfood sectors, in the food processing sector, whenever consumers' income increases, the demand for new methods of delivery and services increases faster than the demand for new products. Hence firms implement process innovation at higher rates than product innovation.

Firms' Capability

Larger firms have been argued to be more innovative than smaller firms, as they benefit from economies of scale. Our data support this argument (Table 7.2). Larger firms are also likely to finance R&D and other complementary activities that could in turn increase their innovation performance. From a system perspective, larger firms are likely to have wider collaborations with other actors in the system, and because of increased interaction, increase their innovativeness (Tödtling, Lehner, and Kaufmann 2009). Some scholars have, however, suggested that these arguments may not hold for all firms, as the efficiency of firm-level innovation could be higher among smaller firms owing to their increased flexibility and reduced bureaucracy, among other factors (Hussen and Çokgezen 2020).

Regarding firms' age, older firms are expected to be more innovative than younger firms. It is expected that older firms have taken time to build their experience, knowledge, and entrepreneurial flexibility to a level where they are comfortable enough to take risks and make decisions to innovate (Hussen and Çokgezen 2020). This argument particularly holds where firms are involved in incremental innovation as opposed to novel innovations. Some scholars, such as Akcigit and Kerr, have, however, contested this argument, indicating that younger firms may be more innovative as they "enter the market with new technologies and apply exploratory R&D, mainly in the case of radical innovation" (2018, 33). The ownership structure of a firm has also been considered as a driving force for firm-level innovation, with some scholars arguing that government-owned firms are more likely to engage in innovative activities due to their access to resources, while others postulate that managers of government-owned firms lack motivation, a quality that could hinder them from seeing the need to engage in innovative activities (Lööf 2009).

Human capital has also been identified as a key driver of firm-level innovations in current industries, with the relevance of its endowment being emphasized even in cases where a firm is engaged in imitating, or implementing technologies and products that already exist somewhere else (Khatiwada and Arao 2020). Firms have various ways of acquiring human capital, the key ones being through formal education, in-firm training, and building up experience of workers within the firm. Studies have shown that simultaneously engaging in R&D and worker training significantly increases the likelihood of innovating (González, Miles-Touya, and Pazó 2016). Likewise, an increase in the proportion of skilled workers in a firm increases the likelihood of both process and product innovation, as shown in a study by Dohnert, Crespi, and Maffioli (2017).

For small food processing firms, as most African firms are, the characteristics of the top managers are also key drivers of innovation (Diederen, Meijl, and Wolters 2000). Data presented in Table 7.2 show the role of the gender and experience of the top manager for innovativeness. Firms with female and young managers are more innovative than firms with male and experienced managers.

Investing in R&D

There is little doubt on the role of R&D for innovation, though it is not the only option for innovating. Figure 7.7 shows the percentage of African food

TABLE 7.2—PERCENTAGE OF FIRMS THAT HAVE INNOVATED, ACROSS FIRM SIZE AND LEADERSHIP CHARACTERISTICS

	Product innovation	Process innovation
Firm size (number of employed people)		
Small (< 20)	21.7	28.3
Medium (20–99)	28.6	33.6
Large (100 and over)	48.3	45.6
Gender of top manager		
Female	32.4	37.1
Male	29.6	33.5
Experience of the manager		
10 years and less	34.3	40.3
More than 10 years	27.9	31.3

Source: Authors' estimation based on the data described in the methodology.

processing firms that have innovated with and without investment in R&D. More than two-thirds of the firms that invested in R&D have been able to innovate, while only one-fifth of the firms that did not invest in R&D were able to innovate. This finding is consistent with a recent study that demonstrated that in developing economies, capital investment and training are just as important to innovation activities as R&D spending (Paus, Robinson, and Tregenna 2022).

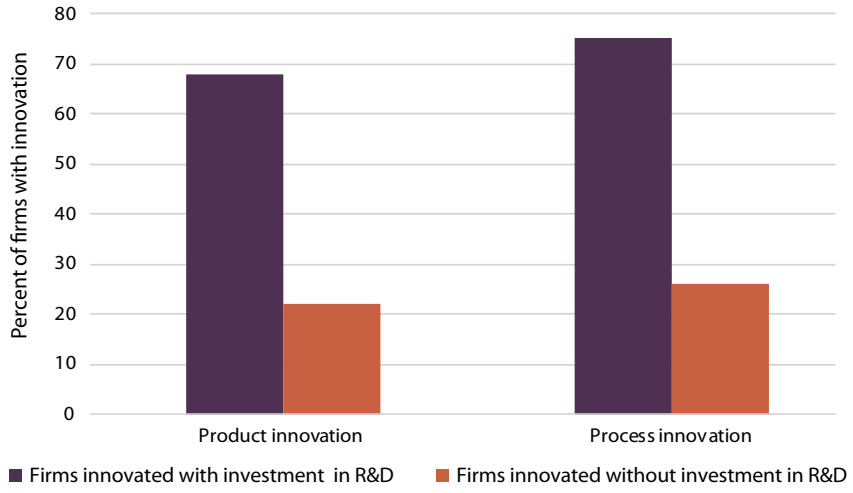
Investing in R&D seems more important for creating new products than it is for creating new processes. However, we noted two important perspectives. First, a significant number of firms (25 to 32 percent) that invested in R&D did not innovate any new product or process, implying that the investments have not yet been translated into innovations. This raises a concern about the productivity of R&D investments in the African food processing sector. Second, the percentage of firms investing in R&D has been declining over the years (Figure 7.7).

As shown in Figure 7.8, of all food processing firms surveyed during 2011–2015 in Africa, about 24 percent have invested in R&D, a much higher rate than that of the firms surveyed in 2016–2020. Africa-wide, the percentage of firms investing in R&D has declined by about 15 percentage points. The result is consistent across countries for which we have comparable datasets in the two periods. Of the six countries for which we have two periods' data, the percentage of firms investing in R&D has declined in all (Figure 7.8).

Technology Transfer from Foreign Companies

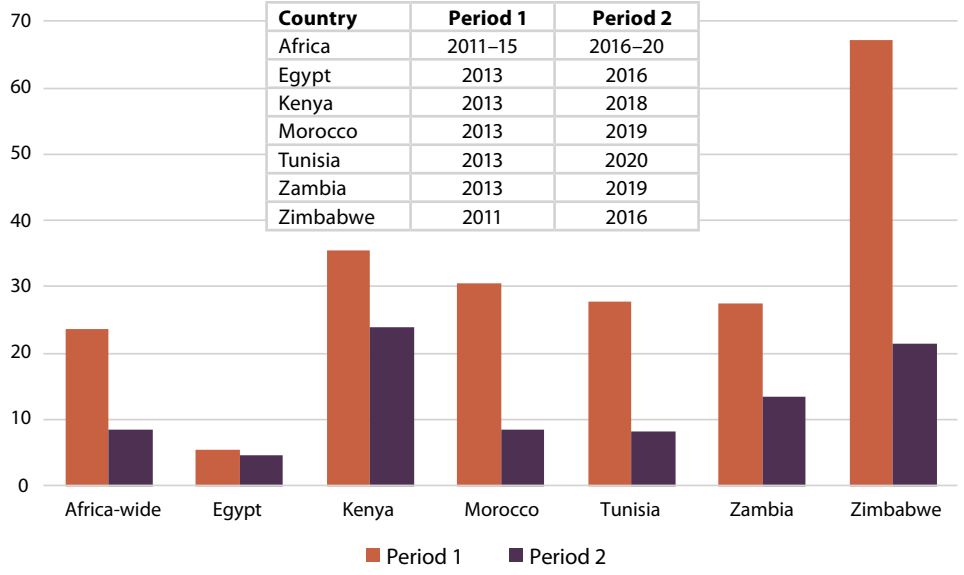
Despite several arguments for innovations in developing countries to be based on knowledge diffusion and absorption instead of investing in R&D, so as to reap the benefits of catching up through adoption and transfer of international technologies, our data show that the extent of technology transfer in the African food processing sector has remained very low. Of the 4,227 African food processing firms surveyed since 2006, only 13 percent have formal agreements for technology transfer with foreign companies. However, the data display a strong association between technology transfer and firms' innovation (Figure 7.9). Firms that have technology transfer agreements with foreign companies have a higher probability of innovation than firms without such an agreement. For instance, 56 percent of firms with

FIGURE 7.7—RATE OF INNOVATION WITH AND WITHOUT R&D



Source: Authors' estimation based on the data described in the methodology.

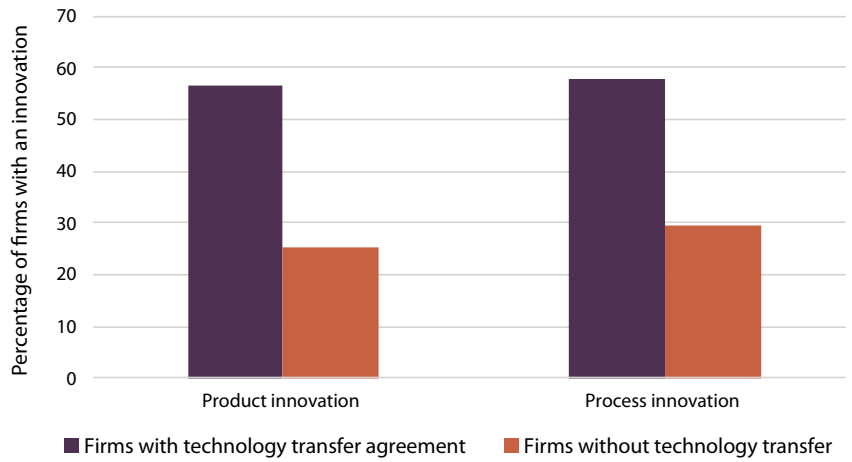
FIGURE 7.8—CHANGES IN PERCENTAGE OF FIRMS INVESTING IN R&D



Country	Period 1	Period 2
Africa	2011–15	2016–20
Egypt	2013	2016
Kenya	2013	2018
Morocco	2013	2019
Tunisia	2013	2020
Zambia	2013	2019
Zimbabwe	2011	2016

Source: Authors' estimation based on the data described in the methodology.
Note: Africa-wide includes other countries, which are listed in Table 7.1.

FIGURE 7.9— THE RATE OF INNOVATION WITH AND WITHOUT TECHNOLOGY TRANSFER



Source: Authors' estimation based on the data described in the methodology.

TABLE 7.3—MARGINAL EFFECTS OF INDUSTRIAL GROWTH STAGE ON FIRMS' INNOVATION IN AFRICAN MANUFACTURING AND SERVICE INDUSTRIES

Industrial growth stage (ref = initiation stage)	(1) Product innovation	(2) Process innovation	(3) R&D spending
Emerging stage (Quantity expansion stage)	0.027* (0.015)	0.022* (0.013)	0.015 (0.010)
Maturation stage Quality improvement stage)	0.059*** (0.017)	0.054*** (0.016)	0.006 (0.011)

Source: Saki and Tadesse (Forthcoming).

Note: Numbers in parentheses are standard errors. * and *** represent 0.1 and 0.01 levels of significance, respectively.

technology transfer agreements have innovated new products, which is twice the rate of firms without formal technology transfer agreements.

Vertical Coordination and Innovation

Firms' involvement in vertical supply chains is critical for innovation. It helps to ensure an adequate, high-quality, and timely supply of raw materials for food processing. Studies on the role of vertical coordination for innovation are scant. However, a few existing case studies indicate that though the linkages are critical for facilitating innovation, the level of enterprises' participation in these innovation platforms (linkages) is very low. Box 7.1 describes the performance and role of vertical coordination for innovation in the Ethiopian brewery industry. A series of studies conducted on the role of vertical coordination for breweries and malt barley producers indicate that there are options whereby the brewery companies can benefit through a quality input supply that helps them develop new products and brands (see Box 7.1).

Industrial Clustering

Empirical studies on the role of clusters suggest that the effect of clusters on firms' innovation is positive and significant. A study by Fang (2019) found that in the US manufacturing sector, the citation-weighted number of patent applications for firms in a cluster is 17.6 percent higher than that of firms outside of a cluster. A recent cross-country analysis in Africa indicated that most industries in Africa are at the emerging (quantity expansion) stage and thus continue to experience a rise in the number of firms (Saki and Tadesse, forthcoming). With respect to the relationship between innovation and industrial clusters, although a generally low level of innovation was observed in this study and there was no significant association between spending on R&D and industrial clusters, the findings showed that industrial clustering is an important driver of firms' product and process innovations in Africa (Saki and Tadesse, forthcoming). The study further indicated that firms in a mature (quality improvement stage) industry are more innovative than firms in the initiation and emerging (quantity expansion) industrial growth stages (Table 7.3). Table 7.3 shows that firms in the quality improvement stage have a 5.9-percentage-point higher probability of innovating than firms in the initiation industrial stage. The differences in firms' innovativeness between the emerging and initiation stages are barely significant.

BOX 7.1—VERTICAL COORDINATION AND INNOVATION IN THE ETHIOPIAN BREWERY INDUSTRY

Driven by rising incomes and urbanization, the market for beer in Ethiopia is booming. A series of studies conducted by Tefera and Bijman (2019, 2021) and Tefera, Bijaman, and Slingerland (2020) have indicated that the Ethiopian brewery industry is responding to the emerging high demand for beer through attracting multinational companies and innovating several institutional arrangements to secure improved and diversified beer production. The total beer consumption in the country has increased from 1 million hectoliters in 2003 to 11.7 million hectoliters in 2017, an annual growth rate of 20 percent (Tefera, Bijman, and Slingerland 2020). This has attracted many international brewing companies, including Heineken and Diageo (Meta-Abo), to invest in brewing and local sourcing of malt barley from smallholders using vertical coordination. Unlike the conventional direct contractual arrangements between farmers and producers, the vertical coordination model initiated by these companies is facilitated by producer organizations (POs), nongovernmental organizations (NGOs), and lead farmers who serve as intermediary actors between the breweries and malt barley producers. The intermediaries sign contracts with breweries to supply a specified quality of malt barley as well as with individual farmers to deliver malt barley that fulfills the quality requirements. They also facilitate input supply, provide technical assistance, and arrange logistics and aggregation of the produce. The farmers, in return, receive price premiums and improved seeds from the breweries.

The experience of these companies suggests that vertical coordination through contractual arrangements was very effective in meeting the supply of expected quantities with better-quality malt barley. While Heineken has managed to fully aggregate the contracted quantity, Diageo has collected more than 90 percent of its contracted malt barley supply (Tefera, Bijman, and Slingerland 2020). Contractual breach, which is a widely recognized problem of linking processing enterprises with growers in Africa, was not an issue in this case. The intermediation of POs, NGOs, and lead farmers might have contributed to the successful contractual system. Indeed, the impact of POs, specifically cooperatives, has been significant in promoting industrial innovations by linking producers with processors (Tefera and Bijman 2019). The vertical coordination has helped the brewery companies not only to reduce transaction costs but also to secure quality raw materials to produce quality and differentiated beers.

The reliable supply system through vertical coordination creates incentives for the breweries to invest in product and process innovations. Therefore, brewing enterprises engaged in vertical coordination have shown a higher chance of performing, in terms of innovation and other performance indicators, than enterprises that have not yet participated in the contractual vertical coordination system. Though causality cannot be claimed with these data, the two companies that have participated in the vertical coordination contracts have developed more brands than others. Both Heineken and Diageo have developed more than four brands each, while other companies developed only two or three brands. In terms of market shares, Heineken and Diageo account for 28 and 12 percent of the Ethiopian beer market, respectively (Tefera, Bijman, and Slingerland 2020).

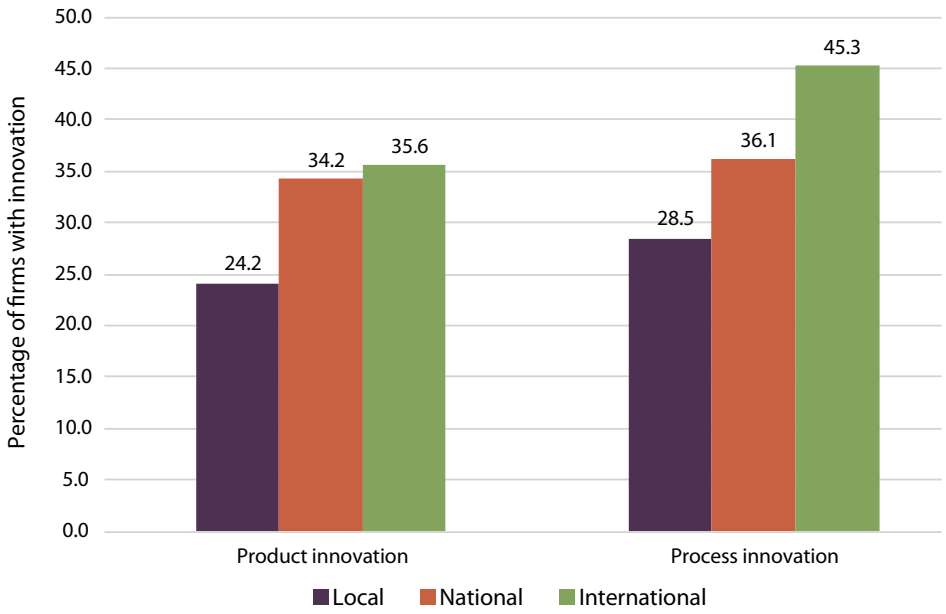
Contrary to popular belief, vertical coordination has also helped smallholder producers to significantly improve their malt barley production, intensification, commercialization, and quality (Tefera and Bijman 2021), which will further improve the innovativeness of the brewery companies in the long run. Therefore, vertical coordination with intermediaries in the Ethiopian brewery industry is a success that can be advocated and scaled up as the best and most innovative approach for reducing contractual breaches as well as expanding innovation in the African food processing sector.

Source: Compiled from Tefera, Bijaman, and Slingerland (2020), Tefera and Bijman (2019), and Tefera and Bijman (2021).

Market Competition

A firm's level of innovation can also be determined by the structure of the market from which it acquires its inputs and to which it sells its output (Hussen and Çokgezen 2020). The level and type of competition has been highlighted as a key factor when assessing the role of market structure in driving firm-level innovation. Competition and technological opportunities vary by product market and can directly influence decisions on innovation activities and investments (OECD and Eurostat 2018). Both the innovation system approach and the industrial clustering approach underline the importance of competition in motivating firms to innovate, generate price premiums, and survive in the industry. Using the type of market to which firms sell their main output, we explored the importance of competition for innovation.

FIGURE 7.10—THE RATE OF INNOVATION OF FIRMS SELLING IN LOCAL, NATIONAL, AND INTERNATIONAL MARKETS



Source: Authors' estimation based on the data described in the methodology.

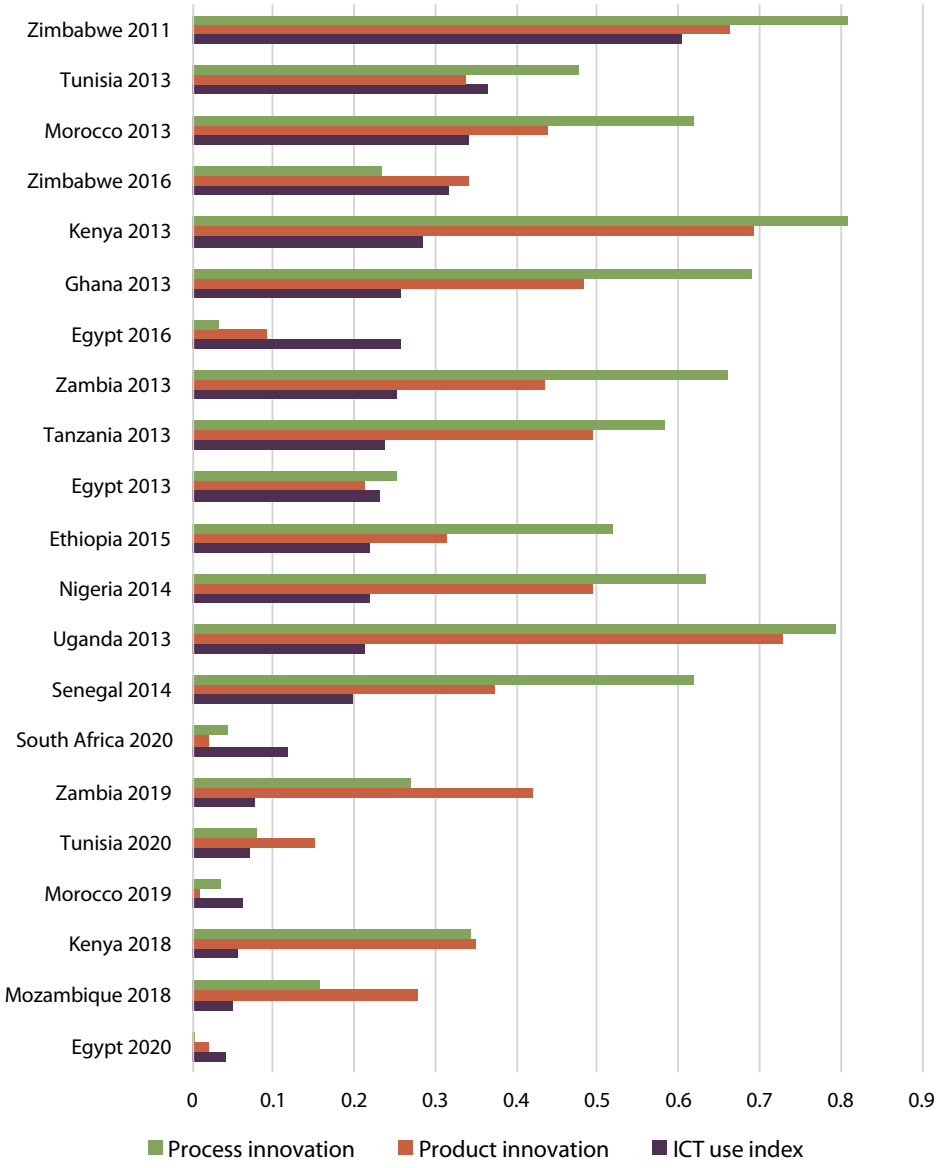
Figure 7.10 shows the percentage of firms that reported product and process innovation whose major markets for their products are local, national, or international. Assuming that international markets are more competitive than national and local markets, it seems that competition has indeed forced firms to innovate. However, the effect appears to be higher on process innovation than on product innovation (Figure 7.10). Firms that sell their products mainly in international markets innovate at rates that are 17 and 9 percentage points higher than firms that mainly sell in local and national markets, respectively. This is consistent with our expectation that process innovations are essential to be more competitive in larger international markets through reducing costs and improving efficiency. Consumers' WTP might be more important than the size of the market for product innovation.

ICT and the Innovation of Firms

A typical public service pertinent to innovation is access to ICT, which facilitates firms' innovation through easing communications, fostering the accumulation of knowledge, and creating innovation platforms. ICT is commonly considered an input for product innovation (Spiezia 2011). It helps firms interact with trade partners and solicit their needs as well as acquire knowledge for innovations. It also allows firms to invent ICT-based products and services. Innovations related to e-commerce platforms and delivery systems are easier if firms have access to reliable and low-cost ICT services. With these premises in mind, we explored the extent of ICT use by African food processing firms and its association with firms' ability to innovate.

Figure 7.11 shows the average ICT use index of food processing firms across countries in ascending order from left to right. The ICT use index is calculated based on seven firm-level indicators: (1) use of email, (2) owning a website, (3) access to broadband internet, (4) use of internet for purchasing, (5) use of internet to deliver services, (6) use of internet to do research and develop ideas, and (7) overall access to telecommunication services. All of these indicators take a value of 1 if the firm responded Yes to the question about access and 0 if the response was No. The total value of the index is normalized from 0 to 1, by dividing by 7.

FIGURE 7.11—ICT USE AND RATE OF FIRMS' INNOVATION



Source: Authors' estimation based on the data described in the methodology.

The result, in Figure 7.11, shows that the use of ICT by African food processing sectors is generally very low. The maximum value of the ICT use index is 0.8, which was reported in the Zimbabwe survey in 2011. Irrespective of the extent of firms' use of ICT, we compared how the ICT use is associated with firms' ability to innovate. The results suggest that as the ICT use index increases, the proportion of firms innovating increases (Figure 7.11). This suggests that though the level of ICT access and use by African firms is low, it plays a role in innovation, and public support is needed to enhance ICT services so as to encourage firms' innovativeness. Of the seven ICT services, access to broadband internet and overall access to telecommunication are key services that require the attention of the government more than the other indicators. The other indicators are partly associated with the internal capacity of the firms.

Access to Public Services and Firms' Innovation

Some public services affect firms' innovation indirectly through their production inputs and outputs. The basic argument is that firms' efforts to innovate and become efficient depend on the business-enabling environment. In many instances, in areas where the business-enabling environment is conducive, firms may tend to be innovative. However, in some instances, firms could also be innovative in areas where business obstacles are still significant. A recent study on the links between business obstacles (due to limited access to public services) and firm-level innovation in Africa has shown that the effect of access to public services depends on context and could be negative (Tadesse, Gachango, and Gwatidzo 2022).

Contrary to the authors' expectation, the econometric results suggest that firms that were affected by power outages were more likely to innovate. Both the incidence of power outages and firms' identification of access to electricity as a major obstacle have positive and significant effects on all three innovation indicators (Table 7.4). The same applies to those that consider access to finance to be a major obstacle. This has been interpreted as indicating that firms in Africa are innovating as a strategy to cope with business obstacles, rather than to enhance competitiveness (Tadesse, Gachango, and Gwatidzo

TABLE 7.4—EFFECT OF BUSINESS OBSTACLES (ENERGY, FINANCE, AND MARKET) ON THE LIKELIHOOD OF FIRMS TO INNOVATE

Business obstacle	Product innovation	Process innovation	Investment in R&D
Power outages, past year	0.486*** (0.054)	0.381*** (0.061)	0.303*** (0.078)
Number of power outages	0.002 (0.002)	0.000 (0.002)	0.002 (0.002)
Power outage duration	0.001 (0.001)	0.001 (0.001)	-0.004 (0.003)
Electricity as major obstacle	0.241*** (0.040)	0.247*** (0.043)	0.196*** (0.056)
Finance as major obstacle	0.067* (0.040)	0.118*** (0.043)	0.036 (0.056)
Secured government contract	0.319*** (0.047)	0.292*** (0.049)	0.374*** (0.063)

Source: Tadesse, Gachango, and Gwatidzo (2022).

Note: Business obstacles were estimated separately in each innovation regression model; they were not all entered simultaneously. However, other control variables related to firm characteristics were included in the models.

*, **, and *** represent 0.1, 0.05, and 0.01 levels of significance, respectively.

TABLE 7.5—RATE OF INNOVATION FOR FIRMS THAT REPORTED REGULATIONS AS MAJOR AND MINOR OBSTACLES

Extent of obstacle	% firms reporting product innovation			% firms reporting process innovation		
	Court system	Customs and trade regulations	Labor regulations	Court system	Customs and trade regulations	Labor regulations
Not an obstacle	30.40	28.00	30.11	31.07	29.29	30.53
Minor obstacle	39.11	36.52	37.70	38.82	36.88	37.00
Moderate obstacle	35.55	37.28	34.32	35.14	37.82	35.00
Major obstacle	33.39	41.11	33.86	31.97	37.90	32.27
Very severe obstacle	41.93	42.87	33.69	42.20	41.27	36.68

Source: Authors' estimation based on the data described in the methodology.

Note: The percentage shows the number of firms that reported innovation out of the number of firms that gave each response.

2022). Unfortunately, such innovations may not lead to competitiveness. They remain as adaptation options rather than as a long-term strategy for enhancing economywide efficiency and global competitiveness. Table 7.5 also shows that secured market access in the form of government contracts has shown strong and positive effects on firms' innovation. As argued above, secured demand for firms' products encourages firms to invest in innovation.

Regulations and Firms' Innovation

Besides public services, regulatory policies play a role in motivating or discouraging firms to innovate. For example, the effectiveness of the court system matters for firms to protect their inventions and appropriate the entire benefits. In many African countries, regulatory policies to protect patent rights are in place with clear legal provision for firms or individuals to privately own their inventions (Aubert 2010). However, the capacity of courts is very limited and unable to enforce such rights. Other regulatory policies such as trade, customer, and labor regulations could also discourage firms' interest in innovating. Table 7.5 presents the percentage of firms that have reported innovation across their responses on the extent of these regulatory obstacles. However, none of these obstacles seem detrimental for firms' innovation in the food processing sector: in general, the rate of innovation appears higher among firms that see regulations as larger obstacles (Table 7.5).

Conclusion and Policies for Enhancing Innovation

Within the context of the African agrifood processing sector, firm-level innovations should be defined to broadly encompass high (transformational and high-tech) and low (simple methods or redesigned products) technology innovations, invented and imitated innovations, and innovations for improving the firms' product, process, marketing, and organizational performance. However, even within this broader definition, the level of innovation measured by the numbers of firms that reported

innovation in the sector is generally low: only one-third of the sample firms reported any innovation. To make matters worse, the level of innovation is declining over time. However, the descriptive analysis reaffirms the importance of innovation for increasing firms' participation in global and regional trade and for increasing firms' value addition. All of these findings suggest the strong need for government intervention to create incentives and build an enabling environment.

As an attempt to identify priority areas for public interventions, the chapter examines drivers of and constraints on innovation. A conceptual framework that constitutes a broad range of drivers and economywide as well as firm-, market-, and policy-level factors is proposed and discussed. Existing evidence is reviewed, and available data are used to explore the empirical association of selected innovation drivers with firms' innovation. Based on these conceptual and empirical discussions, we learn that strengthening innovation systems that facilitate linkages, competition, and cooperation among firms and innovation system actors is very critical. Furthermore, building the financial capacity of emerging food processing firms, the majority of which are small and medium enterprises, is essential to enhance their access to foreign technology and allow them to invest in innovation. Technology transfer agreements, vertical coordination, and industrial clustering help facilitate interactions, learning, and cooperation among value chain actors, not only to generate new ideas but also to collectively invest in innovation development.

Infrastructural services such as ICT and energy supply services that directly and indirectly create incentives and reduce costs are also priority areas to guide firms' innovativeness and response to emerging opportunities. The expansion of low-cost ICT services appears to be very critical for product and process innovations, particularly for the food processing sector, as it entails several precautionary activities (packing, ensuring safety, delivering, tracing, and so on) that could be supported by digital platforms. Access to ICTs not only helps firms to interact with trade partners but also allows firms to invent ICT-based products and services. However, regulatory obstacles are not yet very determinantal for African food processing firms, as these firms are not yet inventing advanced innovations that demand regulatory protection.

In line with these findings, the following priority policy actions are proposed. First, African governments that would like to enhance the competitiveness and innovativeness of the food processing sector should prioritize strengthening the innovation system through vertical and horizontal integration in the form of foreign technology transfer, contract farming, and industrial clustering over innovation-related regulatory policies. Second, public investment for enhancing innovativeness in the food processing sector should focus on expanding low-cost ICT services that facilitate the adoption of product and process innovations, particularly for the food processing sector, as it requires several precautionary activities (packing, ensuring safety, delivering, tracing, and so on) that could be supported by digital platforms. Third, to enhance the effectiveness and inclusiveness of public capacity-building activities, they should target firms with female and young top managers, as well as small and medium enterprises, which have limited access to foreign technology and invest very little.

CHAPTER 8

Agro-Parks as Drivers of the African Food Processing Sector: Review of Conditions for Success

Chakib Jenane and John M. Ulimwengu

Context

In July 2003, African heads of state and government ratified the Comprehensive Africa Agriculture Development Program (CAADP) at the Second Ordinary Assembly of the African Union (AU), held in Maputo, Mozambique. In 2014, they adopted the Malabo Declaration on Accelerated African Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, in which they recommitted to the principles and values of CAADP and set ambitious targets in five broad areas (enhancing agricultural investment, ending hunger, reducing poverty, boosting intra-African agricultural trade, and enhancing the resilience of livelihoods and production systems). Other stakeholders in the agricultural sector were also brought in to support the initiative; the commitment by the private sector was reflected in the launch of the Grow Africa initiative (Grow Africa 2016), and that of development partners through their tying assistance to progress in implementing CAADP via the Global Agriculture and Food Security Program (GAFSP) and the New Alliance for Food Security and Nutrition (De Schutter 2015).

Despite the continued commitment to CAADP, the continent continues to import more rice, maize, and large amounts of other staples each year, with an annual food import bill projected to reach US$110 billion by 2025 (AfDB 2021). Under the CAADP/Malabo agenda, African countries have committed to improve access to agricultural inputs and technologies, increase agricultural productivity, reduce postharvest losses, improve food safety, reduce food and nutrition insecurity, and improve social protection coverage for vulnerable groups, in order to end hunger throughout the continent by 2025. During the 2021 Biennial Review cycle, Kenya was the only country on track with respect to this commitment, with a score of 6.40 against a benchmark 6.32 (AUC 2022). Similarly, the commitment to bring down the proportion of the population that is undernourished to 5 percent or less by the year 2025 has not yet been fully met. Of the 22 countries that reported on this indicator, only 13 are on track: Burundi, Cameroon, Egypt, Ethiopia, Gambia, Ghana, Mali, Morocco, Mozambique, Senegal, Tunisia, Zambia, and Zimbabwe. It is safe to say that the vision of Accelerated African Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods under the Malabo Declaration is a work in progress.

Achieving structural transformation that generates sustainable and inclusive growth along with decent jobs, poverty reduction, and food security requires a combination of several factors. As pointed out by Matson, William, and Andersson (2016), sustainable development is grounded on the stocks of capital in five key asset areas: natural, manufactured, human, social, and knowledge. Put together in time and space, the five assets have the potential to trigger structural transformation and sustainable development. In other words, achieving structural transformation—and thereby the Sustainable Development Goals (SDGs)—requires various actors to combine assets through production processes to generate goods and services that are consumed. Indeed, productivity and efficiency are affected by the stocks of natural, manufactured, human, social, and knowledge capital available to farmers. These assets influence what livestock can be raised, what crops can be grown and when, and where these products can be marketed (Hoddinott 2012). Social capital, through market forces, provides signals as to what activities are profitable and what types of inputs can be profitably employed. The main challenge is to ensure the convergence of these key assets in due time and at the right place. Unfortunately, natural processes alone cannot guarantee such alignment in time and space; there must be a commitment from all actors across the development spectrum to "force" the convergence of these fundamental assets. As highlighted by the African Development Bank (AfDB) (2021), the upgrading of agricultural products into higher-value goods for marketable consumption would entail widening the participation of all key value-chain players, resulting in the involvement of smallholder farmers as well as upstream and downstream actors seeking productive employment and income gains. According to the AfDB (2021), a spatial model of agro-industrial processing is the best fit to serve as a strategic spatial solution for transforming Africa's agriculture into a high-value-added industry.

Although there are different forms and natures of special economic zones (SEZs), they all share certain characteristics: (1) such a zone is a geographically delineated area, usually physically secured; (2) it has a single management or administration; (3) it offers benefits for investors physically located within the zone; and (4) it has a separate customs area (for duty-free benefits) and streamlined procedures (FIAS 2008). Farole and Akinci (2011, 14) argued that "countries that have been successful in deriving long-term economic benefits from their SEZ programs have established the conditions for ongoing exchange,

and the accompanying hard and soft technology transfer, between the domestic economy and investors based in the zone. This includes investment by domestic firms into the zones, forward and backward linkages, business support, and the seamless movement of skilled labor."

For several decades, SEZs have proliferated following their successes in East Asia, particularly in China. Like traditional SEZs, there are several ways agro-parks can boost the food processing sector in Africa: (1) encouraging local innovation through technology transfer to small-scale farmers and domestic processing firms along agricultural value chains, (2) bringing skills and knowledge into the rural economy through professional and vocational trainings, (3) promoting the development of the rural nonfarming economy with improved infrastructure, (4) providing an opportunity to implement new policies or introduce reforms that would have been otherwise impossible, and (5) creating a multi-actor platform for sustainable development.

Following the release of the 2018 inaugural CAADP Biennial Review report, the African Union Commission proposed common African agro-parks (CAAPs) as a response to the continent's poor performance in meeting the target of tripling intra-African trade. In October 2019, the African Union formally adopted CAAPs[1] as a program associated with the African Continental Free Trade Area. The CAAPs initiative is part of a larger strategy to create regional agro-industrial hubs, aimed at increasing the supply of domestically produced and locally processed foods and goods. The specific objectives of CAAPs are as follows:

- To move Africa's agriculture from traditional farming systems to integrated agrifood systems akin to the organization [2] of agro-processing and agro-marketing at the continental level
- To reduce by 70 percent the current African food import bill by 2030 through emphasizing local agro-processing and the consumption of Africa-grown food products
- To create employment opportunities along the food system for at least 30 percent of Africa's youth
- To mobilize at least 60 percent of the CAAPs' investment requirements from African private investors, agro-industrialists, and Africans in the diaspora
- To promote and boost regional trade to achieve the continental targets of tripling intra-African trade for agricultural commodities and services by 2025

Several development and social responsibility programs are proposed to be implemented alongside the CAAPs for greater impact: (1) skills development programs for training agri-operators and/or agribusiness incubation centers, usually in partnership with universities; (2) voluntary agri-operator-oriented resettlement and training programs for refugees and immigrants; (3) home return programs for Africa's diaspora; (4) agricultural commodities trade facilitation programs; and (5) youth programs.

This chapter presents a review of past and present experiences with geographically targeted initiatives, in particular agro-parks, and highlights the reasons for failure and success. It concludes with key recommendations for successful implementation of the CAAPs initiative.

Concept and Types of Agro-Parks

Experience across the world points to different understandings and designs of agro-parks, which can be broadly categorized into three groups (World Bank Group 2016). The first is SEZs, which are used as a tool for industrial development. Farole and Akinci (2011) defined SEZs as demarcated geographic areas contained within a country's national boundaries, where the rules of business are different from those that prevail in the national territory. SEZs typically have a strong export focus. They offer land serviced with all utilities to specific types of investors, and focus on the development of specific industries and the exploitation of both upstream and downstream investments. They are equipped with comparatively unique infrastructure assets (such as easy access to power,

1 More specifically, the third Ordinary Session of the Specialized Technical Committee on Agriculture, Rural Development, Water and Environment of the African Union met to discuss the CAAPs.

2 African agriculture is dominated by 62 percent farming systems, whereas the global agricultural sector is composed of more integrated food systems, at 22 percent farming, 15 percent processing, 15 percent logistics, 25 percent retail, and 23 percent input supply.

water, or transport) and are regulated by a specialized authority with an on-site manager/operator, possibly a private investor.

The second is agro-industrial parks (AIPs), which are usually linked to territorial development strategies and may be referred to as *agroparks*, *agribusiness parks*, and *agrifood parks*. Overall, their concept is based on a concentrated industrial estate dedicated to the processing and promotion of agrifood value chains, including crops, livestock/dairy products, and allied services. They seek to drive technological change, add value, and industrialize the agribusiness sector by offering premises and supporting services on the microeconomic scale (Gálvez-Nogales and Webber 2017). They are often based on a public–private partnership (PPP) scheme aimed at facilitating private sector investment in agribusiness by providing (1) access to basic industrial infrastructure; (2) shared common services and facilities, and creation of economies of scale in terms of warehouses, cold storage facilities, logistic services, waste management, finance services, and other such services that may not be financially viable for individual firms; (3) specialized agro-industrial services, such as laboratory testing, certification, and new product development services; (4) improved access to technical support as well as information and management services; and (5) facilitation of partnerships through effective networking between primary producers, agro-processors, traders, retailers, and end markets. AIPs are often owned and operated by a special purpose vehicle, specifically established for the park and often based on a PPP. Depending on the business model, companies can access park plots through lease or purchase contracts.

The third category of agro-parks is the agri-clusters, which are essentially a concentration of producers, agribusinesses, and institutions that are engaged in the same agricultural or agro-industrial subsector, which interconnect and build value networks when addressing common challenges and pursuing common opportunities (Gálvez-Nogales 2010). They often share related production inputs, distribution/communication channels, and specialized labor pools and network associations across a larger geographical area (sometimes within a single country or contiguous regions of two or more countries). They do not have delimitation or a special legal/regulatory regime, but the organization and network of actors within the cluster typically allow them to enhance their productivity and competitiveness.

A key feature of agro-parks is investment promotion. Agro-parks provide domestic and foreign investors with a more attractive business environment—for instance, improved access to serviced land and/or buildings, reliable power supply, protection of land rights, and linkages to local economies. (An example is the KINFRA Food Processing Park in Kakkanchery, Kerala, India, which established a single-window clearance facility for obtaining all regulatory licenses and registrations from different public agencies in one place, and made available ready-to-use industrial plots with all utilities for investors. The park included the construction of general infrastructure such as internal roads, power supply, common facility buildings, and other facilities. It was also equipped with specific facilities needed by the food processing industry, such as a water treatment plant, a quality control laboratory, a food incubation center, a common warehouse, and modern cold storage facilities) (Kinfra Mega Food Park 2020). The key driver of investments in agro-parks (SEZs, AIPs, or agri-clusters) will be consumer demand. Data from eastern and southern Africa project huge growth in the demand for processed foods (Tschirley et al. 2015). Under appropriate conditions, these investments, among other spatial agricultural development tools, can contribute significantly to local socioeconomic development.

Agro-parks can serve as growth poles, taking advantage of government regional growth initiatives based on existing domestic agro-industry, local and export markets, and main trade infrastructure. This is the case in Côte d'Ivoire, where the government promoted three SEZs near Bouake, a key economic center that was at the epicenter of the 2011 political crisis (AfDB 2015), and in Tunisia, where the agrotechnopark of Bizerta is strategically located in the vicinity of Tunis, Carthage International Airport, the commercial port of Bizerta, and the free zone around Lake Bizerta (Gálvez-Nogales and Webber 2017).

Agro-parks can also lead to a broader engagement of the private sector in the economy, especially in supporting the development of small and medium enterprises (SMEs) by facilitating their entry into the agro-parks or enabling them to become suppliers to the zones. For example, in Kenya, the SEZ authority established an incubator program to help SMEs establish direct exporting and subcontracting linkages with firms in the zone (Farole 2011). Agro-parks can support economic diversification, especially those SEZs that are mixed-use zones, which can set the foundations for a steady emergence of a services- and export-oriented manufacturing sector (for instance, the cases of Egypt, Mauritius, Morocco, and the United Arab Emirates) (Farole and Moberg 2017). Moreover, such development tools can foster institutional collaboration and policy coherence through improved sector governance as well as clear and transparent legal

and regulatory frameworks that codify the agro-park strategy and establish the rules of the game for all stakeholders involved in the process, including government, the private sector, civil society, and development partners (AfDB 2015).

Overall, investments in agro-parks offer the potential for improved coordination between the chain actors and agglomeration economies that can lead to enhanced productivity and performance (reduced logistical and transaction costs, improved quality and food safety management, access to markets, and increased profits). Such coordination fosters linkages among farmers and enterprises, as well as collaborative relations with local institutions (that is, extension and research institutes), supporting knowledge spillovers (that is, easing the flow of business ideas and technology) and spurring innovation and development in agribusiness. Agro-parks reduce uncertainty for producers, who, through proximity to processors, gain the assurance of consistent demand and clear communication of market requirements (quantity, type, and quality of produce). In addition, such investments help by clustering agri-enterprises in defined zones, making them more convenient to attract suppliers, service providers, skilled workers, and customers, and to provide a private sector–driven basis for market linkages for all participants in value chains. Clustering can also boost the performance of smallholder farmers, as it enables them to increase productivity through innovations. Together, these improvements trigger significant development impacts that can strengthen the local economy, support poverty reduction, and lead to more viable farms and sustainable rural communities.

Like other spatially concentrated industries, agro-parks have the potential to create negative environmental impacts. These can include deforestation, air and water pollution, soil contamination, and increased emissions, among others. Many of these challenges are associated with modern agricultural production in general; they can pose particular issues in AIPs if environmental regulations are looser or are enforced less strictly than in other parts of the country. However, in some cases, it may be more feasible to enforce standards and provide services to support environmental protection within an agro-park than in the rest of the country (UNCTAD 2019). The International Framework for Eco-industrial Parks, developed by the United Nations Industrial Development Organization (UNIDO), the World Bank, and the German Agency for International Cooperation (GIZ) provides guidelines for industrial parks to improve environmental sustainability, including by adhering to or exceeding national environmental standards, ensuring monitoring of environmental performance, using energy and other resources efficiently, having adequate waste management systems, and mitigating pollution and emissions (UNIDO, World Bank, and GIZ 2017).

Lessons Learned from Selected Types of Agro-Parks

Experience with SEZs: The concept of the SEZ has been implemented in several countries to achieve different development objectives, including those of promoting agro-industries focused on export and of creating domestic markets for import substitution. In the last decade, this concept has seen increasing interest in countries' agricultural and agro-industrial development strategies. However, in agro-industry, the SEZ model should be applied within a broader set of policy reforms and based on carefully evaluating the country's or region's comparative advantage in agro-processing activities, as well as ensuring strong linkages to the market. Furthermore, the integrated nature of agricultural value chains requires policymakers to take a value chain approach to improving competitiveness (Gálvez-Nogales and Webber 2017).

The SEZ development tool has been widely promoted in Asia and Latin America, and has contributed to their export-led growth and structural transformation (Gálvez-Nogales and Webber 2017). For example, China used SEZs as a platform to support the development of export-oriented manufacturing. Alder, Shao, and Zilibotti (2013) estimated that SEZs established in various cities in China generated a 12 percent increase in gross domestic product for each respective city. In Latin America, countries such as the Dominican Republic, El Salvador, and Honduras used another form of the SEZ, the export processing zone (EPZ), to take advantage of preferential access to the US market. These zones generated large-scale manufacturing sectors in economies previously dependent on agricultural commodities. Furthermore, SEZs played a key role within the political economy of reform. In several countries, they supported partial exposure to global markets while maintaining protective barriers, in a "stepwise" approach to reform. SEZs aided in piloting new policies before rolling them out to the broader economy and, in the absence of political will to undertake reforms, acted as "second-best environments" and "pressure valves" to absorb excess labor (Farole and Moberg 2017).

The positive experience in Asia and Latin America (as well as countries in the Middle East and North Africa) prompted governments in Africa south of the Sahara (SSA) to initiate their own SEZ programs. According to the United Nations Conference on Trade and Development (UNCTAD 2019), 237 SEZs had been established in the region as of 2019, of which only 51 were under development. These took the form of EPZs, free trade zones, and free ports. The review of these strategies over the past two decades shows that they have generally failed to achieve expected goals. According to Farole (2011), except for Mauritius and the partial initial successes of Gabon (see Box 8.1), Kenya, Lesotho, and Madagascar, most SSA zones have failed to attract significant investment, promote exports, and create sustainable employment. Investments in zone infrastructure resulted in "white elephants" in numerous cases (Farole 2011). In some instances, SEZs became zones where investors took advantage of tax breaks without delivering substantial employment or export earnings. Other zones, such as those in Madagascar, were successful in attracting investment, creating employment in the short term, and contributing to improvements in the overall economic situation of the country in the second half of the 1990s (Cling, Razafindrakoto, and Roubaud 2005); however, even such success has proven to be highly vulnerable to changes in trade preferences and political stability (Cling, Razafindrakoto, and Roubaud 2007; Farole 2011) and has not managed to sustain its competitiveness in the face of eroding trade preferences or rising wages (Staritz and Morris 2013). Other SEZ experiences supported by China in five African countries resulted in poor linkages to the domestic economy, likely limiting their ability to promote wider structural transformation; however, the infrastructure developed for the zones will likely benefit other sectors (Brautigam and Tang 2014).

While SSA zones in most cases established physical and regulatory environments that were more attractive than their national and regional markets, these incentives were insufficient to attract footloose international investors. The causes of failure of these SEZs include several factors, such as a flawed concept, bad planning and implementation, and issues that are beyond the control of the investor (for example, civil unrest, policy inconsistency, regulatory uncertainty, and the like). Other key factors contributing to the failure of zones have included sites that were too remote, requiring substantial capital expenditures; poorly designed and constructed infrastructure facilities; inadequate marketing of the zone; lack of adequate institutional and administrative capacity; and uncompetitive economic policies such as excessive reliance on tax holidays and protectionist labor practices. Finally, an inadequate and irregular supply of raw material of the required quality and quantity is also among the main reasons for the limited performance of agro-parks in Africa. This is partly because, when developing agro-food parks, policymakers tend to focus on developing hard infrastructure at the processing hub level and fail to give due attention to improving the quality and quantity of the supply of raw material. In a recent study, Farole and Moberg (2017) argued that these constraints are mostly technical and that the main reason for SEZ failures in SSA is flaws in the political economy of SEZ schemes, which prevent replication of "best practice" in SEZ

BOX 8.1—GABON SPECIAL ECONOMIC ZONE

The Gabon Special Economic Zone (GSEZ) was set up in 2010 as a joint venture between Olam International Ltd., the Republic of Gabon, and Africa Finance Corporation, with a mandate to develop infrastructure, enhance industrial competitiveness, and build a business-friendly ecosystem in Gabon. It has now emerged as one of west-central Africa's major multisector manufacturing centers. It includes important agro-industrial activities such as wood processing and contributes 14 percent of Gabon's annual export earnings. With some 140 investors already established, GSEZ is considered a commercial success. It offers public–private partnership commitments aligned with special economic zone laws, a specialized infrastructure, and an operational one-stop shop for fast-track customs and regulatory services. The zone was recently awarded ISO 14064-1 Carbon Neutral Certification, which provides a transparent third-party assessment of GSEZ's carbon footprint and offsetting. The zone encourages the participation of small and medium enterprises by facilitating their access to capital through several financing instruments, such as the Gabon Strategic Investment Fund, the Okoumé Capital Fund, COFINA, and the National Social Assistance Fund.

Source:: https://www.ariseiip.com/project/gsez/

development and management. They further suggested that acknowledging the political economy challenges posed by SEZs opens the possibility to mitigate their deleterious effects while offering possible solutions. Therefore, a cautious and conservative approach, taking into consideration the political economy surrounding the region, should be taken when embarking on large, costly, and long-term projects like SEZs.

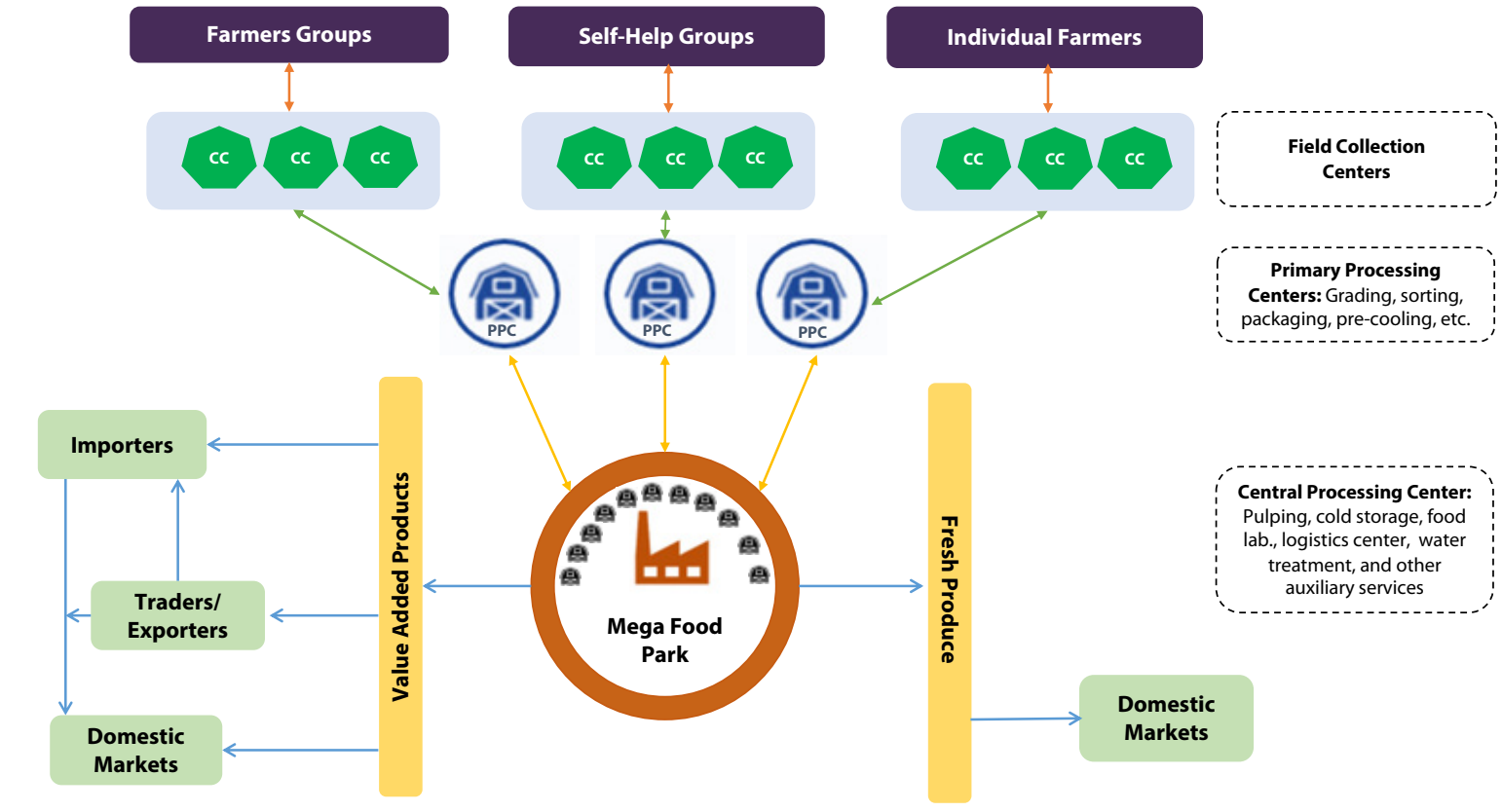
There are several ongoing agro-industrialization experiences across Africa, including integrated AIPs in Ethiopia, horticulture clusters and value chains in Ethiopia and Kenya, the export promotion of the fisheries sector in Senegal, integrated AIPs in Morocco, crop agro-processing in Ghana, agribusiness and zone development in South Africa, and a major agro-industrial SEZ in Gabon's forestry sector. The African Development Bank (AfDB) assessment of these experiences can be summarized as follows (see Table 8.2 for the key drivers of success in each project): (1) the SEZ model "is an appropriate spatial solution that has potential to improve food security, transform agriculture, and promote rural development"; (2) a "development approach based on the concept and operational features of the [SEZ] model is a viable strategy for promoting inclusive growth through widening participation and balanced development resulting from dispersed urbanization"; (3) "the application of the [SEZ] model to development planning is conducive to providing support for regional integration initiatives and value chain development and upgrading"; and (4) "the application of [the SEZ] model as an industrial development strategy is useful for addressing contemporary environmental challenges, including transitioning to green industrial growth based on agro-industrialization, as compared with conventional manufacturing, and also conservation of fisheries and forestry industries."

The industrial park business model has been extensively promoted at the global level, in particular in support of the development of light manufacturing industries such as textiles, clothing, footwear, and electronics. Vidová (2010) reported that industrial parks prospered in the United Kingdom from the 1930s to the 1960s, linked to regional policies to foster growth in crisis areas and regulate the location of a specific industry in selected districts. Over the years, they became a tool frequently used to support local economic development in the United States and Canada in the 1960s (Peddle 1993), and in Germany in the 1980s and 1990s (Vidová 2010). Taking advantage of the globalization era in the 1980s and 1990s, East and South Asian countries adopted the concept to benefit from the related increased trade, global value chains, and production networks (Dinh et al. 2012). In these countries (Hong Kong, Singapore, and the Republic of Korea), industrial parks developed rapidly during the 1980s, and in China, as well as Latin America and India, from the early 1990s. In the 2000s, the concept was applied in other parts of the world, including SSA. In this region, the concept yielded mixed results due to, inter alia, faulty governance structure and increasing global competition.

The adoption of AIPs as a tool for attracting investment, creating agricultural value addition, and increasing competitiveness is quite recent in both industrialized and emerging economies (Gálvez-Nogales and Webber 2017). They were promoted with the objective of instigating local economic development, upgrading product variety and quality, and reducing risk to private sector investors by providing common infrastructure. In late 2000, the government of India promoted a policy (the Mega Food Park program) to incentivize food processing and reduce food wastage. The program envisioned the creation of modern support infrastructure in a well-defined agro-horticultural zone for establishing food processing units within an industrial park. The aim was to provide a mechanism to link agricultural production to the market by bringing together farmers, processors, and retailers so as to maximize value addition, minimize wastage, increase farmers' income, and create employment opportunities, particularly in rural areas. The mega food parks typically consist of supply chain infrastructure, including collection centers, primary processing centers, central processing centers, cold chain facilities, and 25–30 fully developed plots for entrepreneurs to set up their food processing plants (Figure 8.1). These projects are implemented by a special purpose vehicle.

As of March 2022, 22 of the 42 parks envisaged in the India Mega Food Park program were operational but yielding mixed results (Ministry of Food Processing Industries 2022). The main issues faced by the program include delays in approval and implementation, as well as lack of facilitating institutions for land acquisition, labor recruitment, and availability of capital. An evaluation of the scheme, carried out by the Ministry of Food Processing Industries in 2015, concluded that while there was private sector interest in investing in the mega food parks due to rising urbanization, increasing demand for processed food, and huge opportunities to develop new products and brands, the private sector felt that the business model conceptualized in the scheme guidelines was difficult to implement and offered low returns in the beginning. The report also pointed out a lack of buy-in from state governments for the project, which has led to project

FIGURE 8.1—ILLUSTRATION OF THE INDIA MEGA FOOD PARK SCHEME



Source: Adapted from Ministry of Food Processing Industries, https://www.mofpi.gov.in/Schemes/mega-food-parks/project-components

delays (that is, political interference, delays from the ministry in releasing grants, issues regarding acquisition of contiguous land, trouble obtaining the necessary clearances and approvals such as power and water, and lack of fiscal incentives for units to locate in the food park). In addition, the time frame to operationalize the park was limited to 30 months, which was tight and did not take into account any contingencies. It is a challenge for a food park to work with farmers in improving the quality of raw materials, creating linkages, and implementing new technologies and practices in a 30-month time frame. This is further substantiated by the fact that none of the food parks were operational within 30 months. Several developers pointed out that they were expecting organized retail to develop and foreign retailers to come to India. They could then engage in contract manufacturing for the organized food and grocery retailers. Some investors felt the approach of the scheme was basically "one-size-fits-all," which did not allow for attracting investors with different investment requirements. The design

of the scheme also seemed unattractive and restrictive to global multinationals and investors from countries such as Australia, the European Union, Japan, the Republic of Korea, and the United States, as these countries and regional communities cannot invest in a grant-based scheme limited to domestic firms. Most developers' preference would be for joint ventures like the food industrial parks developed in China, Thailand, and Vietnam. In these parks, foreign collaboration led to technology upgrades, access to finance, knowledge spillover, and the adoption of best management practices (UNIDO 2020; Whitfield et al. 2020).

Similarly, in Europe, the AIP concept was also applied in a few countries. The focus of the resulting parks was on increasing competitiveness, spurring innovation, and reducing waste flows while maximizing resource flows in high-value agribusinesses (horticultural products and flowers). This is the case, for example, of the Danish Agro Food Park in Århus [3] and the Greenport Venlo park in the Netherlands. [4]

More recently, with the liberalization of its economy and the increase in competitiveness from imported goods, Morocco promoted the concept of AIPs (called agropoles) as part of its agriculture development strategy, titled the Green Morocco Plan 2010–2020. Six agropoles are planned in different agroecological zones. The aim of the parks, established in areas varying between 100 to 200 hectares, is to strengthen the processing and marketing of agricultural products. The agropoles benefited from substantial funds for their development (ranging from US$45 million to US$92 million per site). Each agropole was designed to offer investors, mainly operating in the agrifood sector, an adequate environment, with serviced industrial plots and quality infrastructure (access roads, power, communication, conference facilities, training centers, logistics, food laboratories, and other common facilities). To further attract investors to the zones, the government provided incentives largely in the form of grants and subsidies, exemption from licenses during the first five years for business and industry, and reduction of import duties on selected key inputs. Despite this support and the attractiveness of the sector, the plan was delayed by five years, and only two parks are currently fully operational (in the cities of Berkane and Meknes). The difficulties encountered in rolling out the plan are linked to (1) the limited consultations with the key value chain actors (including domestic business and local communities) to ensure that demand/support is based on the potential of the area (market demand and political economy), (2) weak institutional capacity in terms of planning and implementation of the concept of agropoles, and (3) the design of the strategy itself. A key element of that strategy is aggregation, the grouping of farmers around private actors (aggregators) with strong managerial capacity to address land fragmentation and ensure that smallholders have access to modern production techniques. The aggregators are supposed to play key roles in the promotion, processing, monitoring, and marketing of products (Picard, Coulibaly, and Smaller 2017). This has happened only to a limited extent. At this stage, however, it is too early to assess the success or failure of these investments, as they are still under development. Nonetheless, clear operational challenges are present.

In Ethiopia, the government has also applied the concept of AIPs under its Integrated Agro-industrial Parks scheme, running from 2009 to the present. The program is based on a "hub-and-spoke" model in which a central processing hub is fed by numerous smaller aggregation centers (the spokes). At the aggregation center (rural transformation center, or RTC), sorting, grading, packaging, storage, and primary processing activities take place, as well as agricultural and financial services for farmers and allied industries. Agricultural produce is then transported to the central hubs for further processing and onward shipment to domestic, regional, and global markets (AfDB 2018). The aggregation center helps ensure that smallholder farmers are integrated into value chains and benefit from agro-industrialization. The RTCs can be publicly run or managed by private agro-processors themselves, while the agri-processing hubs are each owned and operated by a special purpose vehicle, based on a PPP approach. The government has established four integrated agro-industrial parks (IAIPs) with shared infrastructure in Amhara; Oromia; the Southern Nations, Nationalities, and People's Region; and Tigray. These IAIPs specifically target the expansion of inclusive, broad-based economic opportunities through Ethiopia's structural change from an agricultural-based economy to a more industrial economy (AfDB 2021). However, the government has faced some binding constraints in the form of inconsistent policy knowledge on the agglomeration effects of these spatial zones. According to the Organisation for Economic Co-operation and Development

3 http://www.agrofoodpark.dk

4 http://www.greenportvenlo.nl

(2020), outdated "rural–urban" typologies have failed to account for changing rural realities and the multidimensional needs of labor migrants.

Experiences with agri-clusters: In 2014 the Democratic Republic of the Congo (DRC) initiated an ambitious program to establish 22 agri-cluster parks across the country on more than 1.5 million hectares. The program aimed to boost agricultural production, encourage private and foreign capital investments, and increase agricultural exports. Its concept was based on a "hub farm" developed in partnership with the private sector, which would enable the country to fast-track a modern commercial agricultural sector. The first park was developed as a pilot in Bukanga Lonzo, some 260 km southeast of the capital, Kinshasa, with an estimated US$90 million in public funding from the government. It covers 80,000 hectares and involves major investments in basic infrastructure (including roads, buildings, a power plant, and water supply), irrigation pivots, greenhouses for tomato production, grain storage facilities, feed mill and flour units, and highly mechanized production. The expectation was that corporate partners experiencing some level of comfort would further invest in the government agro-cluster parks program for nationwide upscaling. However, its implementation has been slowed by political instability, inconsistency in the government agenda and vision, absence of stable funding for infrastructure, and lack of good governance and management. Several nongovernmental organizations have also raised concerns around land grabbing, including the opacity of land acquisition, the lack of consultation with local populations, the absence of a contract between the company and the locals, and forced displacement of local farmers (The Oakland Institute 2019).

This experience points to the need for governments to promote responsible investment in agriculture and food systems with a focus on socially inclusive investments that are mutually beneficial for investors, landowners, local communities, and the region. The governments should ensure that affected communities have the opportunity and responsibility to identify land appropriate for investment, based on informed choices; secure sustained and well-defined benefits; receive fair compensation for the land and natural resources that they make available for investment; engage in ongoing partnerships with investors and the government; and be able to hold investors and government institutions accountable for their commitments. Furthermore, the complexity of an integrated project like the Bukanga Lonzo park requires a wide range of expertise and institutions that are limited in DRC. It also requires time, sustained government buy-in, and an improved business environment to encourage private sector involvement. Without consistency over several years and good governance and management, the loss of political buy-in is likely to hamper the success of the agri-cluster parks program in DRC.

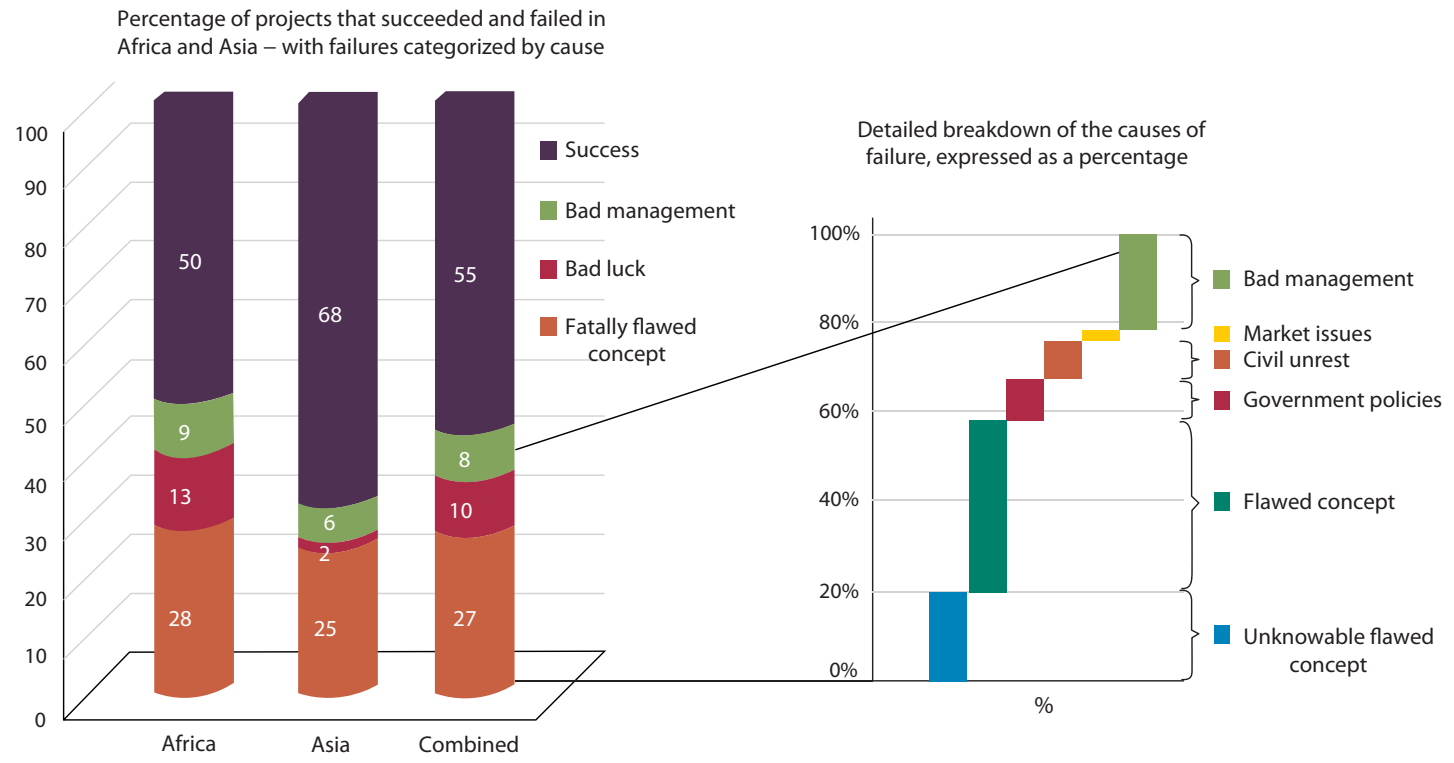
Success and Failure Factors in the African Context

While still a relatively recent investment trend in the African context, agro-parks are increasingly being promoted as potentially effective tools for regional development and spatial inclusion, to attract agro-industrial investments with the aim of enhancing value addition, creating jobs, increasing exports, increasing tax revenues, and providing markets for new and existing producers. Their potential to deliver these impacts derives from the business model's ability to (1) concentrate scarce resources to provide priority firms and sectors with high-quality public infrastructure and services; (2) encourage firm clustering to unlock economies of scale and scope, positive agglomeration externalities, and industrial linkages; and (3) enable the integration of local SMEs as well as surrounding production zones to ensure reliable inputs as well as forward linkages to the market (CASA 2021).

In general, successfully developed agro-parks around the world share the following main features (Ulimwengu and Jenane 2019): (1) selection of a site offering a clear legal title and little or no population displacement to minimize transaction costs and uncertainty; favorable physical characteristics and a suitable soil foundation capable of being secured with minimal environmental constraints (for instance, flooding, rivers) and minimal environmental impact (for example, water quality, biodiversity, air quality); proximity of the proposed zone to existing public infrastructure facilities to minimize public off-site infrastructure development expenditures; and selection of a site that has physical expansion potential with no encroachment vis-à-vis urban centers or tribal communities; (2) construction of the park near existing population centers, national or international transportation networks, and enterprise clusters to provide easy access to labor, raw materials, suppliers, and distribution markets; (3) existence of land use plans that adhere to best-practice urban planning standards regarding population density and mixed-use buffer zones that separate the industrial park from

commercial and residential areas; (4) public or private construction of infrastructure facilities (such as sewage and wastewater treatment plants), including social infrastructure (especially for education and health care) to attract skilled workers; implementation of environmental protection technologies (for instance, in storage and incineration areas); and provision of waste disposal and refuse collection capacities; (5) an effective and transparent legal, regulatory, and institutional framework to ensure the quality of the business environment inside the zones, including infrastructure provision and trade facilitation capacity; and (6) the existence of privately managed zones to increase administrative, operational, and management efficiencies and to lower costs vis-à-vis public sector counterparts.

FIGURE 8.2—PERCENTAGE OF PROJECTS THAT SUCCEEDED AND FAILED, WITH REASONS FOR FAILURE



Source: Tyler and Dixie (2013).

Tyler and Dixie (2013) analyzed the reasons for success or failure of a number of investments in commercial smallholder and estate agriculture and agro-processing in SSA and Southeast Asia, including estates or plantations—large-scale farming operations with no smallholder component (46 percent); the nucleus estate and smallholders model, in which an investment is made in a processing plant that has an adjoining large-scale farm coupled with outgrowers supplying the necessary raw material (22 percent); outgrower schemes with no significant estate element (12 percent); and firms focused mostly on agro-processing activities (20 percent). They concluded that the causes of failure were mostly related to a flawed concept, bad management, and issues beyond the control of the investor (for example, civil unrest, government policies, and markets) (Figure 8.2). They also highlighted that while significant differences exist between these business models, investments in outgrowers and large farms are the most risky, processing operations next, and nucleus estates the least risky, because the latter's business model is well understood and includes limited processed crops.

TABLE 8.1—CROSS-CUTTING FACTORS THAT FACILITATE SUCCESSFUL AIPS

Sustained high-level political leadership and effective coordination and delivery mechanisms. AIPs are complex long-term projects that require strategic and policy continuity and alignment between—and contributions from—numerous stakeholders, including government bodies, financiers, private sector actors, civil society organizations, and external supporters. Many AIPs get derailed or delayed due to misaligned incentives and a failure to deliver coordinated infrastructure and services or to enforce incentives and regulations.
Policy continuity, consistency, transparency, and predictability. These are critical for sustained implementation, investor confidence, widespread political support, and alignment around clear priorities.
E**mbedding AIPs in broader development strategies.** For AIPs to have the desired broader developmental impacts, they must also be embedded in national economic development strategies, urban development plans, regional infrastructure networks, and agricultural development strategies.
Preliminary research. High-quality research—including demand and raw materials supply analyses and competitiveness assessments—are crucial, first for determining whether an AIP is the right instrument and, second, for guiding site selection, institutional arrangements, value chain targeting, infrastructure, service provision, and other design elements.
Mobilizing long-term capital. AIPs are capital-intensive projects but typically take at least 10 years to be fully established and to generate significant public and private revenues. They therefore require long-term capital, which is often not available. Particularly in the early stages, large-scale public funds typically need to be mobilized to finance the entire project, co-finance the project via a public–private partnership (PPP), or de-risk or guarantee private financing arrangements.
Getting institutional arrangements right. There is growing consensus that government-managed and -operated AIPs tend to fail or underperform most often, but private sector operation is no guarantee of success, and there are numerous examples of privately operated parks failing to attract tenant firms or to deliver development outcomes. This suggests that outcomes are determined not so much by who owns and runs an AIP but how they manage it: their objectives, incentives, and capacity.
Applying a phased approach to park sizing and the number of parks developed. Many AIPs get park sizing wrong, with detrimental consequences; they should start modestly and plan for expansion with demand. Parks that are too small may not reach the required economies of scale or have the desired impact on the local economy, while also potentially facing congestion and waste disposal problems as well as tensions between existing and potential tenants for space. Parks that are too big, on the other hand, may not fill up and can create conflicts with surrounding communities. The same goes for the AIP scheme as a whole: a common recommendation is to start with one or two pilot parks to prove the concept and build momentum before proceeding in incremental stages to expand the scheme. A park can also be constructed on a modular approach and expanded in terms of space only when needed.
Flexibility and responsiveness. Due to their long-term and complex nature, the performance of AIPs depends on the capacity of host governments, operators, and tenant firms to effectively monitor their performance and respond dynamically to changing economic realities.

Source: CASA (2021).

More specifically related to the AIP, CASA (2021) categorized the most important success factors of this business model into four areas: (1) cross-cutting issues related to political will, institutions, and management; (2) design and development of the park; (3) management and operation of the park; and (4) attracting and regulating the park tenant firms. Given the complexity of implementing such an investment, the authors highlighted the need for sustained high-level political leadership and effective coordination and delivery mechanisms involving key stakeholders for sustained implementation, investor confidence, widespread political support, and alignment around clear priorities. They indicated that the design of AIPs should be embedded in broader national economic development strategies, urban development plans, regional infrastructure networks, and agricultural development strategies. They emphasized that these investments, which are capital-intensive projects, require mobilizing long-term capital, which is often not available. Therefore, for an AIP's successful implementation, it is important that in the early stages, large-scale public funds be mobilized to finance the entire project, co-finance the project via a PPP, or de-risk or guarantee private financing arrangements. Moreover, to achieve expected development objectives, CASA (2021) highlighted the need for putting in place an adequate balance between the business environment within the park and its catchment area, ensuring targeting the right tenant firms, and fostering strong relationships between agro-processing firms in the parks and farmers in surrounding areas. Table 8.1 presents cross-cutting factors that help to prevent failure of an AIP (CASA 2021).

Table 8.2 summarizes a recent AfDB (2021) report that includes seven case studies. These findings may serve as the starting point for evidence-based policy recommendations and guidelines pertinent to the design and programming of AIPs.

TABLE 8.2—COUNTRY PERFORMANCE CRITERIA AND SUCCESS INDICATORS FOR THE SPECIAL AGRO-INDUSTRIAL PROCESSING ZONES MODEL

Country	Macroeconomic policy environment (investment, trade, and industrial policies)	Political will, leadership, and long-term commitment at the highest level	Legal and regulatory institutional framework	Relationship with external investors and development partners	Integration with the rest of the national economy	Productive and remunerative employment and skills upgrading	Spatial development and dispersed urbanization	Value addition and economic structural transformation	Technology transfer, diffusion, and innovation
Ethiopia I	V	V	Somewhat	V	V	Somewhat	V	V	Unclear
Ethiopia II	V	V	Somewhat	V	Somewhat	Somewhat	V	V	Unclear
Gabon	V	V	V	V	Somewhat	Somewhat	Unclear	V	V
Ghana	Somewhat	X	Unclear	V	Somewhat	X	Somewhat	X	X
Kenya	Somewhat	V	V	V	Somewhat	Somewhat	Unclear	V	Somewhat
Morocco	V	V	V	V	Somewhat	V	V	V	Somewhat
Senegal	V	V	V	V	V	Somewhat	V	V	V
South Africa	Unclear	Somewhat	Somewhat	Unclear	X	X	Unclear	Somewhat	Unclear

Source: AfDB (2021).
Note: V = successful; X = unsuccessful; somewhat = partial progress; unclear = insufficient information or too early to assess.

Expectations for the Potential Success of Agro-Parks through the CAAPs Initiative in Africa: Beyond Boosting the Agri-Processing Sector

As pointed out by CASA (2021), investment in agro-parks is a means to an end (for example, job creation, export growth, and smallholder incomes), not an end in itself. Hence, the factors that attract firms should be the same as those that help agro-parks achieve their broader developmental goals. While attracting firms is about giving them what they want—access to raw materials, a low cost of doing business, access to markets, and stability—making sure agro-parks achieve their developmental goals should prioritize a conducive ecosystem—productive farmers, competitive agro-processors and supporting functions, conditions supporting decent work and quality of life as well as environmental sustainability, and strong links between the ecosystem actors. The AfDB developed and coined the name of Special Agro-industrial Processing Zones as its brand for a spatial development solution in the rural landscape aimed at achieving agricultural transformation across the continent (AfDB 2021). The bank considers such a model to be (1) a development approach for structural change and economic transformation, (2) a spatial solution for rural development and dispersed urbanization, (3) a basis for an industrial policy, (d) a stimulant for infrastructural investment, (4) a catalyst for private sector development, (5) a support for regional integration and value chain development, (6) a strategy for promoting inclusive growth, and (7) a conduit for human capital development.

It follows that if successfully implemented, agro-parks have the potential to deliver needed innovations and fundamentals such as human capital, institutions, and infrastructures for sustainable development (in accordance with SDG 9, which addresses industry, innovation, and infrastructure). This is possible because each agro-park will involve various agricultural stakeholders (professionals, farmers, and others) operating on plots of variable size but pooling together basic infrastructure (roads, water, energy, telecommunications, and so on), local services (finance, quality control laboratory, transportation, maintenance, waste management, cold storage, and the like), knowledge, and good agricultural practices (training, research, management, and technology

transfer). By design, such agro-parks will include a processing and agro-industrial area with related logistics and coordination mechanisms to reinforce synergies between all stakeholders. Hence, they will contribute to the integration of upstream and downstream value chain actors, and the establishment of a comprehensive supply of services for investors and agricultural enterprises. Each agro-park is expected to provide a favorable business environment, including specialized counseling, mentoring, and innovation and support services for entrepreneurs to consolidate and develop markets; access to secured financing; and "smart" partnerships that stimulate sustainable economic development based on local and regional potential. Hence, each agro-park has the potential to create jobs for households along the agricultural value chain (promoting SDG 8, good jobs and economic growth). Moreover, value chain development across agro-parks should allow sustainable consumption and production patterns (in line with SDG 12, responsible consumption).

Each agro-park will be designed as a hub-and-outgrower scheme linked to processing, storage, and marketing facilities in a PPP context between government, private investors, service providers, smallholder farmers, and development partners. Engagement and coordination of various stakeholders in the implementation of agro-parks are necessary conditions for their success (as targeted in SDG 17, partnerships for the goals). Indeed, when properly implemented, an agro-park has the potential to address the concerns of all stakeholders. Private investors are interested in a business-friendly, safe, and secure environment, with no undue government interference, where a good return on investment can be expected. The government is seeking a productive use of natural resources, the development of infrastructure to improve the population's welfare, increased food security and social stability, greater employment opportunities, and equity and fairness for all stakeholders, including a solid future tax revenue base. Smallholder farmers, in turn, want the ability to easily acquire access to inputs and farming services, market availability and fair prices, and access to affordable farm finance when needed. A fully functional agro-park should promote investment and sustainability, and hence should place emphasis on long-term planning for infrastructure to support a competitive agriculture sector; it should also be supported by reputable research institutions that add value to agricultural activities.

Each agro-park will be a de facto city; thus, agro-parks create an opportunity to design sustainable cities and communities (per SDG 11, sustainable cities and communities). More specifically, the infrastructure and services provided by an agro-park should include the following: power generation; communications; pumping stations and water distribution network; management of solid and liquid waste disposal; road network; grain storage and drying facilities; housing for management and general staff; workshops for maintenance, repair, and rental of equipment; office space; general security; agrochemicals and fertilizer supply; cold storage for perishables to support the cold chain; and logistical support for grain hauling and transportation of inputs. Thus they would leverage buying power to reduce the cost of supplies, machinery, and services. The parks would also include residential zones, green (recreation) spaces, and commercial zones (with grocery stores and so on) for park residents.

Ultimately, agro-parks are designed to support income-generating agricultural and nonagricultural activities in rural areas, often the most underdeveloped regions, known to host most of the poorest households (aligning their purposes with SDG 1, poverty reduction). Smallholder farmers in outgrower schemes should expect the following benefits: a cash market for their production; production credit (to be paid with crop production); fertilizer and improved seed; agronomy support; grain storage; transport (field to market); equipment rental for tillage, planting, and harvesting; contract services for field operations; equipment repair facilities; cold storage for perishable crops; value-added processing for crops; and irrigation. Most smallholder farmers in Africa are women; thus it stands to reason that women should benefit disproportionately from the outgrower schemes put in place as a result of an agro-park. Also for this reason, many agro-park services targeting smallholder farmers should be customized to fit the needs of women farmers (heeding SDG 5, gender equality). Finally, the community in the vicinity of a given agro-park should expect to see substantial improvements in their well-being in terms of access to food, social services and facilities, housing, internet and communication, and education (aligned with SDG 3, good health and well-being).

Concluding Remarks

In the absence of a transformation of the agriculture sector in Africa, the continent will not be able to achieve the Malabo commitments of reducing poverty by half and ending huger by 2025. Moreover, the continent will not be able to reach its target of tripling intra-African trade for agricultural commodities and services by 2025. The food security situation will worsen with increased annual

food import bills, climate change and the resulting low agricultural productivity, and weak rural economies. Policymakers are becoming increasingly aware that such a transformation would require de-risking private sector investments, facilitating economic linkages, ensuring diversification, and converging key assets in due time and at the right place. Natural processes alone cannot guarantee such alignments in time and space; there must be a commitment from all actors across the development spectrum, including the private sector, to achieve the required convergence of assets and avoid the pitfalls of the past. In view of the challenges Africa's agriculture is facing, the promotion of agro-parks (including SEZs, AIPs, and agri-clusters) is gaining increasing attention and consideration across the continent (from actors including international financial institutions and development partners) as a policy tool to attract investment (domestic and foreign) and drive the sector's transformation. Recently, the African Union Commission initiated CAAPs as a response to the continent's poor performance in meeting the intra-African trade target.

This chapter shows that territorial development tools such agro-parks have the potential to provide an attractive space for investment, facilitate the integration of upstream and downstream value chain actors, establish a comprehensive supply of services for investors and agricultural enterprises, support the development of growth poles, and foster institutional collaboration and policy coherence, which can set the foundation for—and drive—agricultural transformation. However, establishing such agro-parks is a complex venture, and global experience has shown the risks and related costs of failure—even in relatively developed countries.

Here we underline that agro-parks should be designed in response to specific economic situations, taking into consideration the parks' distinctive competitive factors, such as geographic location, resource endowment, market demand, available skilled workers, and regional integration, as well as the competitiveness of the country's broader business environment. Specifically, there must be strong and sustained political support for the development of the agro-park, based on the right design characteristics and appropriate implementation; in particular, private sector involvement should be wide-ranging and should include strategy, development, financing, operation, and administration of key aspects of the business and regulatory environment. Governments should not embark on agro-park investments based on vested interest and politicized decision-making, but should ensure that the program is fully aligned with—and an integrated part of—their national development strategies. Dedicated and sustained administrative support is needed, from inception and design to implementation. Relevant administrations (land authority, finance, energy, transport, labor, customs, industry, and so on) should be engaged and provided with the resources needed to support the program. Investment support measures should also be put in place. These should not undermine more mature economies with regard to tax incentives and production costs but should be derived from the competitiveness of the country or region, as well as its limitations. Finally, the infrastructure design and management are an essential factor for success. They must be aligned with international standards, superior to what exists outside the park, and priced competitively.

Access to Finance

Toshiaki Ono

Why is Access to Finance Important?

Financially constrained agrifood processors may not be able to fully utilize their production capacity and make sufficient investments for future business opportunities. They may also be more susceptible to external shocks. These limitations could force companies to focus on low-risk and low-return business opportunities, leading to slower growth and suboptimal impacts on national economic growth, job creation, and competitive agricultural value chains. Agribusinesses, including agrifood processors, finance their operations through internal and external sources. Their primary source is funds generated by their daily operations. However, steady expansion and responses to emergencies require external financing, both formal and informal. Agribusinesses, especially small and medium-sized enterprises (agri-SMEs), need stable access to formal external finance, which is often larger in size and offers more competitive interest rates than informal sources of finance. Such external finance is especially critical if companies aspire to grow rapidly, lack resources, or suffer from a disaster or downturn. Yet, these agribusinesses have great difficulty in accessing external formal financing (World Bank 2021). According to the Enterprise Surveys of the World Bank, about 40 percent of surveyed agrifood processors in 14 countries in Africa south of the Sahara identify access to finance as a major constraint. On average, only 11 percent of their investments are financed through banks as opposed to internal finance, which provides 74 percent (WBES 2022). [1]

Estimating the Finance Gap

Precise data are not readily available on the finance gap facing agrifood processors in Africa south of the Sahara. Existing research broadly estimates the financial gaps of smallholder farmers and agri-SMEs. For example, ISF Advisors, who define agri-SMEs "holistically as encompassing medium- and large-scale farms, agri-services companies, and the range of SMEs within value chains that facilitate input and offtake activities," estimate that there are 130,000 agri-SMEs in Africa south of the Sahara (ISF Advisors 2022, 16). Agri-SMEs are estimated to need approximately USD$90 billion annually in financing, but 86 percent of their financing needs remain unmet (ISF Advisors 2022). The report does not provide financing gap data by subsegment, including for agrifood processors.

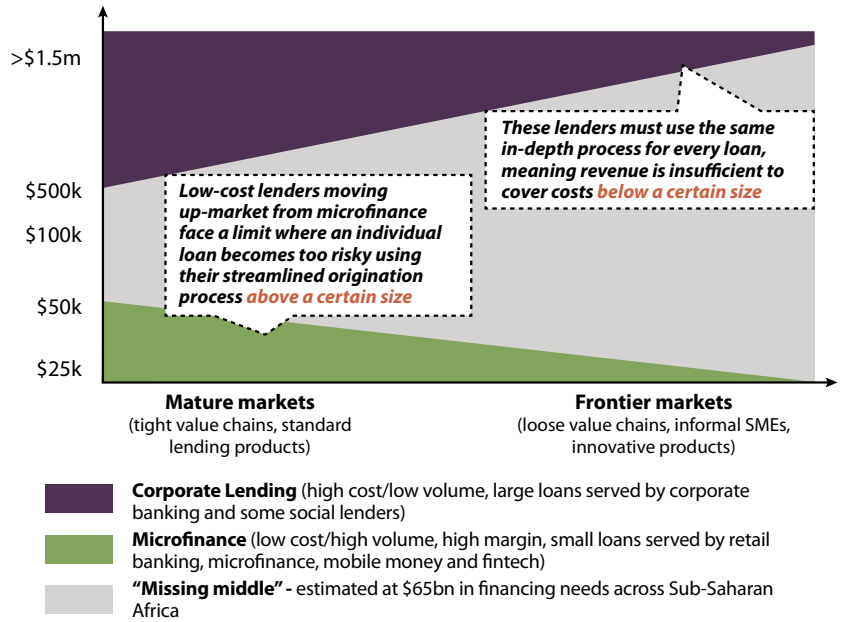
Accessibility of finance varies depending on the size and growth prospects of agribusinesses. These companies are diverse in nature, ranging from micro informal businesses to large established companies. A few larger entities are disproportionately served by formal financial institutions, especially commercial banks and impact-oriented investment funds (ISF Advisors 2022). Established agrifood processors are likely to be found in this category, together with other large entities typically in the trading sector and cash crop value chains. On the other hand, most agribusinesses are categorized as SMEs, and many of them are micro and informal. They do not have strong growth prospects and rely largely on their own funds or informal finance. However, in some markets, non-bank financial institutions (NBFIs), such as microfinance institutions (MFIs), provide financing to smaller SMEs and micro companies by upgrading their individual and group lending models. Between the large and small/micro borrowers, there is a so-called "missing middle" in access to finance. A market assessment by Dalberg and KFW Africa estimates that the missing middle—unmet financing needs among agri-SMEs seeking loans from US$25,000 to US$1.5 million—is about US$65 billion in Africa south of the Sahara (Aceli Africa and Dalberg 2021). The gap seems to widen for companies in unstructured value chains with limited and ad-hoc market access (Figure F1.1).

1 These statements are based on the author's analysis of data from 14 country surveys: Ethiopia, Ghana, Guinea-Bissau, Kenya, Madagascar, Mauritius, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe.

Challenges in Financing Agri-SMEs, Including Agrifood Processors

Lending to agri-SMEs involves numerous challenges, from underdeveloped financial markets and enabling environments in Africa south of the Sahara (including weak infrastructure, nonexistent or inadequate insurance markets, collateral registry, and credit bureaus) to the inherent risks in agricultural value chains. Agricultural production is seasonal and susceptible to climate change, crop disease, and price volatility. Linkages with markets, including with traders and processors, tend to be weak, especially in loosely organized value chains. Agri-SMEs, including agrifood processors, are subject to these challenges in agricultural production. In addition, lenders have to assume high transaction costs in serving dispersed small SMEs. These companies generally lack financial records and assets for collateral. Given these adverse conditions, formal lenders have a strong bias toward large and established companies, to whom they provide short working capital loans. They are usually reluctant to develop capacity and suitable financial products to respond to the various needs of agri-SMEs. A recent evaluation of agri-SME lenders in Africa justifies this conservative strategy. It revealed that loans of less than $500,000 (after credit losses and overheads) had net losses due to lower interest income against fixed loan execution costs in smaller loans. In the same analysis, loans with tenors of more than 12 months were unprofitable on average and had four times the risk of impairment (USAID 2018).

FIGURE F1.1—MISSING MIDDLE IN AGRI-SME FINANCE



Source: Aceli Africa and Dalberg 2021.

Major Finance Providers

Although financing is not sufficient to meet demand, there are various financial products available, depending on business need and context. Formal external financing sources for agribusinesses vary. Major sources include commercial banks, development banks, NBFIs, and investment funds. They offer various financial products, such as short- and long-term debt, equity, and quasi-equity. The following highlights major formal financiers (ISF Advisors 2022; World Bank 2021):

Commercial banks: Commercial banks are, by far, the largest finance providers for agri-SMEs in Africa. They usually provide short- and long-term debt to a small number of agribusinesses specializing in commodities that involve a large volume of transactions and well-structured markets. Such commodities often include coffee, tea, cocoa, palm oil, wheat, and maize. These banks mainly operate in cities and large town centers. Some banks have a strong agri-focus, with specialized divisions and loan officers for agriculture lending including agri-SMEs. The banks are mainly funded through deposits and generally lack long-term finance, which limits their capacity to provide long-term loans.

Development banks: Development banks are mandated by the government to provide financial resources to countries' priority sectors, which often include agriculture and agri-SMEs. Some development banks exclusively serve the agriculture and agribusiness sector. Many development banks traditionally focus on providing long-term loans to large companies and projects. However, some banks also cater to SMEs and farmers by providing smaller loans in rural areas. Loan size varies depending on the borrowers. Some banks offer concessional loans subsidized by public sources, wholesale credit to other lenders, and credit guarantees. While there are well-performing development banks, others rely on periodic injections of capital from the government and other agencies.

Non-bank financial institutions (NBFIs): NBFIs include MFIs and cooperative financial institutions such as savings and credit cooperative societies. They traditionally serve individuals and group borrowers with small and short-term loans. Some are expanding their focus to include SMEs by upgrading their lending models and products. In some markets, NBFIs have wider networks in rural areas than other players, but they are small in size and offer smaller loans with higher

interest rates than banks, partially due to limited capital and loanable resources.

Investment funds: Investment funds consist of private equity (PE) and venture capital (VC) funds as well as impact-oriented funds that place a strong emphasis on development return. While PE/VC funds remain underdeveloped in Africa south of the Sahara, especially for the SME segment, many impact-oriented funds for agri-SMEs focus on Africa. Even in the SME segment, they tend to target larger companies due to high fixed costs in investment sourcing and management relative to their investment portfolio. The funds that pursue market return mainly use equity and focus on larger investments of at least US$3–5 million. However, some impact-oriented funds target smaller investments (from US$250,000 to US$2 million) by offering debt and equity.

Recent Developments in Agri-SME Finance

Digital financial services (DFS), or the provision of financial products and services through digital channels, are changing the SME finance space. Globally, they have become essential to closing the SME financing gap (World Bank 2022), and digital innovations are also rapidly evolving in Africa. DFS can reduce transaction costs by automating processes in SME financing such as onboarding, underwriting, due diligence tasks, and collection of payments. In addition, new sources of data and advanced analytics such as Artificial Intelligence (AI) and machine learning can unlock financing for SMEs that often lack proper credit records and bookkeeping (World Bank 2022). In the African SME finance space, new players are emerging in countries like Kenya, Nigeria, and South Africa, and traditional lenders are employing new technologies and upgrading their processes. Digital payments are already widely available for individuals and SMEs, especially in East Africa. In addition, DFS can provide new solutions such as factoring, reverse factoring, peer-to-peer lending, and trade finance (World Economic Forum 2015; World Bank 2022).

Climate finance may become a new financial source for agri-SMEs. However, despite the urgency around climate change and global interest in financing climate mitigation and adaptation, agri-SMEs in Africa are not yet major recipients of climate finance, particularly those focused on adaptation. According to a recent analysis, non-OECD countries receive only a small fraction of climate finance resources, which are overwhelmingly funded by public founders targeting large-scale initiatives with grant and concessional debt (ISF Advisors 2022).

Expanding Access to Finance

Developing the agrifood processing sector and expanding access to finance will require a stable macroeconomy and political environment that pave the way for the long-term growth and stability of the financial and agribusiness sectors. This will boost confidence among private sector players about financial prospects and encourage investments. Similarly, financial sector development is an important prerequisite to expanding access to finance for agrifood processors; this includes savings mobilization and financial infrastructure such as credit registries, collateral registry, and capital markets. Agriculture policies need to create a conducive business environment for strong value chains and vibrant private sector participation. Physical infrastructure, including telecommunication, is indispensable to lower the transaction costs of financial intermediation and facilitate innovation. On the demand side, other sections of the report discuss general challenges among agrifood processors, but limited managerial capacity and weak financial bookkeeping are among the biggest barriers to accessing finance.

On the supply side of finance, commercial banks, development banks, and NBFIs require specific skills and products to finance agrifood processors, especially SMEs, given their exposure to unique risks in agriculture. The introduction of DFS and the digitization of lending operations are increasingly important to promote SME finance. In addition, the following solutions may address the supply side of finance:

- Tools for risk management, such as partial credit guarantees and insurance products (for agricultural production and SMEs)
- Financial resources for lending, including savings mobilization, wholesale long-term credit lines, capital market development, and equity investment to investment funds
- Blended finance, including technical assistance (for agri-SMEs including agrifood processors and financial providers), matching grants, and concessional credit that helps mobilize private sector resources

Case: 4G Capital

Since its inception in 2013, 4G Capital has provided working capital loans totaling more than $195 million to more than 1.5 million small businesses in Kenya and Uganda. Agri-SMEs are their largest client segment, accounting for 36 percent, and 77 percent of their total borrowers in rural areas. To underwrite its loans, 4G Capital uses machine learning technology to analyze borrower risk and affordability. Disbursement and repayments are done through mobile money, and loans do not require collateral. In addition to loans, the company provides bespoke business training programs and credit guidance via mobile apps and in person at its 90 branches. As a result of the borrowings , 84 percent of clients have experienced an increase in sales, and more than 94 percent of loans have been repaid within 30 days (4G Capital 2018 and 2022). ■

Policies and Investments to Support the Development of Technical Skills, Leadership, and Management in Agrifood Enterprises

Oliver K. Kirui

Skills, leadership, and management are critical to the success of the agrifood processing sector. They enable agrifood enterprises to be resilient and foster innovation while promoting the creation of decent employment opportunities in the sector. A well-thought-out strategy to build the right skills and develop effective leadership and management is needed to produce a well-qualified workforce in the sector, both now and in the future. This box highlights policies and investment opportunities related to skills and enterprise leadership and management for Africa's agricultural and food processing sector. The box is organized in four sections. The first section provides context by highlighting gaps in technical, leadership, and management skills. The second highlights the drivers and challenges to skills development and enterprise leadership and management in the sector. The third section discusses promising and inclusive policies and practices needed to develop skills, leadership, and management in the sector. The last section presents main highlights and policy implications.

Background

Supply- and Demand-side Skills Challenges Among Agrifood Enterprises in Africa

A skilled workforce is essential to drive innovation and is a prerequisite for the development and adoption of new technologies, regardless of an agrifood enterprise's size. To be successful, these enterprises require both technical ("hard") skills to support new technologies and increase productivity, and managerial ("soft") skills to develop new business practices (FAO 2017).

Hard skills are technical, job-specific skills that can be taught or acquired through training or hands-on experience. Agrifood enterprises require a variety of technical skills; the exact skills needed will depend on the type of business. For example, food processing firms need staff skilled in grading and sorting; operating and repairing food-processing and transportation machinery and equipment; and quality assurance, food safety, and hygiene. Soft skills are interpersonal skills and are applicable to any management position. These skills include communication, leadership, teamwork, negotiation, and decision-making, among others.

Agrifood enterprises experience challenges in recruiting qualified and skilled workers for innovation and technology adoption. The shortage of workers skilled in production and operations management, financial management, general business management, and decision-making is a central concern for agrifood enterprises globally and especially those in Africa (ETF and EBRD 2021). These enterprises face persistent shortages of recruits with skills related to the development and use of new technologies, supply chain management, and support for innovations in business processes, organization, and human capital, as well as skills to meet the demands of emerging occupations, such as supply chain traceability (OECD 2001; ETF 2021).

The structure of agrifood sectors in most countries creates significant demand-side challenges for skills development, with formal job creation typically limited to a small number of larger enterprises (Jayne, Yeboah, and Henry 2017; Christiaensen, Rutledge, and Taylor 2021). Agrifood is not perceived as an attractive career option by young people, due to the industry's association with low-wage and low-skill work, particularly at the farm level, and limited opportunities for career development (FAO 2014). These structural conditions undermine efforts to transform toward a higher-productivity, higher-value agrifood system that can support and promote demand for higher-level skills.

Matching labor with the demand from the food and agriculture sector is a growing issue in many countries. A recent assessment by the European Training Foundation during the COVID-19 pandemic shows that the skills required by agrifood enterprises are evolving to become more diverse and sometimes less specific to the sector (such as digital and management skills) (ETF 2021).

Connecting educational institutions with labor market opportunities and building strong partnerships with employers is critical to ensure that the skills of agricultural professionals respond to labor market needs and young graduates

are employable (Paisley 2012). Unfortunately, such systems are rarely instituted in most developing countries and access to postsecondary agricultural education is low (World Bank 2011). Training should also be comprehensive, covering areas such as financial management, marketing, human resources management, and practical approaches to business development.

Challenges and Drivers to Skills Development at the Enterprise Level

Challenges to Skills Development

Some of the challenges identified by employers and other stakeholders in the public education and skills provision programs (such as Technical Vocational Education and Training [TVET]) relate to the quality of the trainings and their limited, or inconsistent, relevance to the agrifood enterprise sector (Ngure 2013; ILO 2020). These challenges include over- or under-emphasis on skills for specific occupations; lack of coverage of emerging skills needs related to new occupations; and insufficient linkages between technical and practical instruction (ETF 2021). There is a lack of direct work experience built into training programs and inadequate contact between the agribusiness sector and young people prior to their entering the labor market (Kirui and Kozicka 2018).

Financial and human resource limitations are other constraints to developing and delivering training programs and strategic skills needed for business growth and development (Brown and Majumdar 2020; Sarfo and Mutepfa 2021). Training programs often lack funding, and many skilled workers perceive the agrifood sector as less attractive—in terms of remuneration, career development, and prestige—than opportunities in other sectors with similar skills requirements (ETF 2021). Worker mobility presents a challenge to providing "in-house" training, especially for smaller firms where the cost of training might be considered significant. Workers are more likely to leave these firms for larger competitors who offer higher wages, or for jobs in more attractive and prestigious sectors.

Drivers for Skills Development

Although vocational training can help anticipate demand for new skills and offer lifelong learning, there is concern that the graduates of national TVET systems do not have skills relevant to agribusiness needs (Kirui and Kozicka 2018). As a result of this challenge, many larger agrifood enterprises have established their own skills development activities (such as internal training and work-based-learning), which are tailored to equip workers with the skillsets required by their respective businesses (Jack, Anderson, and Connolly 2014). Larger firms also prefer this approach because it can contribute to improved retention, workforce stability, and prestige (ETF 2021). However, a lack of funding prevents smaller agrifood enterprises from providing their own training and skills development programs. Retention is another risk for these firms, as larger companies may lure and "poach" a trained employee by offering a higher salary and other benefits.

Promising Practices for Leadership and Management in the Agrifood Processing Sector

Against this background exists an opportunity for initiatives, investments, and policies in key areas to support agrifood skills and enterprise leadership and management. Some promising enterprise-level experiences in skills development for agrifood enterprises are discussed below:

Company training centers: Company training for both managers and workers is one successful initiative that has been adopted by larger agribusiness firms (ETF 2021). This formal training is provided in the companies' own centers or "academies" for the professional development of their workforce. Such centers could also be used to identify, develop, and fast-track high-potential talent, including business leaders and managers, from a broad pool.

Industrial clusters and agro-parks (special economic zones, agro-industrial parks, and agri-clusters): Industrial clustering could be another viable and promising strategy to develop the agrifood processing sector in Africa. Clustering benefits firms and provides a competitive advantage to regions and countries. As Tabiri and Sakyi note in chapter 6 of this volume, developing subsidiary industries would supply various intermediate inputs, create a hub of leaders and specialized labor used by firms in the cluster, reduce employment and training costs, and improve firms' efficiency and competitiveness. In chapter 8, Jenane and Ulimwengu observe that investments in agro-parks can improve coordination between chain actors and agglomeration economies, which can lead to enhanced productivity and performance, broader engagement of private sector players in the economy, and support for economic diversification. The success of industrial clusters, however, relies on an adequate and consistent supply of raw agricultural materials for agrifood processing firms.

Public-private coordination and collaboration on enterprise skills: Scaling up coordination and collaboration on skills development among agrifood employers and state actors is critical to fostering closer ties between industry and policymakers (ETF 2021). Coordinated efforts ensure that the employer's needs (demand-side signals) are better communicated to supply-side actors

(skills and education providers such as policymakers, universities, and TVET). Collaboration ensures that evolving labor market needs are incorporated into the educational curricula. This allows the private sector to contribute to developing skills frameworks, so that training programs are suitable and responsive to labor markets. These efforts would collectively address employer concerns, practical training shortfalls, and insufficient experience among new recruits. Collaboration would also improve access to employment and career development through internships and apprenticeships.

Fostering entrepreneurship: At the enterprise level, it is important to create new jobs and increase the demand for skills by encouraging entrepreneurship (including support for women entrepreneurs). Education and training institutions could be indirectly involved in creating high-skilled jobs by helping their students to develop the skills necessary to become entrepreneurs. Teaching the skills of entrepreneurship and providing hands-on support requires close links between researchers and education providers, as well as with entrepreneurship-support providers. Skill building works best when it is connected to real work and practical problemsolving (Boettiger, Denis, and Sanghvi 2017). Thus, there is great value in anchoring entrepreneurship support at training institutions to facilitate networking and exchange while building the next generation of leaders in an agricultural transformation.

Executive training: New models of entrepreneurship and executive training for enterprise leadership and management are being offered by traditional institutions (such as universities, colleges, technical colleges, vocational schools, and extension agencies) and, more recently, by private sector and nongovernmental organizations (Mabaya, Christy, and Bandama 2010). These higher-end agribusiness training programs are mostly targeted at executives from established enterprises. Trainings focus on several areas, including marketing management, human resources management, supply chain management, finance and accounting, and business management. These programs are designed to produce the kind of leaders and managers who can meet today's enterprise needs and are prepared to tackle future challenges. Indeed, successful enterprise leaders and managers must be market-oriented and able to communicate, learn, solve problems, and innovate (World Bank 2007). The demand for executive enterprise education is also driven by the growing need for training on new technological developments and the implications of such developments for managers in mid-size and larger enterprises.

Conclusions and Implications

This box highlights various gaps in skills, including those related to production and operations management, financial management, general business management, and personal attitudes and decision-making. It also highlights the drivers and challenges to skills development and enterprise leadership and management, and discusses promising policies and practices needed for leadership and management in Africa's agrifood processing sector. Among other drivers, public and private investments in human resources capacity could ensure that food systems and agribusinesses are more innovative and sustainable. There are several roles and opportunities for government, development partners, and the private sector to develop the workforce skills needed to facilitate the innovation-led growth of higher-value agrifood systems and to promote the creation of decent employment opportunities throughout agrifood value chains. For instance, concerted efforts are needed to establish public and/or private skills academies and training centers run by government and the private sector, respectively. There is also an urgent need to address skill mismatches and promote coordination around skills development. To do so, the private sector should align and collaborate with educational institutions to ensure that the enterprise leadership and management skills taught in schools are relevant to today's job market. Capacity building institutions should regularly consult with private enterprises to assess their skills and expertise requirements. Both the public and private sectors should collaborate in designing alternative programs—or even specialized institutions—that offer innovative capacity building to leaders and managers to enhance the economic performance of their enterprises. Carefully crafted entrepreneurial and technical training can be effective in providing essential knowledge and inclusive skills development and increasing youth employment. Finally, there is a need to strengthen the linkages between innovation, skills development, and policies and strategies relevant to agrifood enterprises. ■

CHAPTER 9

Tracking Key CAADP Indicators and Implementation Processes

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Introduction

Agriculture is a vital source of livelihoods for more than 60 percent of Africa's population. Recognizing the need to boost investments and productivity in the sector, in 2003, African leaders adopted the Comprehensive Africa Agriculture Development Programme (CAADP) as the policy framework for revitalizing agriculture and reducing poverty and food insecurity on the African continent. Following a decade of implementing CAADP, the framework gained momentum in 2014, when African heads of state and government adopted the Malabo Declaration on *Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods*. Through the Declaration, they recommitted to upholding CAADP principles and values, which include adopting evidence-based planning, policy efficiency, dialogue, review, and accountability and exploiting regional complementarities. They also pledged to increase investment in agriculture, end hunger and halve poverty by 2025, boost intra-African agricultural trade, enhance resilience to climate variability, and strengthen mutual accountability for actions and results by conducting a continental Biennial Review (BR) of progress made in achieving the commitments (AUC 2014).

The Regional Strategic Analysis and Knowledge Support System (ReSAKSS) was established in 2006 to support the successful implementation of CAADP by providing policy-relevant data; facilitating dialogue among stakeholders; monitoring progress toward achieving goals and targets; and strengthening mutual accountability processes at the continental, regional, and national levels.[1] Starting in 2007 and at the behest of the African Union Commission (AUC), ReSAKSS led the development of the first CAADP monitoring and evaluation (M&E) framework for assessing CAADP implementation progress and performance (Benin, Johnson, and Omilola 2010). Between 2008 and 2014, ReSAKSS used the M&E framework to track CAADP implementation processes and indicators that were initially focused on allocating 10 percent of national budgets to the agriculture sector and achieving a 6 percent agricultural growth rate at the national level. As the Malabo Declaration had broadened the CAADP agenda by adding new commitment areas, AUC and the African Union Development Agency–New Partnership for Africa's Development (AUDA-NEPAD) developed a new CAADP Results Framework (RF) for 2015–2025 for measuring progress in CAADP implementation, including progress toward meeting the Malabo commitments (AUC and NPCA 2015).

To report on the provisions of the Malabo Declaration, the CAADP RF is organized on three levels: Level 1 outcomes, Level 2 outputs, and Level 3 inputs.

- Level 1 of the CAADP RF includes broader development outcomes and impacts to which agriculture contributes, including wealth creation; food and nutrition security; enhanced economic opportunities, poverty alleviation, and shared prosperity; and resilience and sustainability.
- Level 2 includes the outputs from interventions intended to transform the agriculture sector and achieve inclusive growth: improved agricultural production and productivity; increased intra-African trade and functional markets; expanded local agro-industry and value chain development, inclusive of women and youth; increased resilience of livelihoods and improved management of risks in agriculture; and improved management of natural resources for sustainable agriculture.
- Level 3 includes inputs and processes required to strengthen systemic capacity to deliver CAADP results and create an enabling environment in which agricultural transformation can take place: effective and inclusive policy processes; effective and accountable institutions that regularly assess the quality of implementation of policies and commitments; strengthened capacity for evidence-based planning, implementation, and review; improved multisectoral coordination, partnerships, and mutual accountability in sectors related to agriculture; increased public and private investments in agriculture; and increased capacity to generate, analyze, and use data, information, knowledge, and innovations.

There are 38 indicators in the CAADP RF: 14 for level 1, 12 for level 2, and 12 for level 3 (Table 9.1). ReSAKSS tracks progress on CAADP indicators in the CAADP RF for 2015–2025 through its flagship Annual Trends and Outlook Report (ATOR) and website (www.resakss.org).

1 ReSAKSS is facilitated by AKADEMIYA2063 and works closely with CAADP stakeholders across the continent. The ReSAKSS activities discussed in this chapter were carried out in collaboration with partners such as the African Union Commission, the African Union Development Agency–New Partnership for Africa's Development (AUDA-NEPAD), regional economic communities, national governments, farmer organizations, members of the African and international research communities, and development partners.

TABLE 9.1—NUMBER OF INDICATORS IN THE CAADP RESULTS FRAMEWORK AND BIENNIAL REVIEW

CAADP Results Framework	Number of indicators
Level 1: Agriculture's contribution to economic growth and inclusive development	14
Level 2: Agricultural transformation and inclusive growth	12
Level 3: Systemic capacity to deliver results	12
Total number of indicators	**38**
CAADP Biennial Review and Africa Agriculture Transformation Scorecard	**Number of indicators**
Commitment 1: CAADP processes and values	3
Commitment 2: Investment finance in agriculture	6
Commitment 3: Ending hunger by 2025	21
Commitment4: Halving poverty by 2025	8
Commitment 5: Boosting intra-African trade in agricultural commodities and services	3
Commitment 6: Enhancing resilience to climate variability	3
Commitment 7: Mutual accountability for results and actions	3
Total number of indicators	**47**

Source: Authors based on AUC and NPCA 2015 and AUC 2014.

While the CAADP RF is intended to help track progress in implementing the Malabo Declaration, the CAADP BR process initiated in 2015 introduced additional indicators specifically aimed at monitoring all of the seven Malabo commitments using the Africa Agriculture Transformation Scorecard (AATS). About 24 of the CAADP BR indicators were drawn from the CAADP RF while additional new indicators were added, resulting in a total of 47 BR indicators compared to 38 RF indicators (Table 9.1).

The BR is the paramount continentwide mutual accountability process in the agriculture sector, allowing AU member states to collectively review progress toward the Malabo goals and commitments. However, the CAADP RF is an important complement to the BR process as its indicators provide context for BR results and its coverage enables a range of analyses across the continent and over time. This chapter reviews progress on CAADP indicators using the CAADP RF because the RF data assembled by ReSAKSS are consistently available for a larger number of countries and for longer time periods than the BR data, including both pre- and post-CAADP eras (1995–2003 and 2003–2021). This in turn allows for aggregation across countries and an examination of trends over time periods and across different country groupings (for example, organized by economic categories, regional economic communities, and stage of CAADP implementation) that are not considered by the BR. While the CAADP BR indicators are broader in coverage, there is considerable overlap between these indicators and those in the CAADP RF. Currently, ReSAKSS tracks progress on 18 CAADP BR indicators that overlap with the CAADP RF indicators it tracks (Table 9.2).

The six other overlapping indicators between the CAADP RF and the CAADP BR are not yet included in the ReSAKSS database because the data are not available at all or are not available across all countries to allow for cross-country aggregation. These include indicators on postharvest loss, women's and children's dietary adequacy, resilience, sustainable land management, and capacity of statistical systems. Additional data gaps in other areas covered in the CAADP RF, including those on social protection and private sector investment, mean that currently only 27 of the 38 CAADP RF indicators can be tracked (Table 9.2). Although discussions on filling data gaps are underway among CAADP technical partners, increasing the availability of data in these areas can be challenging and will require resolute efforts by countries and their partners to develop and fund comprehensive data collection activities.

Objectives of the Chapter

With the ATOR as the official CAADP M&E report, this chapter reviews Africa's progress in implementing CAADP processes and progress on the CAADP RF indicators to highlight areas of strong performance that need to be sustained or accelerated as well as areas of weak performance that require urgent attention to enable the continent to meet its Malabo Declaration agricultural transformation goals. In particular, the chapter discusses progress in the CAADP implementation processes and on 27 of the 38 CAADP RF indicators for which cross-country data are available (Table 9.2). Details of the indicators and aggregate statistics are available in the data tables in Annexes 1–3 of this report. Progress on the RF indicators is discussed across different aggregated geographic and economic

TABLE 9.2—CAADP RESULTS FRAMEWORK INDICATORS DISCUSSED
LEVEL 1: Agriculture's Contribution to Economic Growth and Inclusive Development
1. L1.1.1 GDP per capita (constant 2015 US$)
2. L1.1.2 Household final consumption expenditure per capita (constant 2015 US$)
3. L1.2.1 Prevalence of undernourishment (% of population)
4. L1.2.2a Prevalence of underweight, weight for age (% of children under 5)
5. L1.2.2b Prevalence of stunting, height for age (% of children under 5)
6. L1.2.2c Prevalence of wasting, weight for height (% of children under 5)
7. L1.2.3 Cereal import dependency index
8. L1.3.1 Employment rate
9. L1.3.3 Poverty gap at $1.90 a day (2011 PPP)
10. L1.3.4 Extreme poverty headcount ratio at $1.90 a day (2011 PPP), % of population
LEVEL 2 Agricultural Transformation and Sustained Inclusive Agricultural Growth
11. L2.1.1 Agriculture value added (million, constant 2015 US$)
12. L2.1.2 Agriculture Production Index (2004-2006 = 100)
13. L2.1.3 Agriculture value added per agricultural worker (constant 2015 US$)
14. L2.1.4 Agriculture value added per hectare of agricultural land (constant 2015 US$)
15. L2.1.5 Yield for the five most important agricultural commodities
16. L2.2.1 Value of intra-African agricultural trade (constant 2015 US$, million)
17. L2.4.2 Existence of food reserves, local purchases for relief programs, early warning systems, and school feeding programs
LEVEL 3 Strengthening Systemic Capacity to Deliver Results
18. L3.1.1 Existence of a new NAIP/NAFSIP developed through an inclusive and participatory process
19. L3.2.1 Existence of inclusive institutionalized mechanisms for mutual accountability and peer review
20. L3.3.1 Existence of and quality in the implementation of evidence-informed policies and corresponding human resources
21. L3.4.1 Existence of a functional multisectoral and multistakeholder coordination body
22. L3.4.2 Cumulative number of agriculture-related public-private partnerships (PPPs) that are successfully undertaken
23. L3.4.3 Cumulative value of investments in the PPPs
24. L3.5.1 Government agriculture expenditure (billion, constant 2015 US$)
25. L3.5.2 Government agriculture expenditure (% of total government expenditure)
26. L3.5.3 Government agriculture expenditure (% of agriculture value added)
27. L3.6.2 Existence of an operational country SAKSS
Source: AUC and NPCA (2015).
Note: GDP = gross domestic product; NAFSIP = national agriculture and food security investment plan; NAIP = national agriculture investment plan; PPP = purchasing power parity; SAKSS = Strategic Analysis and Knowledge Support System. Highlighted indicators are also BR indicators.

groupings of African countries by comparing trends in the RF indicators during the first five years after the adoption of CAADP (2003–2008) with later subperiods (2008–2014 and 2014–2021).

Before reviewing trends in the 27 CAADP RF indicators, in the next section, the chapter will discuss progress made in the CAADP implementation process in terms of country and regional-level progress in developing evidence-based, Malabo-compliant national agriculture investment plans (NAIPs) and operationalizing CAADP mutual accountability processes to support agriculture sector review and dialogue through agriculture Joint Sector Reviews (JSRs) and the CAADP BR. The CAADP implementation process is led by AUC and AUDA-NEPAD working in collaboration with national governments, regional economic communities (RECs), non-state actors, and development and technical partners. The section describes general progress in the implementation process while highlighting the contribution of ReSAKSS as a technical partner.

Progress in CAADP Implementation Processes

Implementation Support

As the continent continues to battle a combination and succession of crises since the COVID-19 pandemic, attention has been heightened about the urgency of accelerating implementation of priority actions and strengthening implementation capabilities and delivery for both immediate and medium-long term transformative results in agriculture across Africa. The Malabo NAIP domestication is a sequential process led by AUC, AUDA-NEPAD, and regional economic communities (RECs). It includes a convening by national CAADP

constituencies to discuss and agree on a country roadmap to review and formulate a new NAIP when necessary. In general, the roadmap spells out specific roles for all the parties involved, timelines, and coordination modalities needed to review existing NAIPs and generate new NAIPs. However, except for country engagement to prepare for the 2021 United Nations Food Systems Summit (UNFSS), there has not been any significant progress registered toward Malabo domestication during the past year. During the review period, no African Union institution reported having conducted an Independent Technical Review (ITR) to improve the quality of any NAIP formulated by a member state. To date, only 25 out 55 member states of the African Union have gone through the full Malabo domestication process. A total of 42 countries had drafted, reviewed, or validated a Malabo-compliant NAIP by the end of September 2022 (Table L3(a)).

Implementation support for the NAIP domestication process at regional and country levels has been constrained by a number of factors. A stocktaking exercise on lessons learned from NAIP implementation held in mid-2022 by AUDA-NEPAD and AUC suggested that, while NAIPs are generally well aligned to provide direction for the required actions, clarity on how to ensure implementation is often missing (AUDA-NEPAD 2022). Thus, one shortcoming in many cases is the lack of an appropriate set of instruments needed to support implementation by rationalizing the use of limited available resources (time, financial resources, and human capital). The end of the Multi-Donor Trust Fund in 2015, a funding mechanism administered by the World Bank which supported CAADP implementation, has limited the capacity of the African Union institutions to continue to play their much-needed facilitation role for strengthening national and regional CAADP processes. In addition to resource constraints, other challenges hampering the implementation of NAIPs include: (1) technical capacity constraints, translating into insufficient capacity for policy and economic analysis and for reporting and evaluating NAIPs; (2) inadequate and ineffective resource mobilization efforts, insufficient capacities to tap into global development funds, and insufficient private sector partnerships and involvement; (3) limited agribusiness development skills; and (4) other constraints, including limited capacity for M&E, poor harmonization of policies, low dissemination of research, and lack of effective multisectoral coordination of NAIP implementation. In the remaining years before 2025, the AUC, AUDA-NEPAD, and technical partners including ReSAKSS will work to identify avenues to address these constraints in order to strengthen NAIP implementation and inform the development of the next generation of post-Malabo NAIPs.

Biennial Review

The CAADP BR is a process for promoting mutual accountability by reviewing country performance in progressing toward meeting Malabo Declaration commitments by 2025. Africa successfully held three BRs in 2017, 2019, and 2021. Along with other technical partners, ReSAKSS supports the BR process by contributing to technical improvements of BR technical guidelines and tools, including the digital eBR data entry platform and the BR country reporting profile; training country and regional BR teams on the guidelines and tools; and supporting countries and RECs with data analysis, reporting, cleaning, and validation. During the third BR cycle of 2021, ReSAKSS also provided targeted technical and backstopping support to 10 countries (Benin, Botswana, Burkina Faso, Kenya, Mozambique, Malawi, Senegal, Togo, Uganda, and Zimbabwe) with the goal of improving the accuracy, consistency, traceability, and validation of BR data in these countries.

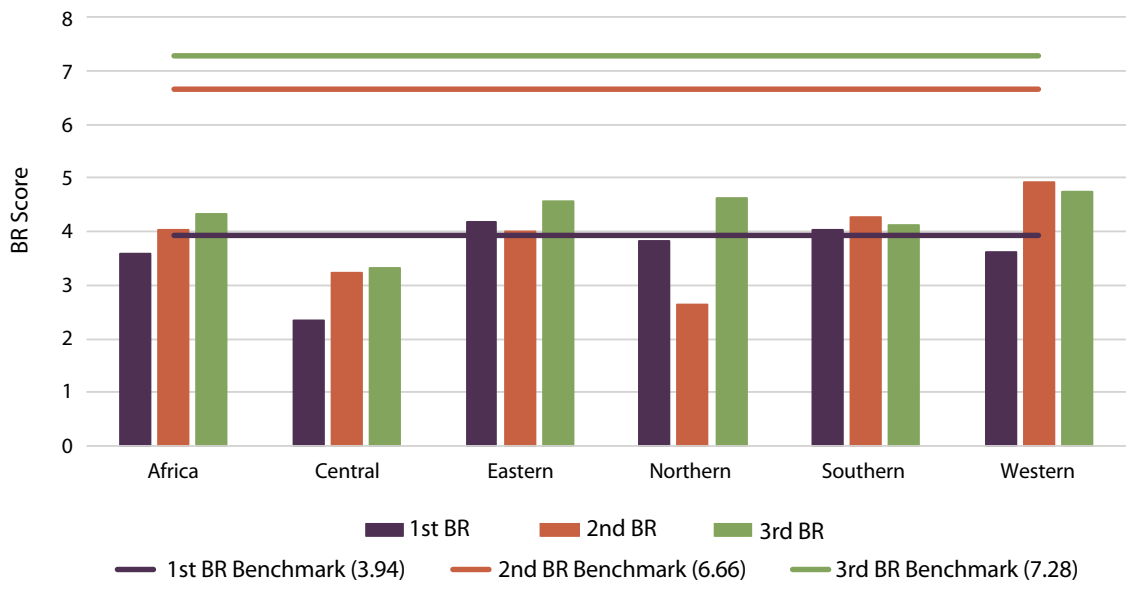
The third BR report, entitled "Accelerating CAADP Implementation for a Resilient African Food System," was released after two difficult years for African agriculture during which the COVID-19 pandemic ravaged health systems, depressed agricultural production, and disrupted market systems, with smallholder producers and SMEs, most of them run by women and youth, bearing the brunt of COVID-19 (AUC and AUDA-NEPAD 2022a). The report is timely as it comes midway through the implementation of the Malabo commitments and goals to be achieved by 2025. It also comes shortly after the yearlong UNFSS process of 2021 that focused attention on food systems.

The third BR report was endorsed by the African Union at the 35th Ordinary Session of the Assembly of the African Union Heads of State and Government in February 2022 in Addis-Ababa. The BR report is a fundamental instrument to help account for the outcomes of different agricultural efforts and interventions on the continent. It enables countries to track, measure, and report progress achieved against agreed result areas. In the third BR report, countries are considered "on-track" if their total score is equal to or higher than the benchmark of 7.28 out of 10; "progressing well" when their score is at least 5.00 but less than 7.28 out of 10; or "not-on-track" if their score is less than 5.00 out of 10 (AUC

2022). The report found that only Rwanda is on-track to meet the Malabo goals and targets by 2025, while 19 countries are classified as progressing well. With an overall average score of 4.32, the continent clearly is not-on-track to meet the Malabo goals and targets by 2025 (Figure 9.1). The report shows that only four countries invested at least 10 percent of their national annual public budget in agriculture, and only one country is on track to meet the goal of ending hunger by 2025. As shown by both empirical observations and the research findings presented in the report, the COVID-19 pandemic and its impacts on agriculture and food security on the continent partly explain the recent low performance of the continent in making progress to meet the Malabo goals and targets by 2025.

Although progress was insufficient to be considered on track to achieving the Malabo commitments, the continent as a whole and three out of five geographic regions increased their scores compared to the first (2017) and second (2019) BR processes (Figure 9.1). In addition, countries' capacities to collect and report data for the BR have improved. A total of 51 countries submitted BR data during the 2021 BR cycle compared to 47 during the 2017 BR and 49 during the 2019 BR (Table L3(c)). In addition, in the 10 countries that received targeted training and backstopping support from ReSAKSS, BR reporting rates were higher compared to non-targeted countries (AKADEMIYA2063 2022). Further assessment is needed to identify the top priority areas for further technical support to enable countries to strengthen their data systems and improve future reporting.

FIGURE 9.1—AFRICA'S PERFORMANCE IN THE 2017, 2019, AND 2021 BRS (AVERAGE AGRICULTURAL TRANSFORMATION SCORE)



Source: Authors' compilation based on AUC (2018), AUC (2020), and AUC (2022).

Joint Sector Reviews

As part of the broader commitment to mutual accountability under the Malabo Declaration, the agriculture Joint Sector Review (JSR) in individual countries provides an inclusive, evidence-based platform for multiple stakeholders in the agriculture sector to jointly review progress; hold each other accountable for actions, results, and commitments; and, based on gaps identified, agree on future implementation actions. As such, JSR platforms are key potential users of BR data as well as opportunities for organizing the collection of BR data and vice versa. Thus, JSRs play an essential role in promoting mutual accountability. They should be introduced where they have not yet been set up and strengthened where they exist. The ultimate step should be integration of the JSR and the BR platforms to consolidate a more cohesive and efficient mutual accountability mechanism in individual countries.

A framework to guide mutual accountability processes under CAADP was developed in 2011 which identified JSRs as a tool for operationalizing the framework. Countries introduced JSR processes to track the implementation of their NAIPs (Matchaya et al. 2022). Over 30 countries have implemented a JSR or a JSR-like process since 2015 (Ulimwengu et al. 2020). At the request of AUC and AUDA-NEPAD, ReSAKSS has been strengthening agriculture JSRs since 2014 by conducting assessments of JSR or JSR-like processes to identify actions that would improve their effectiveness. These

JSR assessments have been conducted or initiated in 21 countries and 2 regional economic communities to date (Table L3(a)).

ReSAKSS has catalogued a set of JSR best practices that promote the creation of an effective, inclusive, and technically robust platform to (1) assess the performance of the agriculture sector; (2) assist governments in setting sector policy and priorities; and (3) assess how well state and non-state actors have implemented pledges and commitments laid out in NAIPs and other agreements (ReSAKSS 2014). However, countries have flexibility to implement JSRs in the way that best fits their needs. For example, while JSRs are annual activities in many countries, Rwanda traditionally holds JSRs twice a year, with one backward-looking session dedicated to reviewing past progress and one forward-looking session on future priorities. JSRs provide an opportunity to assess both agricultural sector performance and the status of institutions and coordination mechanisms for agricultural sector stakeholders. For example, Kenya's 2021 JSR process report (Kenya 2022) noted improved coordination between the national and county governments through the Joint Agriculture Sector Coordination and Cooperation Mechanism. This has been cascaded to the county governments through the establishment of the County Agriculture Sector Steering Committees. ReSAKSS provided technical support throughout the process in Kenya and will continue to assist with follow-up activities, including developing an action plan to support the implementation of the recommendations.

As the third BR report examined ways to improve the BR process and country data capacities, there was a clear call to synergize the processes of the BR, NAIPs, and JSRs that have been running in parallel within most member states.

Progress on CAADP Indicators

This section discusses Africa's performance on 27 of the 38 CAADP RF indicators for which data are available, organized by the three RF levels.[2] Data on the 27 indicators are presented in Annexes 1–3. Progress on the quantitative indicators is presented at the aggregate level for seven different breakdowns:

1. Africa as a whole
2. AU's five geographic regions—central, eastern, northern, southern, and western
3. Five economic categories—countries with less favorable agricultural conditions, countries with more favorable agricultural conditions, mineral-rich countries, lower middle-income countries, and upper middle-income countries[3]
4. Eight regional economic communities (REC)—Community of Sahel-Saharan States (CEN-SAD), Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), Southern African Development Community (SADC), and Arab Maghreb Union (UMA)
5. By the period during which countries signed the CAADP compact—CC0, CC1, CC2, and CC3[4]
6. By the level or stage of CAADP implementation reached by the end of 2015—CL0, CL1, CL2, CL3, and CL4[5]

2 Several of these indicators are also part of the CAADP BR and the Africa Agriculture Transformation Scorecard (AATS).

3 The five economic categories are exclusive. See Benin et al. (2010) for a description of the categorization methodology and criteria for classifying countries based on income, favorability of agricultural conditions and mineral wealth.

4 CC0 = group of countries that have not yet signed a CAADP compact; CC1 = group of countries that signed the compact in 2007–2009; CC2 = group of countries that signed the compact in 2010–2012; CC3 = group of countries that signed the compact in 2013–2015.

5 CL0 = group of countries that have not started the CAADP process or have not yet signed a compact; CL1 = group of countries that have signed a CAADP compact; CL2 = group of countries that have signed a compact and formulated a NAIP; CL3 = group of countries that have signed a compact, formulated a NAIP, and secured one external funding source; CL4 = group of countries that have signed a compact, formulated a NAIP, and secured more than one external funding source. Obtaining funding for NAIPs is a key step in CAADP implementation, and countries that have secured external funding sources are expected to be better able to implement NAIPs and other agricultural investments (Benin 2016).

7. By the distribution of countries in formulating first- and second-generation NAIPs—N00, N10, N01, and N11[6]

Annex 4 lists countries in the various geographic, economic, and REC categories; Annex 5 lists the countries in the different groupings for CAADP compact signing or level of implementation reached; and Annex 6 lists countries by NAIP formulation category. Complete information for all categories is provided in the Annexes 1–3; the discussion in the text here focuses on progress among different geographic groupings, economic categories, RECs, and NAIP categories. Progress is reported over different subperiods, with achievement in the early CAADP subperiod of 2003–2008 compared with achievements in the later subperiods of 2008–2014 and 2014–2021.[7] For all indicators, changes over periods are reported in terms of annual average percent change.

The discussion of trends and changes in CAADP indicators pertains to country categories or groupings as a whole and not individual countries within the categories—for example, it relates to Africa as a whole, central Africa as a group, ECOWAS members as a group, and groups of countries categorized by their stage of NAIP formulation experience. Presenting the trends by different groups helps to determine how the implications for strengthening or maintaining desirable outcomes or for reversing undesirable outcomes may differ across the continent, without inference of causality. Unless otherwise stated, all monetary values have been converted into constant 2015 US dollar prices for intertemporal and cross-country or cross-category comparisons.

CAADP Results Framework Level 1 Indicators: Agriculture's Contribution to Economic Growth and Inclusive Development

Wealth Creation

Economic growth in Africa showed an upswing in 2021 following a sharp contraction in 2020 due to the COVID-19 pandemic. Africa's GDP per capita increased by 2.6 percent in real terms from 2020 to 2021 (Figure 9.2, Table L.1.1.1). Among geographic regions, growth in 2021 was the highest in northern Africa, at nearly 4 percent, and lowest in central Africa, where GDP per capita continued to contract. Growth in 2021 was also especially strong in upper middle-income countries and countries that have developed a second but not a first NAIP (N01 countries), at 6.1 and 4.0 percent, respectively, while average incomes in mineral-rich countries continued to decline. The future trajectory of Africa's post-COVID-19 recovery remains uncertain, and the Russia-Ukraine conflict, which began in early 2022, has ushered in a period of high inflation that is expected to result in decelerating growth in 2022 (AfDB 2022).

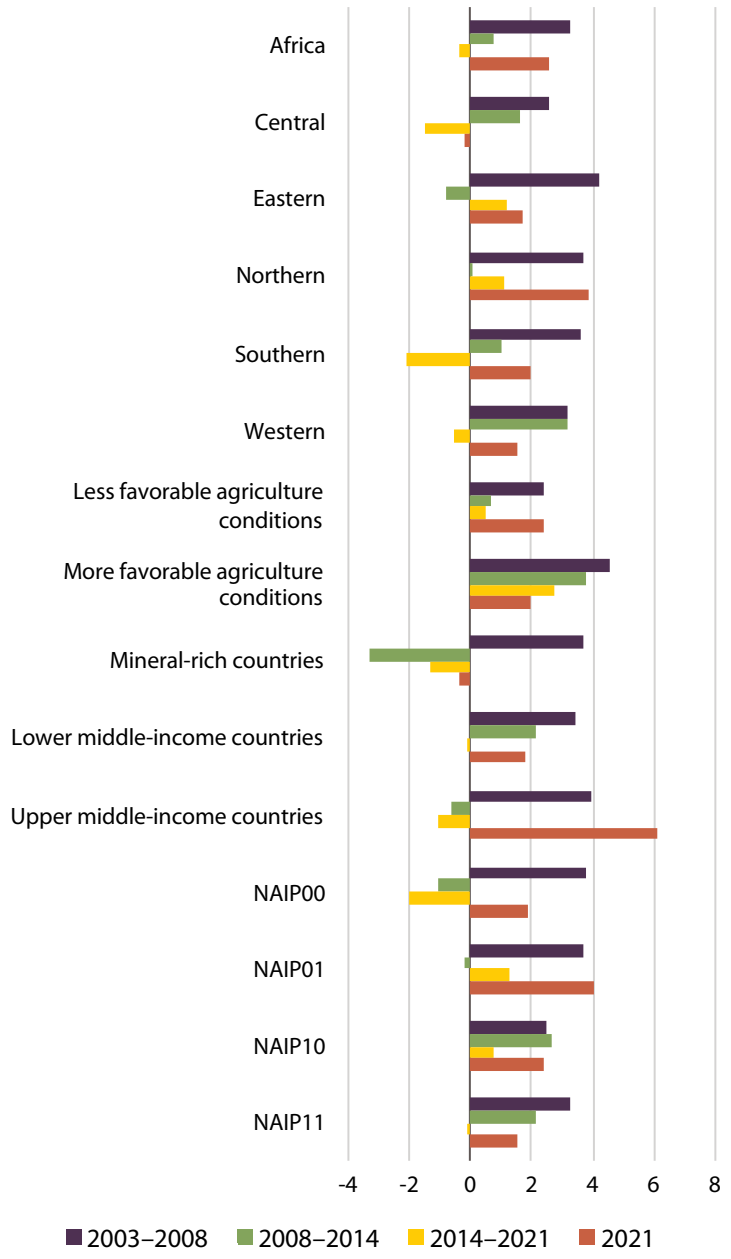
Apart from the impacts of recent crises, economic growth had already been slowing in Africa prior to the pandemic. Generally low growth since 2014 combined with the decline in 2020 means that the average annual rate of growth over the 2014–2021 period was negative for Africa as a whole, at −0.3 percent, and for many of the country groupings. This represents a departure from robust growth rates in the past: GDP per capita increased by an annual rate of 3.2 percent during the 2003–2008 period and slowed to 0.7 percent during 2008–2014 before turning negative during 2014–2021. The pattern of decelerating and recently negative growth is also observed in the central, southern, and western Africa country groupings. In eastern and northern Africa, however, growth was lowest during the 2008–2014 period and accelerated thereafter.

Africa's GDP per capita increased from an average of $1,778 during the 2003–2008 period to $1,963 during the 2008–2014 period and $1,998 during 2014–2021 (Table L1.1.1). Due to the lost ground in 2020, GDP per capita stood at $1,952 in 2021, close to the level of the prior decade. There is wide variation in average incomes across country groupings: GDP per capita in 2021 was $3,875 in northern Africa, nearly twice the average for Africa as a whole, while central Africa's average, $836, was less than half the continental average. Lower-income countries with less favorable agricultural conditions, EAC countries, and countries that developed a first NAIP but not a second (N10 countries) also showed significantly lower income levels in 2021 than the African average.

6 N00 = group of countries that have neither a first-generation NAIP (NAIP1.0) nor a second-generation NAIP (NAIP2.0); N10 = group of countries that have NAIP1.0 but do not have NAIP2.0; N01 = group of countries that have NAIP2.0 but not NAIP1.0; N11 = group of countries that have both NAIP1.0 and NAIP2.0. A second-generation NAIP refers to a NAIP that takes into account the commitments of the 2014 Malabo Declaration; thus, a NAIP can be considered second-generation even if the country does not have a pre-Malabo Declaration, first-generation NAIP.

7 Considering that CAADP was launched in 2003, renewed in 2008, and renewed again 2014 with the Malabo Declaration, the years 2003, 2008, and 2014 represent important milestones. Therefore, the post-CAADP subperiods for reporting on progress use overlapping years to mark these milestones that usually occurred during the middle of the year in June, that is, 2003–2008, 2008–2014, and 2014–2021.

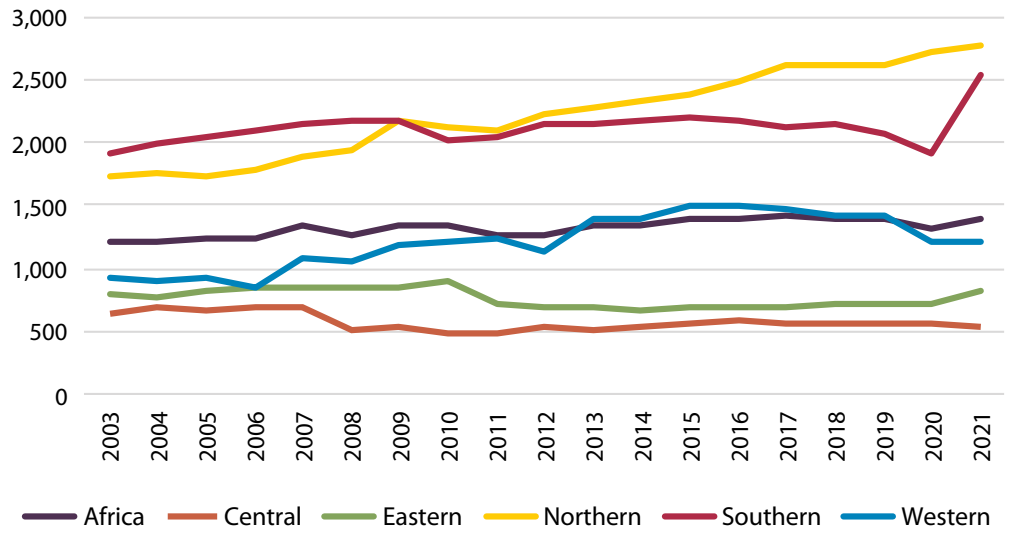
FIGURE 9.2—GROSS DOMESTIC PRODUCT PER CAPITA (CONSTANT 2015 US DOLLARS), ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2021



Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Household consumption expenditure, which captures household spending on goods and services, is another measure of economic well-being and shows patterns similar to GDP per capita. Growth rates of household consumption expenditure per capita have decelerated since 2003, turning slightly negative during the 2014–2021 period for Africa as a whole (Table L1.1.2). The fall in spending was most severe in western Africa, falling by an annual average rate of –2.7 percent during 2014–2021 period; all other geographic regions showed either slight annual declines or moderate annual increases in spending over the same period. Reflecting its relatively strong GDP per capita growth (Figure 9.2), northern Africa showed the highest annual average growth in household consumption expenditure among geographic regions (2.4 percent) during 2014–2021. Northern Africa also had the highest level of household spending in 2021, followed by southern Africa, while eastern and central Africa had the lowest (Figure 9.3). Relatively high growth in household consumption expenditure during the 2014–2021 period was also observed in countries with more favorable agricultural conditions and in the IGAD countries.

FIGURE 9.3—HOUSEHOLD CONSUMPTION EXPENDITURE PER CAPITA (CONSTANT 2015 US DOLLARS), 2003–2021



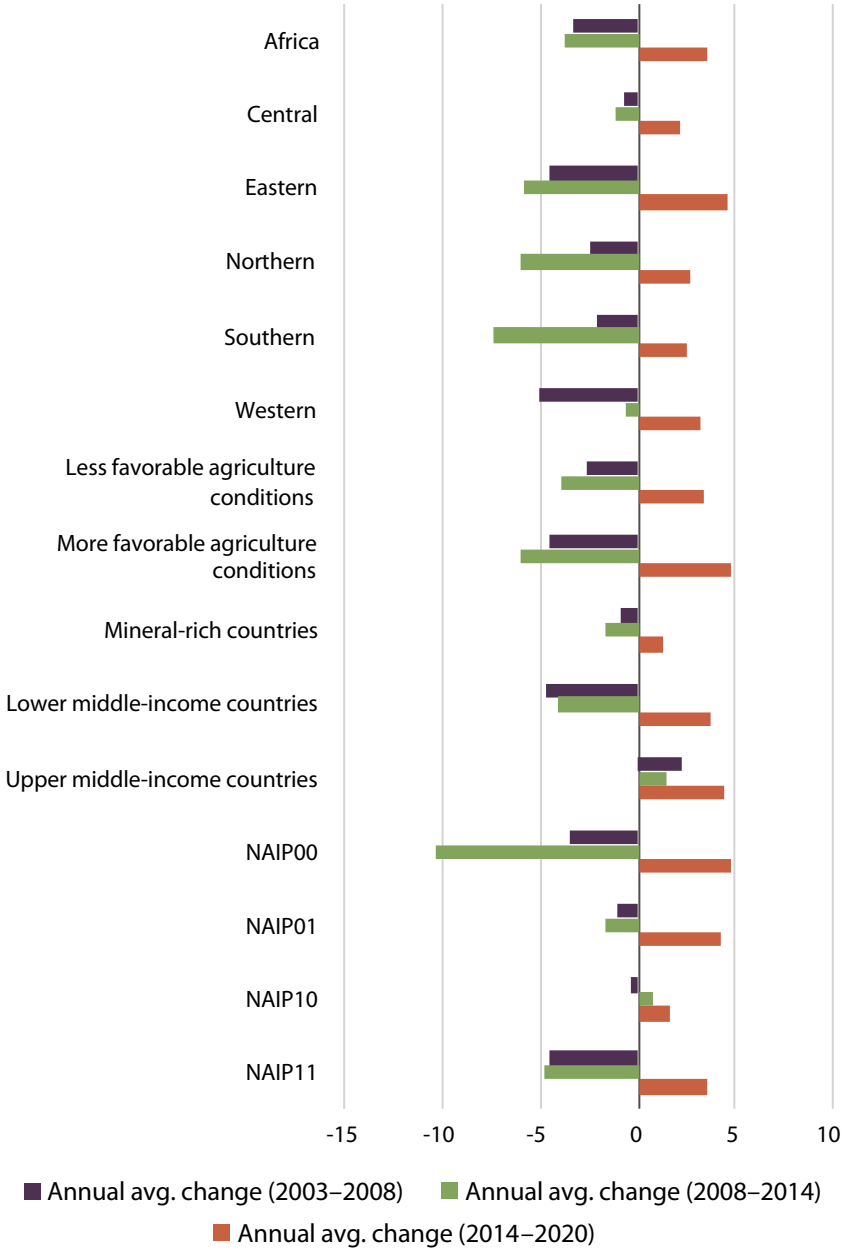
Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Food and Nutrition Security

Like economic growth, food security in Africa has been severely affected by the COVID-19 pandemic. Moreover, the continent already faced increasing food security challenges in the years before the COVID-19 crisis. A prime example is the prevalence of undernourishment, which measures the share of population with caloric intake below the minimum dietary energy requirement. Undernourishment decreased by 3.4 percent annually in 2003–2008, and fell even faster at 3.8 percent per year in 2008–2014. However, the share of undernourished people increased significantly during the 2014–2020 period, rising by 3.5 percent annually (Figure 9.4, Table L1.2.1). This increase is partly related to the COVID-19 pandemic, as reflected in a rise in undernourishment in 2020. However, the prevalence of undernourishment was already growing before 2020, having increased by an annual average of 1.1 percent during 2014–2019 (Tefera, Collins, and Makombe 2021). Although data are not yet available, undernourishment is expected to have risen further in 2021 (FAO et al. 2022), with continued crises in 2022 related to the Russia-Ukraine conflict likely further exacerbating hunger. A study on food security and poverty impacts of the Russia-Ukraine crisis in 10 African countries estimates that household food consumption during the 2022–2024 period will decline relative to the estimated levels in the absence of the crisis in the majority of countries examined due to food price inflation and decreases in household income (Badiane, Fofana, and Sall 2022).

Similar trends in undernourishment—declines in the first two CAADP periods followed by large increases in the third period—are seen in nearly all country groupings. Among geographic regions, eastern Africa showed the largest increase in undernourishment in 2014–2020 at 4.6 percent annually. Countries with more favorable agricultural conditions and countries with neither a first- nor second-generation NAIP (N00 countries) showed even larger increases of 4.8 percent for both groups. In terms of prevalence, undernourishment reached 17.4 percent of the population in Africa as a whole in 2020 (Table L1.2.1). The prevalence was highest in central Africa, mineral-rich countries, EAC and ECCAS countries, and countries with a first-generation but not a second-generation NAIP (N10 countries), all of which had undernourishment rates of 30 percent or above. The lowest rates of undernourishment, 10 percent or below, were observed in northern Africa, upper middle-income countries, UMA

FIGURE 9.4—PREVALENCE OF UNDERNOURISHMENT, ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2020



Source: ReSAKSS based on FAO (2022) and ILO (2022).

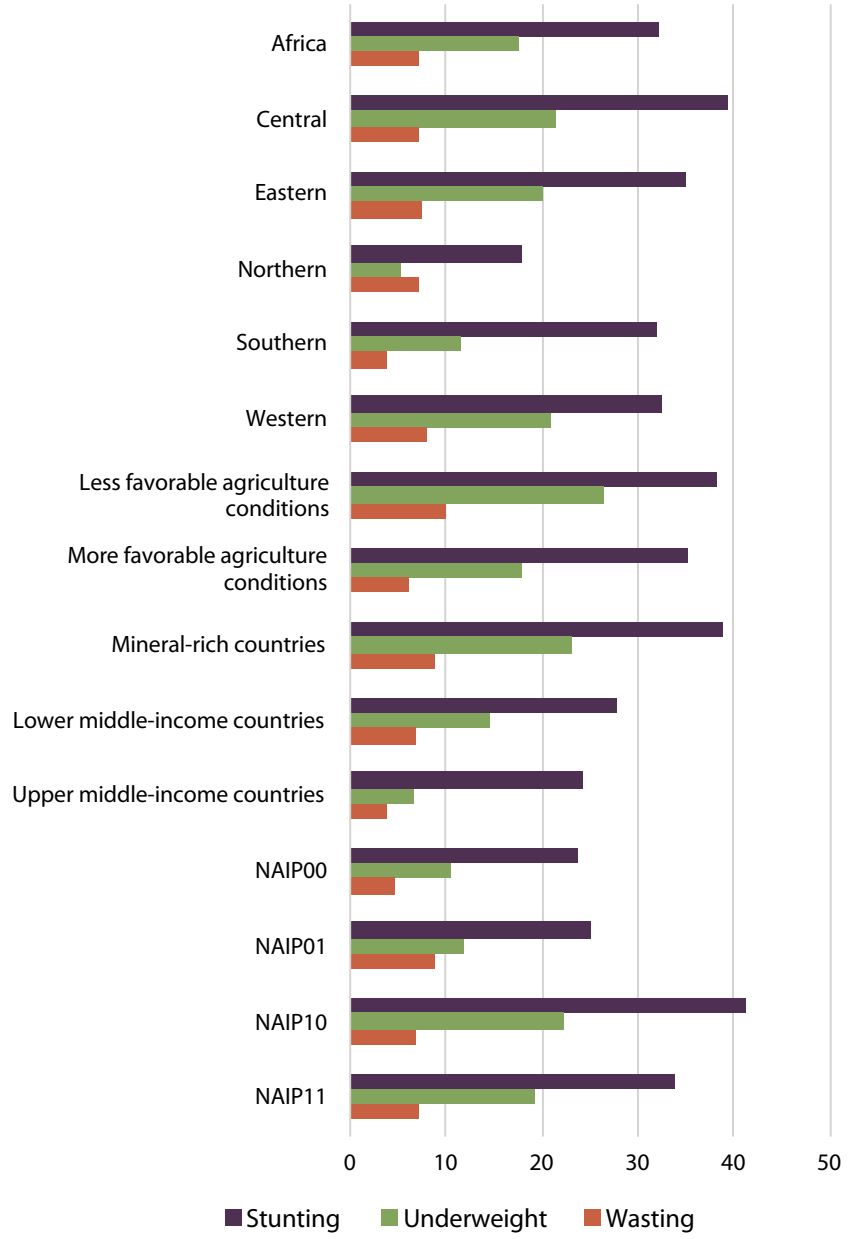
countries, and countries with neither a first- nor second-generation NAIP (N00 countries).

Child malnutrition is an urgent humanitarian issue in the short term and also has longer-term implications for human capital development. We look at trends in three common indicators of malnutrition in children under five years: stunting, or low height-for-age; underweight, or low weight-for-age; and wasting, or low weight-for-height. All three indicators saw moderate declines across the entire period from 2003 to 2019, the last year with available data. The prevalence of child stunting declined at average annual rates of 1.2 percent during the 2003–2008 period, 2.0 percent during the 2008–2014 period, and 1.2 percent during the 2014–2019 period (Table L1.2.2B). Rates of decline were quite similar for the prevalence of child underweight, which fell by annual average rates of 1.5 percent, 2.2 percent, and 1.7 percent during the three periods (Table L1.2.2A), as well as the prevalence of child wasting, for which average annual declines were 1.3 percent, 2.0 percent, and 2.1 percent (Table L1.2.2C). For all three indicators, these rates of decline were steady but not rapid enough to greatly reduce the proportion of malnourished children. As of 2019, 31.3 percent of children were stunted in Africa as a whole, 16.8 percent were underweight, and 6.8 percent were wasted. As with other measures of food and nutrition security, child stunting, wasting, and underweight are all expected to have increased in 2020 due to the impacts of COVID-19 (FAO et al. 2022).

Figure 9.5 presents the average levels of child stunting, underweight, and wasting during the 2014–2019 period. The three indicators show similar patterns. Among geographic regions, central Africa had the highest rates of stunting and underweight; western Africa showed the highest rates of wasting as well as high levels of the other two indicators. Countries with less favorable agricultural conditions and mineral-rich countries had high levels of all three types of malnutrition. Among NAIP groupings, countries with only a first-generation NAIP (N10 countries) had the highest rates of stunting and underweight, while countries with only a second-generation NAIP (N01 countries) had the highest rates of underweight.

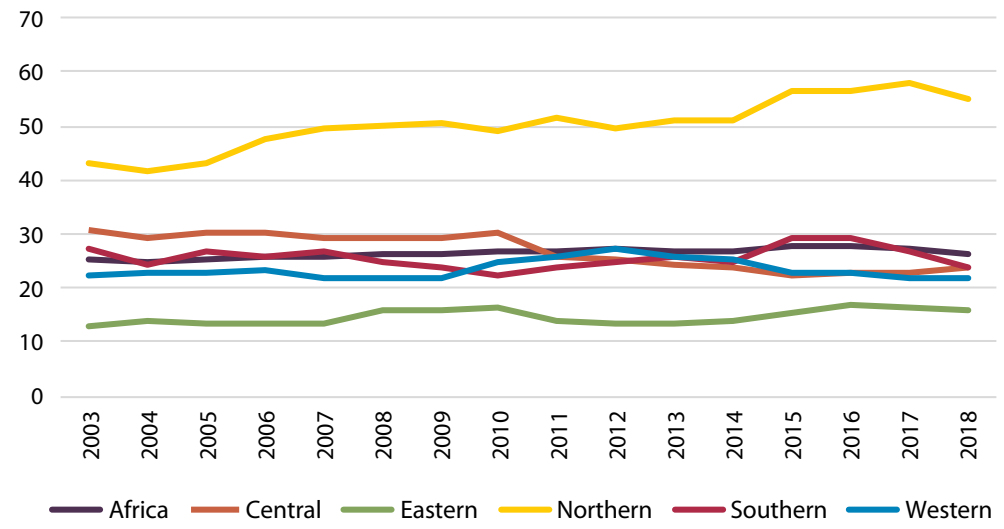
High rates of dependency on food imports can affect countries' food security by making them more vulnerable to international price volatility and other trade disruptions (Luo and Tanaka 2021). The risks of exposure to trade shocks were demonstrated during the Russia-Ukraine conflict in 2022, which caused sharp increases in the international prices of wheat and other commodities, negatively affecting many African countries' terms of trade and causing increased poverty

FIGURE 9.5—PREVALENCE OF UNDERWEIGHT, STUNTING, AND WASTING IN AFRICA (PERCENTAGE OF CHILDREN YOUNGER THAN FIVE), 2014–2019 AVERAGE



Source: ReSAKSS based on World Bank (2022) and ILO (2022).

FIGURE 9.6—CEREAL IMPORT DEPENDENCY RATIO, 2003–2018 (PERCENT)



Source: ReSAKSS based on FAO (2022), World Bank (2022), and ILO (2022).

and hunger (Badiane, Fofana, and Sall 2022). Africa's dependency on cereal imports, calculated as the share of imports in total supply of cereals, increased slightly through much of the CAADP period before decreasing marginally in recent years (Figure 9.6 and Table L1.2.3). The dependency ratio stood at 27.2 percent on average during 2014–2018 (the most recent year with available data), slightly greater than the average 2003–2008 level of 25.6 percent.

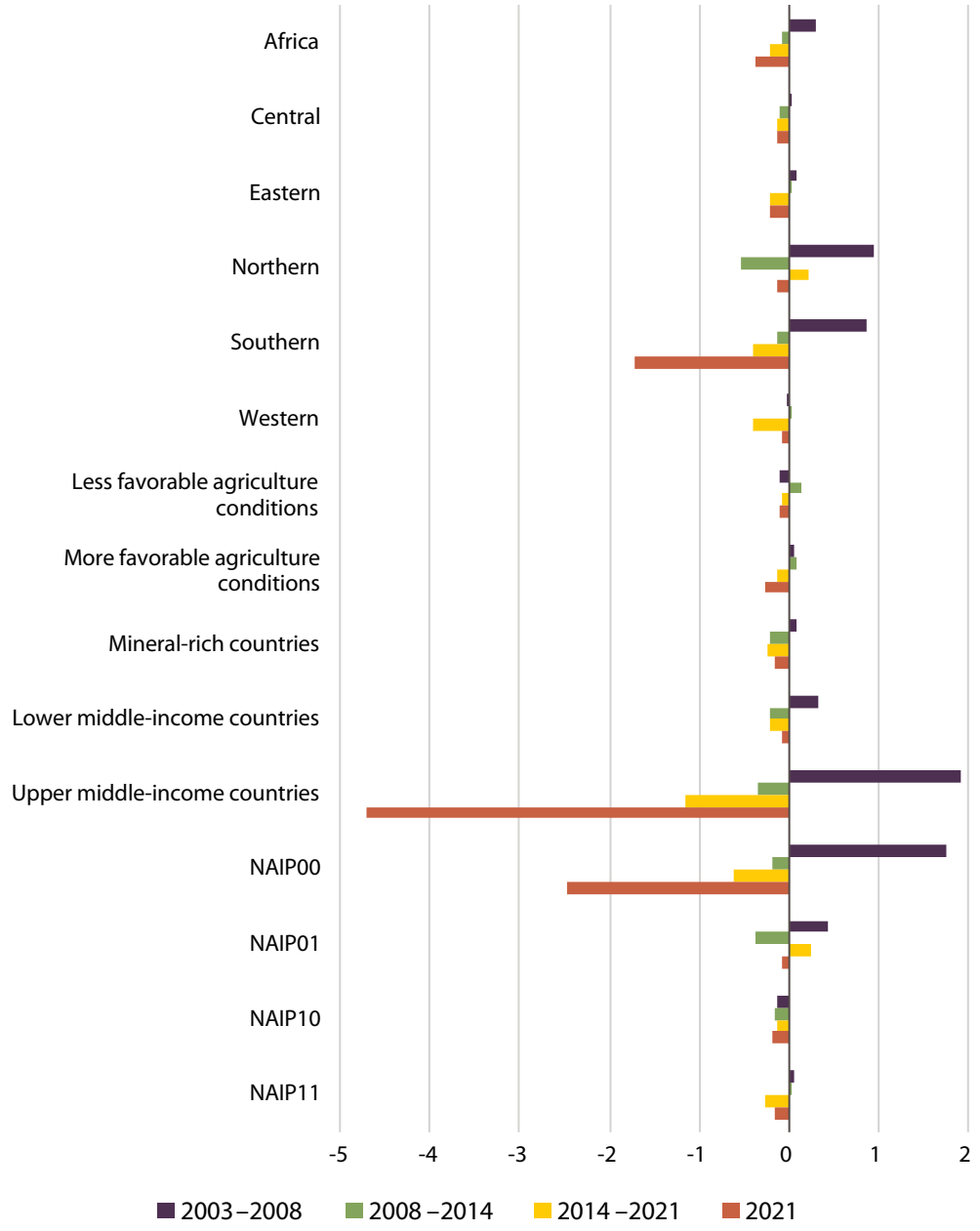
The cereal import dependency ratio shows marked differences among regions. Northern Africa's dependency is significantly higher than all other regions and has also increased faster, rising from an average of 45.9 percent during the 2003–2008 period to 55.4 percent during the 2014–2018 period—over half of cereal consumed in the region is now imported. Eastern Africa showed the lowest cereal import dependency ratios throughout the CAADP period, but saw its ratio rise from 13.7 percent in 2003–2008 to 15.7 percent in 2014–2018. Among economic groupings, lower middle-income countries had the highest dependency ratios as of 2014¬–2018, followed by upper middle-income countries. Countries without a first-generation NAIP—N00 and N01 countries—had relatively high dependency ratios of 40 percent or greater during the same period, while rates were closer to 20 percent in countries with a first-generation NAIP: N10 and N11 countries had dependency ratios of 19.2 and 21.3 percent, respectively.

Employment

Africa's employment rate measured both as a percentage of the labor force (Figure 9.7, Table L1.3.1A) and as a percentage of the population 15 years of age and above (Table L1.3.1B) rose slightly during the first post-CAADP period of 2003–2008, but followed a declining trend in the subsequent periods. The COVID-19 pandemic accelerated this trend: employment as a proportion of the labor force fell annually by 3.4 percent from 2019 to 2020, a much sharper decrease than the average annual decrease in the period 2014–2019 of 0.04 percent (Tefera, Collins, and Makombe 2021). Despite the resumption of positive economic growth in 2021, the employment rate did not recover, declining by a further 0.37 percent from 2020 to 2021. While employment's recovery from the impacts of COVID-19 has been slower than expected globally, developing countries have been especially strongly affected. In Africa, several factors, including low vaccination rates, additional lockdowns associated with new variants, and continued population growth and new entrants to the labor force, have contributed to even lower employment rates in 2021 than in 2020 (ILO, 2022). Declines in employment as a share of the labor force in 2021 were especially steep in southern African and western African countries, upper middle-income countries, and countries with neither a first- nor a second-generation NAIP (N00 countries). Over the 2014–2021 period as a whole, these groups showed the largest drop in the employment rate.

In terms of the employment rate, 92.1 percent of Africa's labor force was employed in 2021, representing a slight decline from the 2003 level of 92.4 percent. The employment rate was lowest in northern and southern Africa, at 88.7 and 85.1 percent respectively, and highest in central and eastern Africa, at 94.7 percent in both regions. Among all country groupings, upper middle-income countries had the lowest employment rate by far of 71.3 percent, while

FIGURE 9.7—EMPLOYMENT RATE (PERCENT OF LABOR FORCE, 15–64 YEARS), ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2021



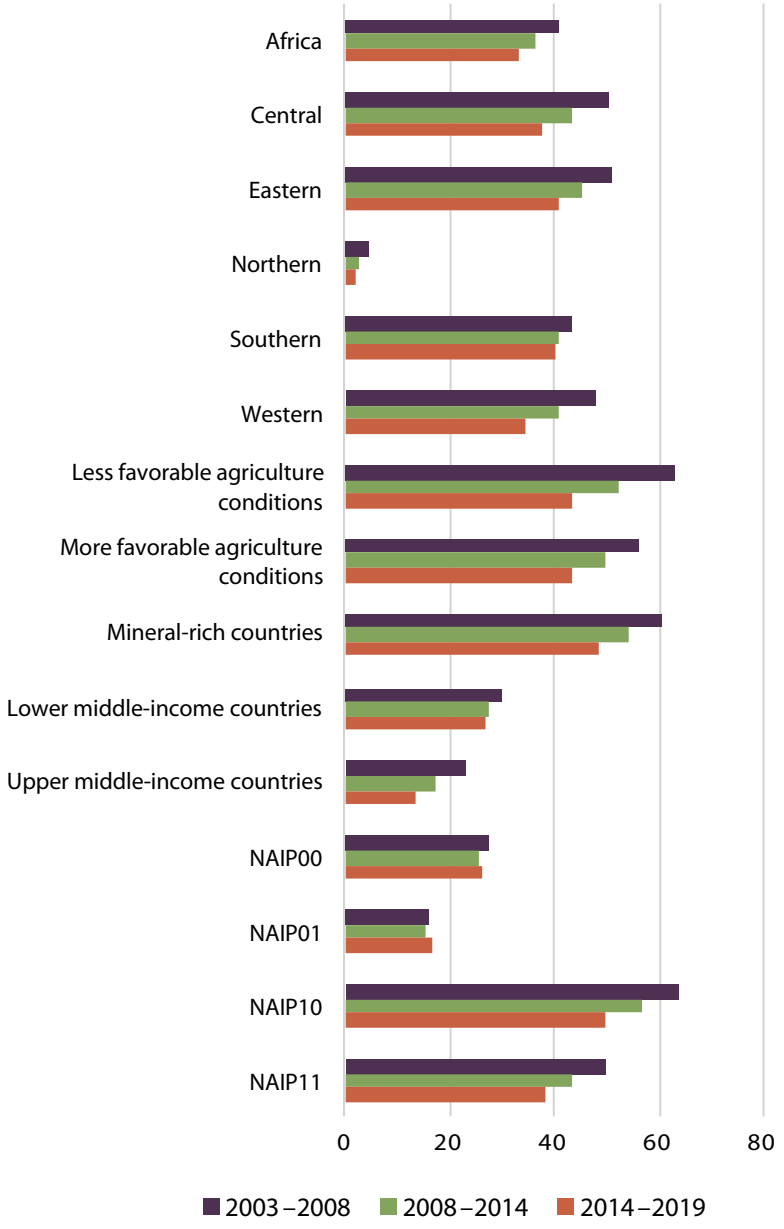
Source: ReSAKSS based on ILO (2022).

the highest employment rate of 95.7 was observed in countries with less favorable agricultural conditions. These trends concord with cross-country analysis by the World Bank, which found that employment rates tend to be higher in low-income countries than in wealthier countries due to the greater necessity faced by populations to earn money; however, low-income countries have high rates of underemployment and informal employment (Merotto, Weber, and Aterido 2018). Employment as a percent of the population over 15 years stood at 56.6 percent in 2020 for Africa as a whole, the last year with available data, down from 59.8 percent in 2003.

Poverty

The poverty headcount ratio measures the share of the population living below the international extreme poverty line of $1.90 per day in 2011 purchasing power parity (PPP). Poverty declined steadily from 2003 through 2019—the last year with data available—for Africa as a whole and for most country groupings (Figure 9.8, Table L1.3.4). At the continental level, the poverty headcount ratio decreased from an average of 41.1 percent during the 2003–2008 period to 33.3 percent during 2014–2019. Among geographic regions, poverty has consistently been much lower in northern Africa, which showed an average poverty headcount ratio of 1.7 percent in 2014–2019. Poverty was highest in the southern and the eastern Africa regions, with rates of 40.1 percent and 41.1 percent, respectively, during the same period. Similarly, among RECs, SADC and EAC had the highest poverty rates in 2014–2019 of over 45 percent, while poverty in UMA had declined to under 1 percent. Both lower and upper middle-income countries had significantly lower poverty rates than the other economic groupings; among low-income countries, those rich in minerals showed the highest poverty rates in 2014–2019 of 48.3 percent. Countries with a first-generation NAIP (N10 and N11 countries) also showed high poverty rates of 49.5 percent and 38.1 percent, respectively. However, N10 and N11 countries showed relatively rapid declines in the poverty rate—as did

FIGURE 9.8—POVERTY HEADCOUNT RATIO AT $1.90 (2011 PPP) PER DAY (PERCENT), 2003–2019



Source: ReSAKSS based on World Bank (2022) and ILO (2022).

western and central African countries and countries with less favorable agricultural conditions—while countries without a first-generation NAIP (N00 and N10 countries) showed slight increases in the poverty rate in the 2014–2019 period.

The consistent declines in the poverty headcount ratio in Africa and across most country groupings were not sufficient to significantly reduce poverty, and the absolute numbers of poor people had begun to increase in Africa even before the COVID-19 pandemic. Data on poverty levels in 2020 and 2021 are not yet available, but it is clear that the pandemic greatly exacerbated existing challenges. The Russia-Ukraine conflict in 2022 and associated trade and price shocks are likely to have caused further deterioration in living standards. The World Bank estimates that the combined impacts of the pandemic and the Russia-Ukraine crisis have led to a rise in the number of poor people in Africa south of the Sahara in 2022 of at least 23.3 million people compared to pre-pandemic projections (Mahler et al. 2022).

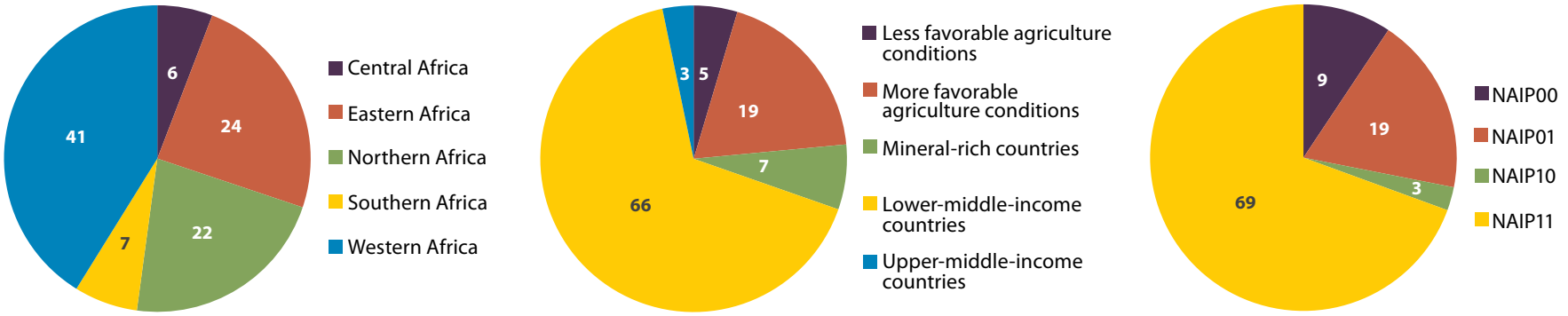
The extreme poverty gap, a measure of the depth of poverty, represents the average distance below the $1.90/day poverty line for the poor population. Prior to the onset of the pandemic, the poverty gap decreased throughout the CAADP period for Africa as a whole, declining from an average of 16.1 percent in 2003–2008 to 11.0 percent in 2014–2019, the last year with available data (Table L.1.3.3). The decrease in the severity of poverty accelerated over the CAADP period, with annual average rates of decline of 3.0 percent in 2003–2008, 3.4 percent in 2008–2014, and 4.2 percent in 2014–2019 for Africa as a whole. Among geographic regions, the poverty gap shrank the fastest in the northern and western Africa regions, which also showed the lowest poverty gaps in 2014–2019 of 0.3 and 10.3 percent, respectively. The poverty gap decreased most slowly in southern Africa, even showing a small average annual increase during the 2008–2014 period. The overall positive performance in reducing the severity of poverty is expected to have been reversed by the COVID-19 pandemic. Continuing employment and income losses are expected to have increased the depth of poverty as well as the prevalence (ILO 2022).

CAADP Results Framework Level 2 Indicators: Agricultural Transformation and Sustained Inclusive Agricultural Growth

Agricultural Production and Productivity

In Africa, agriculture is the largest economic sector in terms of employment with close

FIGURE 9.9—AGRICULTURE VALUE ADDED, PERCENTAGE SHARE IN AFRICA TOTAL, 2014–2021, BY GEOGRAPHIC REGION, INCOME CATEGORY, AND NAIP FORMULATION STAGE



Source: ReSAKSS based on World Bank (2022).

to 60 percent of the population aged 15 and over working in the sector (Table L1.3.1b). In addition, the sector plays a crucial role on the continent by supplying food for consumption, as a source of earnings from agricultural exports (Dercon and Gollin 2014), and through the income it provides the majority of rural households (Rufai, Salman, Salawu 2018). For Africa as a whole, agriculture value added accounted for 15.3 percent of GDP during 2014–2021, slightly less than the 16.1 percent recorded during the early CAADP period, 2003–2008 (Table O.3.2). However, the share and, hence, importance of agriculture in total GDP varies among African countries; the agricultural GDP share reaches 30 percent or higher in a number of countries.

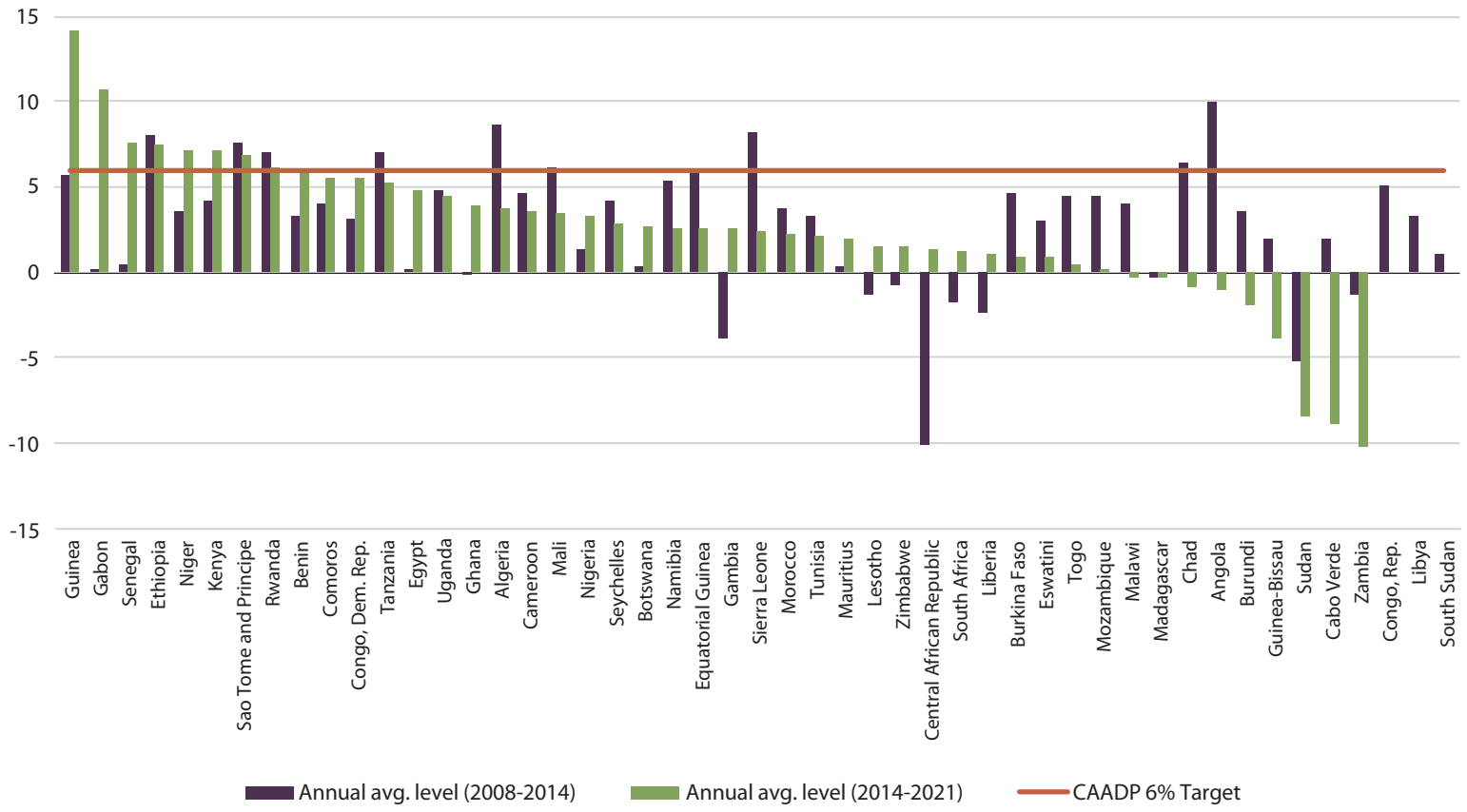
For Africa as a whole, agriculture value added increased from $257.9 billion during the early CAADP period of 2003–2008 to $313.8 billion in 2008–2014 and $382.3 billion in 2014–2021. Unlike the overall economy, the agriculture sector has continued to grow since the onset of COVID-19 in 2020. COVID-19 affected the continent's agriculture sector performance mainly during early 2020 when lockdowns were implemented. In general, the negative outcomes of these measures were contained (OBG 2021). The food security problems that followed the introduction of COVID-19 lockdown measures in Africa were largely related to obstacles to food access, while the impact on agricultural production and food availability has been smaller (FAO 2021).

Agriculture value added recorded by the different subgroups shows that a few categories of countries dominated agricultural production throughout the review period. For example, the western Africa region accounted for 41 percent of the total agriculture value added on the continent during 2014–2021. Likewise, middle-income countries and the countries that formulated both first- and second-generation NAIPs (N11) account for two-thirds of the total production among their respective categories. This is followed by the countries in eastern Africa, countries with more favorable agricultural conditions, and the group of countries that formulated only second-generation NAIPs (NAIP 01), with shares between 19 and 24 percent (Figure 9.9).

Agriculture value added in Africa increased at only a moderate rate, reaching 3.3 percent on average during 2014–2021. As a result, Africa has not been able to meet the CAADP target of sustaining at least 6 percent annual growth in agriculture value added. The same is true for the different country groupings, particularly during 2008–2014 and 2014–2021 (Table L2.1.1). However, three countries have been able to surpass the 6 percent target in both subperiods—Ethiopia, Sao Tome and Principe, and Rwanda—while a handful of other countries managed to meet the target in one of the two periods (Figure 9.10).

The agriculture production index measures agricultural production for each year in comparison with the base period of 2014–2016. The findings show that

FIGURE 9.10—AGRICULTURE VALUE ADDED ANNUAL AVERAGE GROWTH (PERCENTAGE), 2008–2021



Source: ReSAKSS based on World Bank (2022) and ILO (2022).

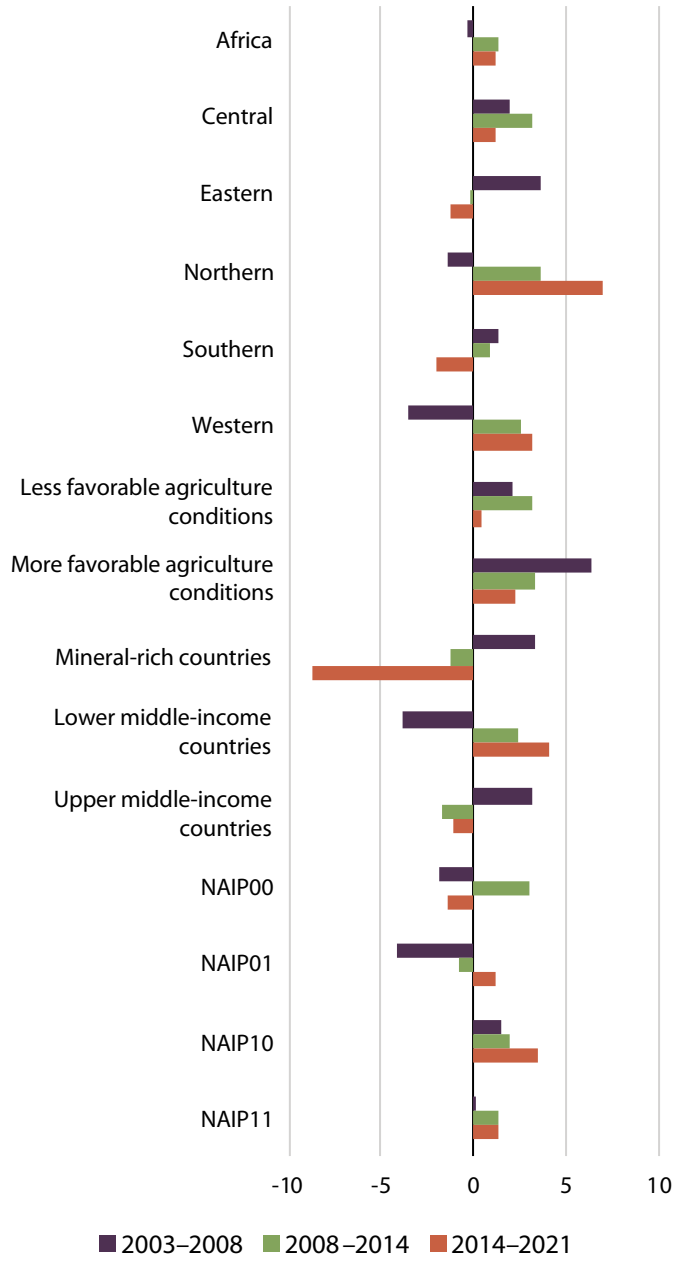
the continent as a whole as well as the various subgroups recorded a consistent increase in the agriculture production index during the entire review period. In 2014–2020, the annual average index for Africa was 104.7, up from 77.0 and 88.8 recorded during 2003–2008 and 2008–2014 (Table L2.1.2). The data also show that agricultural production continued to increase during 2020 after the onset of COVID-19, although at a slower rate compared to the recent past periods, perhaps reflecting the impacts of the pandemic.

For Africa as a whole, agricultural labor productivity, measured by agriculture value added per worker, increased modestly from $1,504 in 2003–2008 to $1,630 in 2008–2014 and further to $1,800 during 2014–2021. However, labor productivity on the continent has not reached half of the global average (Ritchie 2022). During the first CAADP period of 2003–2008, labor productivity on the continent recorded negative annual average growth. The growth in labor productivity improved and grew at an annual average rate of 1.2 percent during

2008–2014 and during 2014–2021 (Table L2.1.3). The negative labor productivity growth in the northern and the western Africa regions in 2003–2008 appears responsible for the continentwide contraction recorded in 2003–2008. Similarly, the notable growth recorded during 2014–2021 in these two regions likely drove the higher growth in continental-level agricultural labor productivity (Figure 9.11).

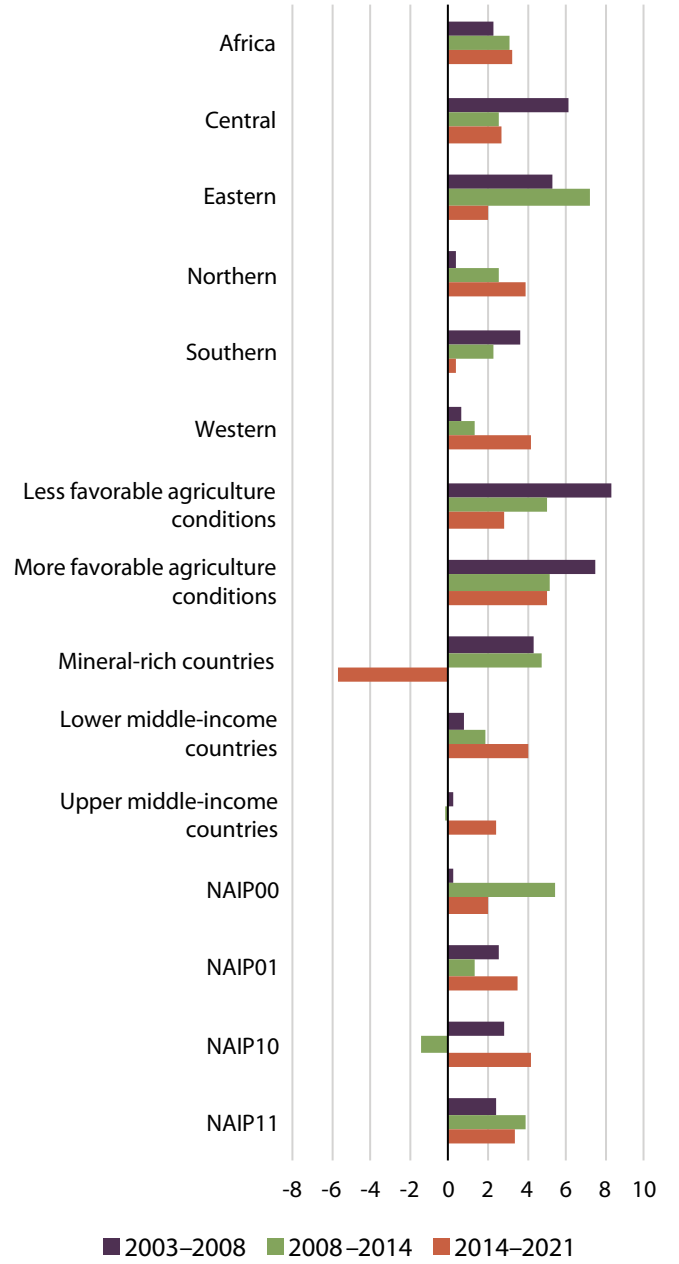
Agricultural land productivity, which measures agriculture value added per hectare of agricultural land, consistently grew over the entire CAADP period. For Africa as a whole, it accelerated from an annual average of 2.3 percent in 2003–2008 to 3.1 percent during 2008–2014 and 3.2 percent in 2014–2021 (Table L2.1.4). During the entire CAADP period (2003–2021), consistent growth in land productivity was recorded in the northern and western Africa regions, while declining growth was observed in southern Africa (Figure 9.12). Countries with more favorable agricultural conditions are the only subgroup that managed to record land productivity growth above 5 percent throughout the CAADP period (Table L2.1.4).

FIGURE 9.11—LABOR PRODUCTIVITY, ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2021



Source: ReSAKSS based on World Bank (2022) and FAO (2022).

FIGURE 9.12—LAND PRODUCTIVITY, ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2021



Source: ReSAKSS based on World Bank (2022) and FAO (2022).

Although land productivity showed an increasing trend during the full CAADP period, it remained low in comparison with other regions of the world. For example, the average cereal yield in 2020 was 1.65 tons per hectare for Africa, while it was 4.07 tons per hectare globally. As a result of such low productivity levels, about 70 percent of the increase in agricultural production that took place in the continent was due to area expansion and not to greater land productivity (Ritchie, 2022).

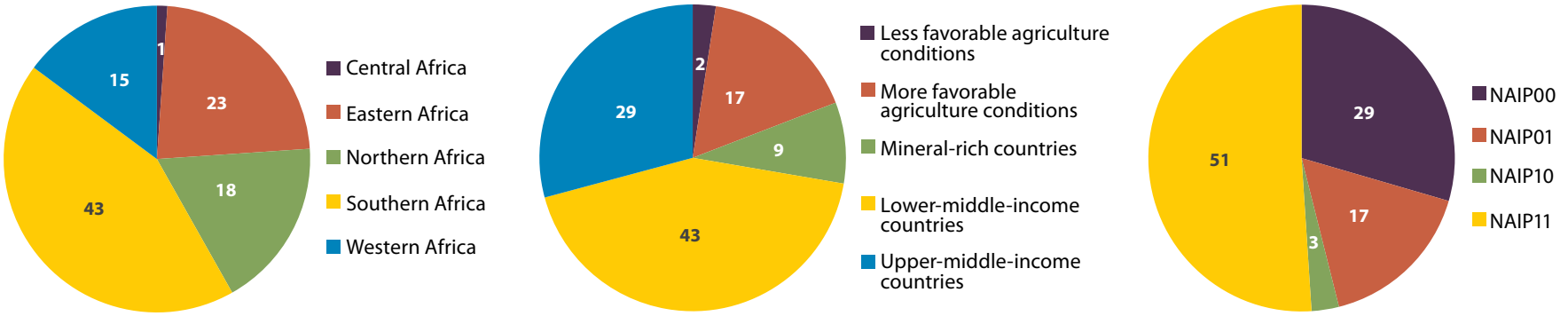
The CAADP RF includes indicators to measure yields of five priority agricultural commodities. This chapter examines yields of cassava, cattle meat, yam, cow milk, and maize, which together accounted on average for 29 percent of the total value of agricultural produce on the continent during 2003–2020. Over this period, cassava had the highest production share at 7.25 percent of the total value of production, followed by cattle meat (7.23 percent), yams (5.14 percent), cow milk (4.79 percent), and maize (4.58 percent). Of these commodities, only maize exhibited a yield increase over the entire CAADP period. A declining trend was recorded for cassava and yams, while yields for cattle meat and cow milk showed little change between the initial CAADP period (2003–2008) and the most recent period (2014–2020) (Tables L2.1.5A, L2.1.5B, L2.1.5C, L2.1.5D, and L2.1.5E).

Intra-African Agricultural Trade

Africa's total agricultural exports as a share of total merchandise exports improved during the CAADP period from an annual average of 8.3 percent in 2003–2008 to 9.1 percent in 2008–2014 and further to 12.8 percent in 2014–2021. There are, however, marked differences among the different country groupings. The contribution of agriculture to total exports was highest in eastern Africa and in countries with more favorable agricultural conditions, where the shares were 43.4 percent and 34.9 percent, respectively, during 2014–2021 (Table O.2.1A). In 2021, Africa's total agricultural exports to the rest of the world reached $63.2 billion.

Turning to trade within Africa, Africa has improved its intra-African agricultural trade during the entire CAADP period. Intra-African agricultural exports more than doubled from $5.7 billion in 2003 to $14.4 billion in 2021 (Table L2.2.1A). Over this period, country groupings that recorded intra-African agricultural export growth above the average for Africa as a whole included eastern Africa, northern Africa, countries with more favorable agricultural conditions, mineral-rich countries, and the group of countries that formulated either NAIP2.0 only (N01) or both first- and second-generation NAIPs (N11). In general, these findings suggest that Africa needs to do more to

FIGURE 9.13—INTRA-AFRICAN AGRICULTURAL EXPORTS (PERCENTAGE SHARE OF TOTAL, 2014–2021)



Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

achieve the 2014 Malabo Declaration commitment to triple intra-African trade in agricultural commodities and services by the year 2025.

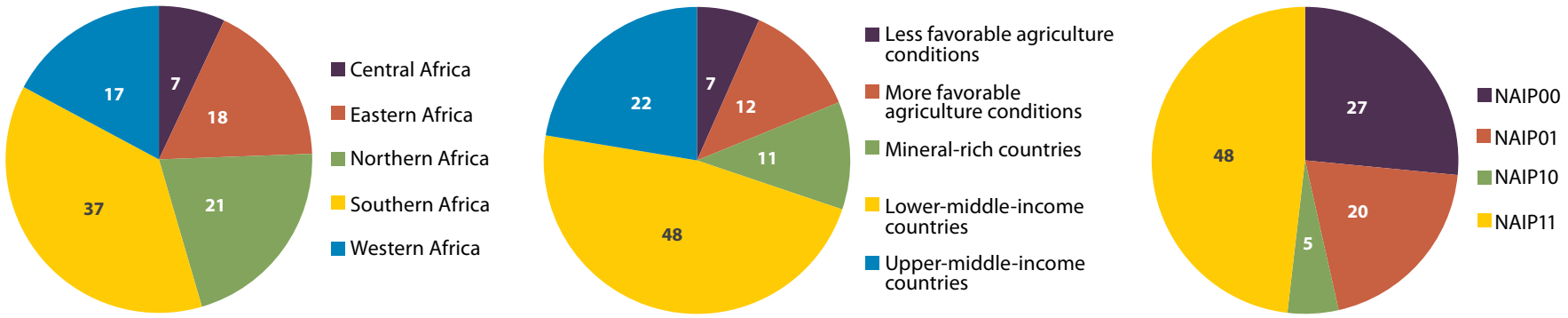
The shares of intra-African agricultural exports by the different country groupings during 2014–2021 are presented in Figure 9.13. It shows that the level of intra-African trade differs substantially by country groupings with some groupings predominating most trade. Namely, southern Africa, lower middle-income countries, and the group of countries that have formulated both NAIP1.0 and NAIP2.0 (N11) account for large shares of intra-African agricultural exports. In contrast, intra-African agricultural trade was lowest in central Africa, countries with less favorable agricultural conditions, and the group of countries that have only formulated a first generation NAIP (N10).

Intra-African agricultural exports declined following the movement restrictions implemented in early 2020 with the onset of COVID-19. However, compared to exports to the rest of the world, intra-African exports have been more resilient (Luke and MacLeod 2021). In fact, intra-African agricultural exports in 2020 were 6.3 percent higher than in 2019. The trade impact of COVID-19 has reinforced the importance of developing trade within Africa (Banga et al. 2020).

Intra-African agricultural imports also more than doubled from $7.7 billion recorded in 2003 to $16.5 billion in 2021 (Table L2.2.1B). Intra-African agricultural imports grew by between 170 and 270 percent in northern Africa, countries with less favorable agricultural conditions, and the group of countries that have not yet embarked on NAIP formulation (N00). In addition, as seen in Figure 9.15, the country groupings that account for substantial shares of intra-African agricultural imports are southern Africa, lower middle-income countries, and the group of countries that have formulated both NAIP1 and NAIP2 (N11). The groups with the smallest shares of intra-African agricultural imports include central Africa, countries with less favorable agricultural conditions, and countries that have only a first-generation NAIP (N10). Figure 9.13 and Figure 9.14 indicate that the same country groups are major players in both intra-African imports and exports, which suggest that agricultural trade within Africa is regionally concentrated.

Despite these increases in intra-African agricultural trade throughout the CAADP period, Africa ranks lower on the measure of intraregional agricultural trade as a share of total agricultural trade compared to other world regions. The major obstacles that impede intra-African trade include weak productive capacities, inadequate economic diversification, and tariff and nontariff related costs (FAO 2021).

FIGURE 9.14—INTRA-AFRICAN AGRICULTURAL IMPORTS (PERCENTAGE SHARE, 2014–2021)



Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

CAADP Results Framework Level 3 Indicators: Strengthening Systemic Capacity to Deliver Results

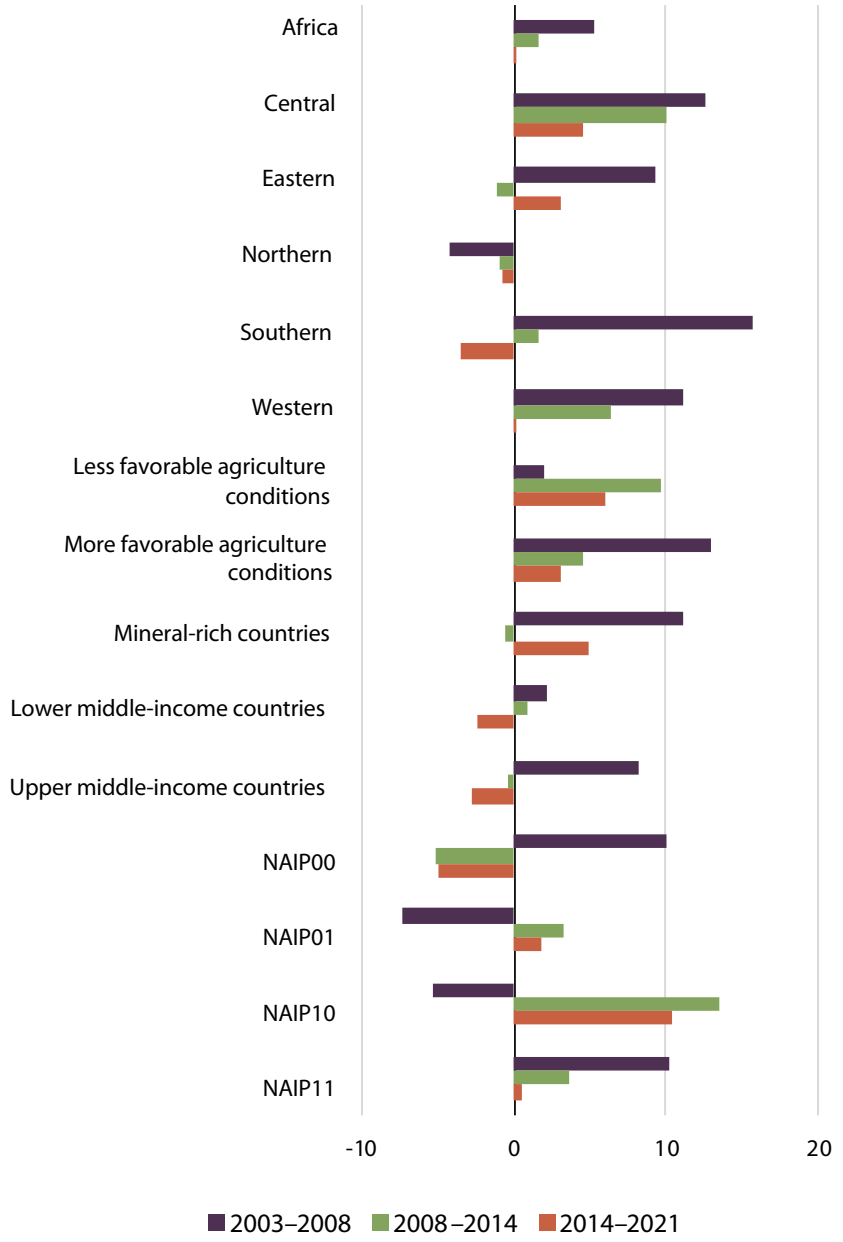
Capacities for Policy Design and Implementation

Indictors of progress in the implementation of actions aimed at strengthening systemic capacity for agriculture and food-security policy planning and implementation are presented in Table L3(b) in Annex 3d. No changes in systemic capacity were observed since September 2021. Thus, as of September 2022, 42 countries had formulated new or revised second-generation NAIPs through inclusive and participatory processes; 28 had inclusive institutionalized mechanisms for mutual accountability and peer review (mainly JSRs); 36 were implementing evidence-based policies; 31 had functional multisectoral and multistakeholder coordination bodies—mainly agriculture sector working groups; and 22 had successfully undertaken agriculture-related public-private partnerships aimed at boosting specific agricultural value chains. ReSAKSS has worked with the country CAADP teams to set up or strengthen country Strategic Analysis and Knowledge Support Systems (SAKSS) rooted in the existing local capacities and infrastructure. The country SAKSS is a critical instrument for supporting the review of and dialogue on CAADP implementation at the country level. Between 2010 and 2017, SAKSS platforms were launched in a total of 14 countries: Benin, Burkina Faso, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Mali, Mozambique, Rwanda, Senegal, Tanzania, Togo, Uganda, and Zimbabwe (Table L3(b)).

Government Agriculture Expenditure

Investments in agriculture, and government agriculture expenditure (GAE) in particular, are a key instrument for driving agricultural growth and poverty reduction. However, although the annual average level of Africa's GAE has increased over time, the rate of increase has been declining. Africa's GAE increased from an annual average of $13.3 billion in 2003–2008 to $14.6 billion in 2008–2014 and further to $16.3 billion in 2014–2021 (Table L3.5.1). And while GAE experienced strong growth following the launch of CAADP when it grew at an annual average of 5.3 percent in 2003–2008 for Africa as a whole,

FIGURE 9.15—GOVERNMENT AGRICULTURE EXPENDITURE, ANNUAL AVERAGE PERCENTAGE CHANGE, 2003–2021



Source: ReSAKSS based on IFPRI (2019), World Bank (2022), and national sources.

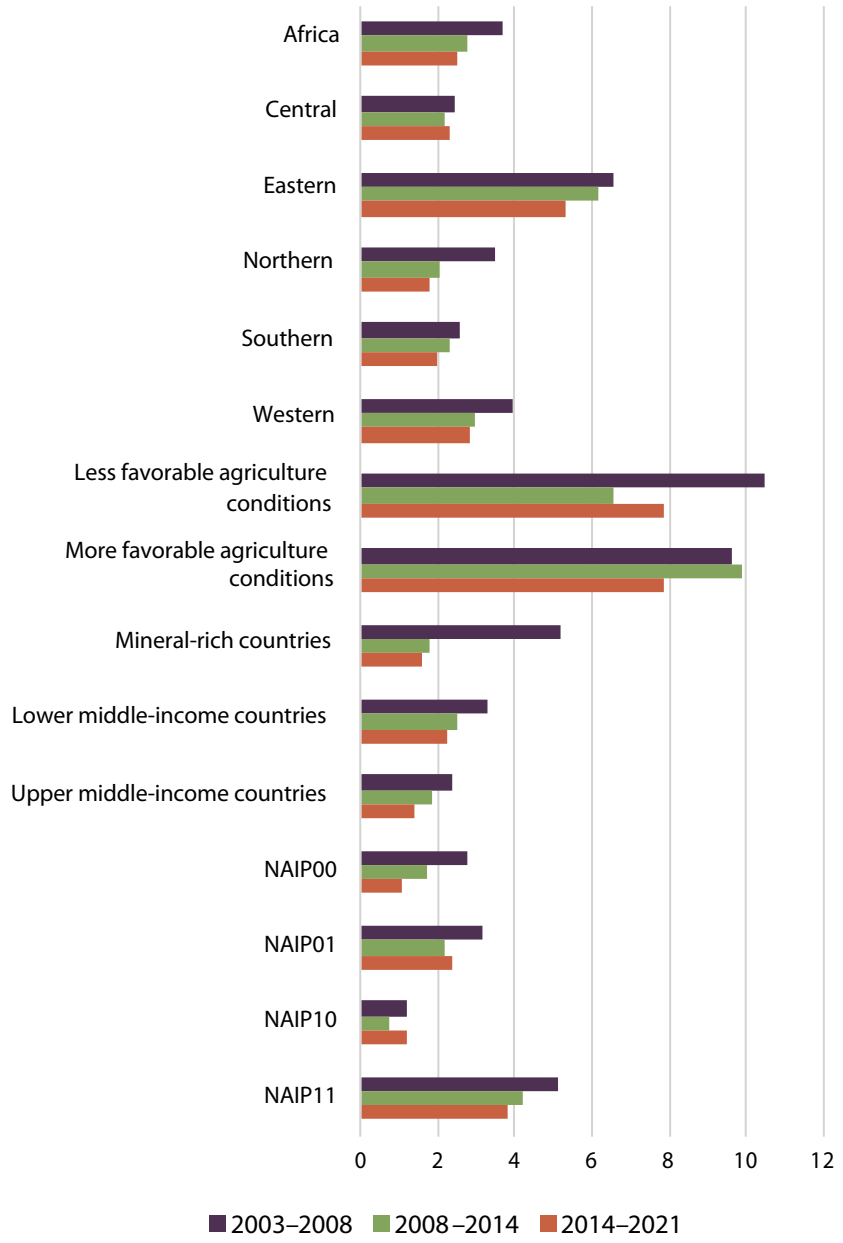
its growth has since decelerated to 1.7 percent in 2008–2014 and down to 0.1 percent in 2014–2021 (Figure 9.15, Table L3.5.1).

A similar pattern of strong growth in GAE in 2003–2008 followed by slower growth, particularly in 2014–2021, is also observed in most of the country groupings (Figure 9.16, Table L3.5.1). For example, although southern Africa experienced strong annual average growth in GAE of 15.6 percent in 2003–2008, the annual average growth rate decelerated to 1.7 percent in 2008–2014 and contracted to –3.5 percent in 2014–2021 (Figure 9.15). Only a handful of country groupings experienced strong growth in GAE of at least 5 percent in the most recent period of 2014–2021—countries with less favorable agricultural conditions (6.1 percent), EAC (5.8 percent), ECCAS (6.4 percent), and the group of countries that have only completed a first-generation NAIP (N10) (10.5 percent).

A key CAADP commitment, included in both the 2003 Maputo Declaration and 2014 Malabo Declaration, is the pledge by African leaders to allocate at least 10 percent of national budgets to the agriculture sector. Assessment of progress on this commitment shows that, across most country groupings, the share of government agriculture expenditure in total government expenditure has not only remained below the 10 percent CAADP target but has also been declining during the post-CAADP period (Figure 9.16, Table L3.5.2). For Africa as a whole, the share averaged 3.7 percent in 2003–2008, but fell to 2.7 percent in 2008–2014 and fell further to 2.5 percent in 2014–2021. Only two country groupings have met or come close to meeting the CAADP budget share target in the post-CAADP period. These are countries with less favorable agricultural conditions (10.5 percent in 2003–2008) and those with more favorable agricultural conditions (9.6 percent in 2003–2008 and 9.9 percent in 2008–2014) (Figure 9.16).

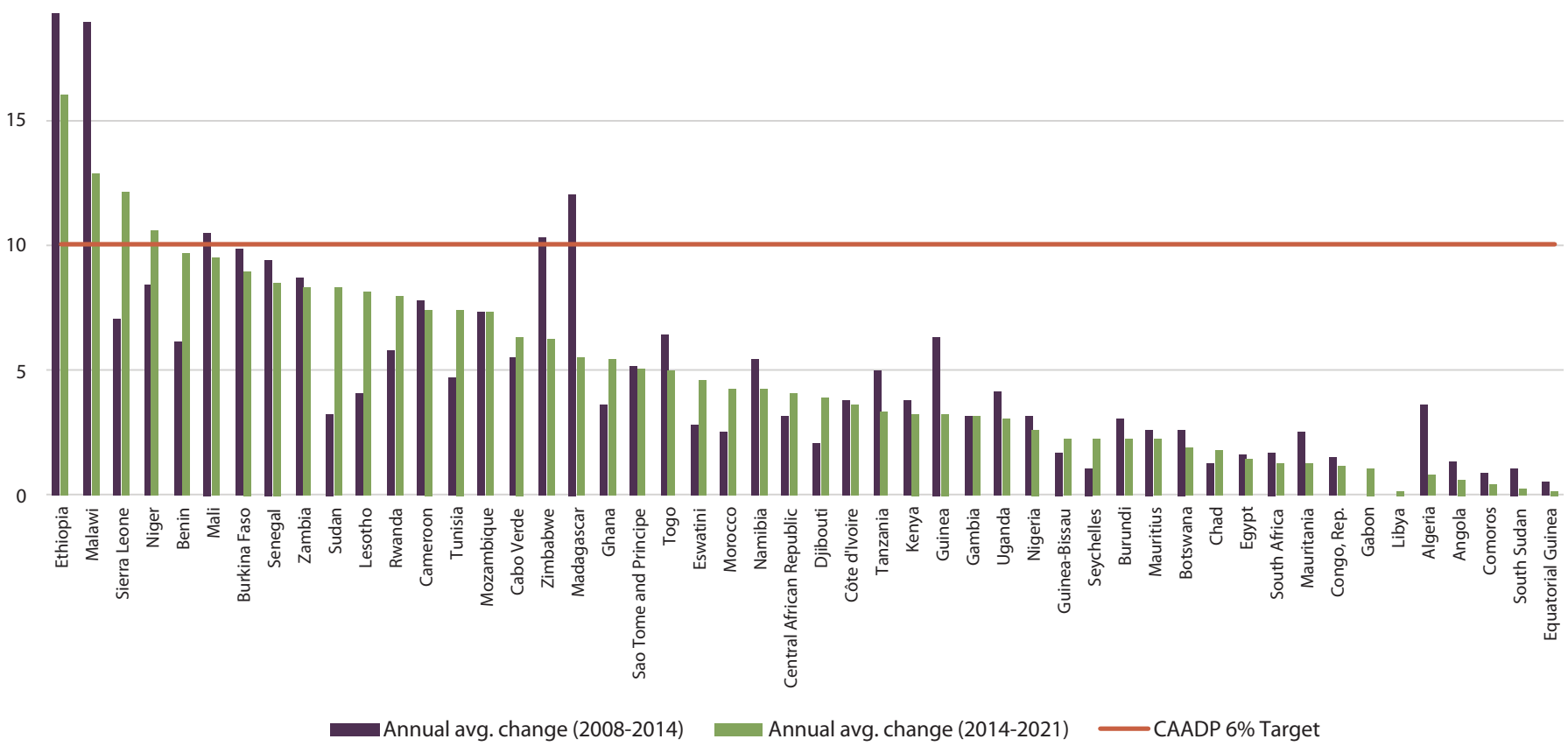
Country groupings that achieved an agriculture expenditure share of at least 5 percent in the most recent period of 2014–2021 include eastern Africa (5.3 percent), countries with less and more favorable agricultural conditions (7.9 percent and 7.8 percent, respectively), IGAD (5.9 percent), and the group of countries that are advanced in implementing CAADP (CL4) (5.2 percent) (Figure 9.16, Table L3.5.2). In addition, although ECCAS and the group of countries that have only completed the first-generation NAIP (N10) have some of the smallest shares of government agriculture expenditure in total government expenditure, they registered the highest growth rates in the share in 2014–2021, at7.0 percent and 13.0 percent, respectively (Table L3.5.2).

FIGURE 9.16—SHARE OF GOVERNMENT AGRICULTURE EXPENDITURE IN TOTAL GOVERNMENT EXPENDITURE (PERCENT), 2003–2021



Sources: ReSAKSS based on IFPRI (2019), World Bank (2022), and national sources.

FIGURE 9.17—SHARE OF GOVERNMENT AGRICULTURE EXPENDITURE IN TOTAL GOVERNMENT EXPENDITURE (PERCENT), 2008–2014 AND 2014–2021



Source: ReSAKSS based on World Bank (2022) and ILO (2022).

While no country grouping met the CAADP 10 percent budget target, Figure 9.17 shows that four countries met or surpassed the target in 2014–2021—Ethiopia, Malawi, Niger, and Sierra Leone. In addition, seven countries came close to meeting the 10 percent target in 2014–2021—Benin, Burkina Faso, Lesotho, Mali, Senegal, Sudan, and Zambia—with agriculture budget shares of more than 8 percent. Ensuring efficiency of government agriculture expenditures in driving agricultural growth objectives will require not only raising agriculture budget shares and the level of expenditures but also paying close attention to the quality and composition of the expenditures (Goyal and Nash 2017). Moreover, scarce public resources will need to be carefully targeted and allocated toward subsectors, including agricultural research and development (R&D) and rural roads, that have been shown to generate greater growth and poverty reduction outcomes (Fan, Mongues, and Benin 2009; Matchaya 2020).

The share of government agriculture expenditure in agriculture GDP provides a good measure of the priority a government places on agriculture expenditure relative to the size of its agriculture sector. Across most country groupings, the share of government agriculture expenditure in agriculture GDP has declined over time and especially in the more recent periods of 2008–2014 and 2014–2021. For Africa as a whole, the share fell from 5.2 percent in 2003–2008 to 4.7 percent in 2014–2019 and to 4.6 percent in 2014–2021 (Table L3.5.3). In contrast, the shares have remained relatively high (above 10 percent) in southern Africa, upper middle-income countries, and the group of countries that have completed only the first-generation NAIP (N10) reflecting, on average, the relatively smaller share of the agriculture sector in the economies of these country groupings (Table L3.5.3).

Conclusions

A series of crises in recent years has threatened Africa's progress toward its agricultural development goals and targets. The COVID-19 pandemic in 2020–2021 and the Russia-Ukraine conflict in 2022 have dealt major blows to a continent that was already facing decelerating economic growth and increases in hunger. After several years of slowing growth, followed by a sharp decline in 2020, GDP per capita growth began to recover in 2021, but trade and price shocks associated with the Russia-Ukraine conflict will likely have a negative impact on economic growth for at least some countries. Like economic growth, progress in terms of food security was faltering even before the pandemic, with increasing rates of undernourishment during the 2014–2019 period, and likely deteriorated further with the onset of COVID-19. Although poverty rates declined moderately throughout the 2003–2019 period, the absolute number of poor people increased over this period. Again, the successive crises are expected to have triggered sharper increases in poverty. Employment has also not recovered after the steep declines associated with the COVID-19 pandemic, with employment rates falling even further in 2021 than in 2020.

All these challenges call for broad and effective social protection programs to help populations better weather protracted and repeated crises, manage loss of employment and price shocks, and protect their food security. African countries should draw from experiences in ramping up social protection programs during the early stages of the COVID-19 pandemic to improve their delivery of social protection in the longer term.

For Africa, agriculture is the most important sector for improving household welfare. It can play a crucial role in poverty reduction and in improving food security and economic well-being. Despite the sector's moderate growth during the review period, the continent has remained well below the CAADP 6 percent annual agricultural growth target. Even for the countries that achieved the 6 percent target, much of the growth can be attributed to factors such as cultivated area expansion rather than to higher productivity levels. In order to have a higher and more sustainable impact in the overall economy, poverty reduction, and improved livelihoods, productivity of the agriculture sector must be improved. This includes improving the productivity of labor and capital, the two main factors of agricultural production.

Despite growth in intra-African agricultural trade, the share of agricultural trade carried out within the continent is relatively low compared to other world regions. As Africa is a net food-importing continent, it is paramount to find a lasting solution to boosting intra-African agricultural trade and fostering improved market integration. In this regard, continued implementation of the African Continental Free Trade Area (AfCFTA) is expected to boost trade within Africa as it aims to address tariff and nontariff trade barriers and other obstacles.

This chapter shows that, on average, growth in the amount of Africa's government agriculture expenditure as well as its share in total government expenditure has been declining. For Africa as a whole, annual average growth in government agriculture expenditure fell from 5.3 percent in 2003–2008 to just 0.1 percent in 2014–2021, while the share of government agriculture expenditure in total government expenditure declined from 3.7 percent in 2003–2008 to 2.5 percent in 2014–2021. Furthermore, in 2014–2021 only four countries—Ethiopia, Malawi, Niger, and Sierra Leone—met or surpassed the CAADP target of allocating 10 percent of the national budget to agriculture. Thus, there is an urgent need to reverse these declining trends by raising the level and shares of government agriculture expenditures, while paying attention to the quality and composition of that spending, if governments are to rapidly increase agricultural growth and reduce rising poverty levels. Moreover, agriculture expenditures will need to be buttressed by good policies and institutions that create an enabling environment for private sector engagement and agricultural transformation.

Regarding implementation processes, the chapter shows that resource constraints at the continental, regional, and national levels have limited capacities for NAIP implementation. Concerted efforts will be required to overcome

these resource and capacity challenges to promote effective implementation of the next generation of NAIPs. Mutual accountability platforms, including the continental BR and national and regional JSRs, offer important opportunities to review progress in implementation of policies and strategies and to monitor their outcomes. The chapter shows that although most countries are not on-track to meet the Malabo Declaration commitments by 2025, countries' capacities to collect and report data for the BR have improved over time, and data systems can be further strengthened through targeted technical support. Due to resource constraints within continental institutions, BR-related activities have become the primary focus of their support in recent years. Yet, the BR has more to offer by evolving into a planning tool to support and boost implementation, rather than a mere performance scoring and comparison mechanism.

CHAPTER 10

Conclusion

Chakib Jenane, John M. Ulimwengu, and Getaw Tadesse

The 2022 Annual Trends and Outlook Report (ATOR) aims to generate evidence to guide the ongoing transformation of African food systems through well-concerted and targeted policy interventions in the agrifood processing sector. In line with this objective, the report brings together several studies that explore available and emerging evidence and knowledge in a wide range of policy areas related to the processing segment of agrifood value chains. Overall, the studies (1) confirm the emerging opportunities for agrifood industrialization in Africa, driven by increased urbanization and middle-income consumers who look for diversified diets and convenient foods; and (2) shed light on key areas where policymakers and partners should design policies and make investments that strengthen the sector and increase its capacity to provide healthy diets for all.

Expand Successful Industries and Best Practices

Encouraged by macroeconomic and socioeconomic changes, some promising policy and private sector practices have emerged in the African agrifood processing sector, though they remain insufficient and, in some instances, limited in scope. However, the emerging agrifood processing sector has created a favorable environment for linking smallholder farmers with markets and value chains. For example, the report points to millet and other crops for which the development of a processing sector has been key to increasing farmgate prices as well as expanding consumption (chapter 2). It also shows that the growth of emerging agrifood processing industries is generating opportunities to advance the long-overdue policy goal of commercializing smallholders, helping to fill the gap between markets and smallholder producers. Therefore, expanding and sustaining these processing industries will not only help to achieve the wider goal of industrialization and employment generation but also to integrate smallholder producers with regional and global value chains.

Policy actions should focus on consolidating and scaling best practices in emerging agrifood industries in many parts of Africa. These include Africa's fruit and vegetable processing sectors—tomato processing in Ghana and Nigeria, fruit juices across the continent, pineapple processing in Benin, and traditional vegetable processing in Kenya and Tanzania (chapter 3)—which have experienced some success but also face significant challenges that must be overcome to reach their potential. Studies of these sectors point to the need for policies aimed at promoting agrifood industrialization to focus on increasing the competitiveness of locally produced fruits and vegetables by expanding the adoption of varieties more suited to processing, improving production processes to increase the stability of supplies, and supporting institutional arrangements to organize smallholders into groups to facilitate coordination and generate economies of scale. Similarly, studies on meat production and processing illustrate the complexity of meat value chains and underline the need for context-specific policy interventions related to linkages between the live animal production sector and the meat sector and policies that promote the productivity, safety, and resilience of the livestock sector (chapter 4).

Strengthen the Transformation of Agrifood Processing Firms

Despite the growing opportunities in Africa's agrifood processing sector, its growth and transformation are sluggish. Therefore, while consolidating and scaling best practices is critical to widen and deepen the growth of the African agrifood processing industry, it is equally critical to revamp public and private actions in areas that are hampering the transformation of the informal sector and the growth and competitiveness of the formal firms. Of particular importance are (1) enhancing the productivity of small and informal firms, which are predominant in Africa's agrifood processing sector and have only limited access to external finance (chapter 5 and featured issue box 1); (2) accelerating the rate of firms' clustering, given the significant role that clusters play in facilitating access to markets, technology, inputs, and infrastructure (chapter 6); and (3) reversing and boosting the declining R&D investment and the low level of innovation in African agrifood processing firms (chapter 7).

Policies and investments to improve firms' performance should focus on enhancing firms' capacity and expanding institutional supports. More specifically, governments should focus on (1) strengthening research and training institutions to capitalize on the potential of clusters to promote processing sector growth and development; (2) expanding intra-African trade and redirecting demand for imported processed products toward local products that offer opportunities for growth; and (3) facilitating innovation by strengthening connections among firms and other innovation system actors through technology transfer agreements, skills development, contract farming, and the promotion of clustering. Expanding access to information and communication

technologies (ICT) is also critical to enable firms to interact with other actors; contribute to areas such as food safety, logistics, and traceability; and enable the development of new ICT-based products and services.

Revitalize Policies

The African agrifood processing sector has experienced a variety of policy failures associated with inappropriate and inadequate interventions. In many instances, public efforts related to the development of agro-parks (geographically targeted agricultural development initiatives) have failed because of poor targeting and provision of supportive services. Yet agro-parks have great potential to attract investment, create linkages among value chain actors, and facilitate the provision of services for investors and firms (chapter 8). The report emphasizes that governments should ensure that agro-park programs are fully aligned and integrated with their national development strategies, and should avoid investments based on vested interests and politicized decision-making. To prevent future failures, policy reforms are needed in the areas of effective design and management of infrastructure, provision of supportive services, strong private sector involvement at all stages, and consistent political support over time.

The other policy failure widespread in the processing sector is the poor alignment of public support services with emerging agribusiness potential. For instance, evidence presented in this report (chapters 6 and 7) suggests that women and informal entrepreneurs are by far more predominant and innovative than their male and formal counterparts in the processing sector; however, women and informal entrepreneurs benefit less from public services. In addition, the political commitment to support the private sector, specifically emerging small and informal agrifood processing and trading industries, is inadequate to carry them to the next stage of industrialization. African governments and development partners aspiring for agricultural transformation should streamline and intensify policy support for informal and small agrifood processing actors. Specific policy actions should include improving access to finance (featured issue box 1), resolving business obstacles (chapter 7), and enhancing technical and managerial skills (featured issue box 2).

The agrifood processing sector has enormous potential to enable food system transformation in Africa, to contribute to improved livelihoods as well as broader economic growth, and to help ensure wider availability of adequate and healthy diets. However, policymakers and other food system actors must work to address the constraints that continue to limit the sector's ability to reach its potential. In summary, urgent areas for policy action include (1) facilitating the transformation of informal agrifood processing enterprises; (2) boosting the competitiveness of the formal agrifood processing establishments; and (3) deepening the involvement of the private sector through the provision of supportive services such as human capital development, energy, and infrastructure and financial services.

ANNEXES

Core CAADP Monitoring & Evaluation and Supplementary Indicators

Annexes:
Core CAADP Monitoring & Evaluation and Supplementary Indicators

This section presents data and trends across three levels of the CAADP Results Framework as well as supplementary data and trends.[1]

The data are presented at the aggregate level for the entire continent (Africa); the five geographic regions of the African Union (central, eastern, northern, southern, and western); eight regional economic communities (CEN-SAD, COMESA, EAC, ECCAS, ECOWAS, IGAD, SADC, and UMA); [2] five economic categories defined by agricultural production potential, nonagricultural sources of growth, and income level; nine CAADP groups representing either the period during which countries signed a CAADP compact or the level of CAADP implementation reached by countries by the end of 2015; and four levels of progress for countries in formulating national agriculture investment plans (NAIPs). Data for individual countries and regional groupings are available at www.resakss.org.

Technical Notes to Annex Tables

1. To control for year-to-year fluctuations, moving averages are used. Therefore, the values under the column "2003" are averages over the years 2002 to 2004 and the values under the column "2021" are averages over the years 2020 to 2021.
2. Annual average level and annual average change for 2014–2021 include data from 2014 up to either 2021 or the most recent prior year that is measured and available.
3. Annual average level is the simple average over the years shown, inclusive of the years shown.
4. Annual average change for all indicators is annual average percent change, from the beginning to the end years, shown by fitting an exponential growth function to the data points (that is, "LOGEST" function in Excel).
5. For indicators for which there are only a few measured data points over the years specified in the range (such as poverty, which is measured once every three to five years or so), a straight-line method was used to obtain missing values for the individual years between any two measured data points. Otherwise, estimated annual average change based on the measured values is used to obtain missing values either preceding or following the measured data point. In cases where the missing values could not be interpolated, the data are reported as missing and excluded from the calculations for that time period. Any weights used for these indicators are adjusted to account for the missing data in the series.

1 Future Annual Trends and Outlook Reports (ATORs) will report on more of the CAADP Results Framework indicators as more data become available.

2 CEN-SAD is the Community of Sahel-Saharan States; COMESA is the Common Market for Eastern and Southern Africa; EAC is the East African Community; ECCAS is the Economic Community of Central African States; ECOWAS is the Economic Community of West African States; IGAD is the Intergovernmental Authority on Development; SADC is the Southern African Development Community; and UMA is the Union du Maghreb Arabe (Arab Maghreb Union).

6. Values for Africa, the regional aggregations (central, eastern, northern, southern, and western), economic aggregations (less favorable agriculture conditions, more favorable agriculture conditions, mineral-rich countries, lower middle-income countries, and upper middle-income countries), regional economic communities (CEN-SAD, COMESA, EAC, ECCAS, ECOWAS, IGAD, SADC, and UMA), CAADP groups (Compact 2007–2009, Compact 2010–2012, Compact 2013–2015, Compact not yet, Level 0, Level 1, Level 2, Level 3, and Level 4), and NAIP groups (NAIP00, NAIP10, NAIP01, and NAIP11) are calculated by weighted summation. The weights vary by indicator and are based on each country's proportion in the total value of the indicator used for the weighting measured at the respective aggregate level. Each country i's weight in region j (wij) is then multiplied by the country's data point (xi) and then summed for the relevant countries in the region to obtain the regional value (yj) according to: $yj = \Sigma i\ wijxi$.

The trend data are organized as follows:

Annex 1
Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development

Annex 2
Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth

Annex 3
Level 3— Strengthening Systemic Capacity to Deliver Results

Annex 4
Country Categories by Geographic Regions, Economic Classification, and Regional Economic Communities

Annex 5
Distribution of Countries by Year of Signing CAADP Compact and Level of CAADP Implementation Reached by End of 2015

Annex 6
Distribution of Countries in Formulating First-Generation Investment Plan (NAIP1.0) and Second-Generation Investment Plan (NAIP2.0) Reached by September of 2022

Annex 7
Supplementary Data Tables

ANNEX 1a: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.1.1

TABLE L1.1.1—GDP PER CAPITA (constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	1,533.0	1.4	1,644.2	1,777.7	3.2	1,962.8	0.7	1,998.1	-0.3	1,952.2
Central	721.9	-0.4	743.2	800.6	2.6	876.8	1.6	876.7	-1.5	836.1
Eastern	783.1	1.9	841.5	923.1	4.2	1,024.3	-0.8	1,071.2	1.2	1,092.8
Northern	2,756.0	2.5	3,034.6	3,330.6	3.7	3,661.2	0.1	3,825.2	1.1	3,874.7
Southern	2,553.6	0.9	2,671.9	2,891.3	3.6	3,163.5	1.0	3,068.2	-2.1	2,822.5
Western	1,208.4	1.7	1,348.8	1,462.8	3.2	1,754.1	3.2	1,888.4	-0.5	1,851.0
Less favorable agriculture conditions	451.4	1.3	488.4	525.0	2.4	569.0	0.6	591.1	0.5	592.8
More favorable agriculture conditions	406.0	1.8	438.1	485.5	4.5	603.3	3.7	749.7	2.7	801.4
Mineral-rich countries	934.6	1.5	998.1	1,080.0	3.7	1,118.5	-3.3	1,007.5	-1.3	955.3
Lower middle-income countries	1,806.4	2.0	1,979.8	2,147.9	3.4	2,500.3	2.2	2,667.4	-0.1	2,639.8
Upper middle-income countries	5,426.2	1.4	5,830.6	6,457.3	4.0	6,758.3	-0.6	6,426.9	-1.1	6,029.5
CEN-SAD	1,646.7	2.0	1,799.9	1,955.7	3.4	2,178.5	0.6	2,234.0	0.2	2,223.2
COMESA	1,302.5	1.4	1,362.2	1,467.4	3.3	1,567.1	-0.7	1,598.7	1.1	1,624.1
EAC	604.6	-0.4	611.5	672.6	4.7	812.2	1.2	890.7	1.4	920.0
ECCAS	863.7	0.5	919.4	1,038.7	5.1	1,203.0	1.7	1,174.8	-2.4	1,083.6
ECOWAS	1,208.4	1.7	1,348.8	1,462.8	3.2	1,754.1	3.2	1,888.4	-0.5	1,851.0
IGAD	847.0	1.9	910.7	1,000.0	4.4	1,095.8	-1.7	1,112.0	1.1	1,135.8
SADC	1,639.8	0.5	1,688.8	1,811.5	3.2	1,963.6	1.0	1,931.1	-1.7	1,797.5
UMA	3,002.4	2.3	3,330.9	3,683.0	3.4	3,871.4	-0.5	3,859.0	-0.2	3,695.2
CAADP Compact 2007-09 (CC1)	949.9	2.0	1,082.3	1,195.0	4.0	1,481.5	3.7	1,619.8	-0.3	1,596.8
CAADP Compact 2010-12 (CC2)	701.7	-0.1	703.5	745.7	2.6	847.3	2.5	984.1	1.7	1,020.6
CAADP Compact 2013-15 (CC3)	1,593.1	2.1	1,722.8	1,875.2	3.7	1,987.4	-0.6	1,819.2	-3.0	1,632.2
CAADP Compact not yet (CC0)	3,257.2	2.1	3,546.8	3,865.5	3.4	4,087.2	-0.8	4,021.7	0.3	3,977.7
CAADP Level 0 (CL0)	3,257.2	2.1	3,546.8	3,865.5	3.4	4,087.2	-0.8	4,021.7	0.3	3,977.7
CAADP Level 1 (CL1)	1,699.6	2.2	1,836.1	2,009.2	3.9	2,135.5	-0.7	1,916.9	-3.4	1,694.9
CAADP Level 2 (CL2)	601.5	-1.4	589.9	619.6	1.9	673.4	2.2	769.5	1.1	785.0
CAADP Level 3 (CL3)	528.2	1.8	568.3	604.4	2.9	709.8	2.5	768.1	0.4	769.4
CAADP Level 4 (CL4)	955.3	1.6	1,056.1	1,156.3	3.7	1,407.5	3.5	1,576.5	0.3	1,582.5
NAIP00 (N00)	3,676.2	1.7	4,012.3	4,408.1	3.8	4,674.0	-1.0	4,235.5	-2.0	3,907.3
NAIP01 (N01)	2,378.3	2.2	2,565.6	2,806.9	3.7	3,074.6	-0.2	3,190.9	1.3	3,251.8
NAIP10 (N10)	456.4	-3.9	409.8	434.7	2.5	490.5	2.7	556.4	0.7	564.6
NAIP11 (N11)	984.1	1.6	1,072.2	1,158.6	3.3	1,350.8	2.1	1,450.2	0.0	1,438.9

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: GDP = gross domestic product. Aggregate value for a group is the sum of real GDP for countries in the group divided by total population of countries in the group.

ANNEX 1b: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.1.2

TABLE L1.1.2—HOUSEHOLD CONSUMPTION EXPENDITURE PER CAPITA (constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	1,145.1	1.0	1,205.7	1,243.2	1.5	1,306.6	0.3	1,376.8	-0.1	1,349.1
Central	636.9	0.4	669.9	650.8	-3.2	512.4	1.1	563.1	-0.1	553.2
Eastern	785.3	0.1	779.8	820.2	2.0	767.4	-4.8	713.6	2.2	767.5
Northern	1,726.9	0.8	1,765.3	1,803.4	2.1	2,163.8	2.6	2,569.0	2.4	2,738.8
Southern	1,911.0	0.4	1,949.2	2,066.5	2.6	2,121.2	0.0	2,164.8	0.4	2,232.4
Western	733.8	3.2	895.4	953.2	3.3	1,231.7	4.2	1,391.2	-2.7	1,212.1
Less favorable agriculture conditions	366.4	0.6	390.1	396.0	1.6	435.8	2.3	502.8	1.3	516.7
More favorable agriculture conditions	390.5	1.4	411.6	431.3	2.2	465.9	0.2	522.0	2.6	564.5
Mineral-rich countries	1,215.0	0.0	1,199.1	1,188.1	-4.8	723.4	-4.3	577.6	-0.2	598.8
Lower middle-income countries	1,145.5	1.9	1,256.6	1,314.6	2.6	1,628.1	3.6	1,882.4	-0.2	1,827.3
Upper middle-income countries	3,279.6	-0.2	3,299.0	3,465.1	2.9	3,776.4	1.0	3,791.5	-1.6	3,493.6
CEN-SAD	1,105.2	1.7	1,200.8	1,258.6	2.8	1,503.1	2.2	1,634.7	-0.3	1,585.0
COMESA	1,355.1	0.6	1,362.1	1,370.5	0.1	1,211.6	-3.0	1,212.1	2.1	1,296.4
EAC	546.8	0.6	553.5	568.2	0.4	560.2	2.3	623.6	0.9	627.4
ECCAS	664.0	-0.4	682.0	662.3	-2.3	609.4	2.4	710.6	-1.1	673.4
ECOWAS	733.8	3.2	895.4	953.2	3.3	1,231.7	4.2	1,391.2	-2.7	1,212.1
IGAD	1,007.0	0.2	998.7	1,051.5	1.9	886.9	-8.6	745.9	2.7	823.9
SADC	1,415.0	0.1	1,428.1	1,451.6	-0.8	1,271.5	0.7	1,281.0	-1.0	1,225.4
UMA	1,603.7	-0.9	1,578.9	1,513.6	-0.4	1,689.4	1.8	1,934.7	0.9	1,942.6
CAADP Compact 2007-09 (CC1)	729.7	3.6	903.5	962.0	3.3	1,127.8	0.2	1,194.6	-2.3	1,056.8
CAADP Compact 2010-12 (CC2)	551.7	0.1	560.1	578.5	0.8	580.6	1.9	687.7	1.9	712.1
CAADP Compact 2013-15 (CC3)	1,042.9	-0.3	1,030.3	1,050.6	1.1	1,081.8	-1.1	1,053.9	0.0	1,072.3
CAADP Compact not yet (CC0)	2,053.0	0.8	2,112.8	2,215.0	2.7	2,531.6	1.3	2,740.7	1.1	2,798.4
CAADP Level 0 (CL0)	2,053.0	0.8	2,112.8	2,215.0	2.7	2,531.6	1.3	2,740.7	1.1	2,798.4
CAADP Level 1 (CL1)	1,107.5	-0.8	1,075.4	1,095.5	1.1	1,127.6	-1.4	1,077.1	-0.3	1,093.8
CAADP Level 2 (CL2)	653.7	1.5	694.9	687.9	-3.3	505.6	0.7	549.8	0.1	536.0
CAADP Level 3 (CL3)	382.0	1.1	403.6	424.3	2.3	497.5	2.7	524.9	-0.4	514.6
CAADP Level 4 (CL4)	719.3	2.8	851.9	905.9	3.2	1,061.0	0.9	1,164.8	-1.1	1,084.8
NAIP00 (N00)	2,189.2	0.0	2,207.2	2,285.2	1.6	2,403.9	-0.1	2,404.7	-1.1	2,266.6
NAIP01 (N01)	1,571.0	1.0	1,615.1	1,675.3	2.9	2,026.0	2.5	2,341.1	2.0	2,466.7
NAIP10 (N10)	771.6	-1.1	754.9	724.6	-8.0	379.4	0.6	399.5	-0.3	382.8
NAIP11 (N11)	744.0	1.9	832.2	877.8	2.7	980.6	0.3	1,038.9	-0.6	995.7

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: Aggregate value for a group is the sum of household consumption expenditure for countries in the group divided by total population of countries in the group.

ANNEX 1c: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.2.1

TABLE L1.2.1—PREVALENCE OF UNDERNOURISHMENT (% of population)

Region	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. level (2014-2020)	2020
Africa	21.3	19.6	-3.4	15.7	-3.8	15.6	3.5	17.4
Central	31.4	31.0	-0.8	28.5	-1.1	30.0	2.2	31.9
Eastern	34.5	30.6	-4.6	22.8	-5.8	21.9	4.6	24.8
Northern	6.1	5.9	-2.4	4.4	-6.0	4.1	2.6	4.5
Southern	23.4	22.2	-2.0	15.6	-7.5	14.2	2.4	15.4
Western	14.8	13.0	-5.0	11.1	-0.7	11.5	3.2	12.9
Less favorable agriculture conditions	25.5	24.1	-2.6	18.9	-3.9	18.4	3.5	20.9
More favorable agriculture conditions	34.2	30.3	-4.5	21.9	-6.1	20.8	4.8	24.0
Mineral-rich countries	33.2	32.7	-0.9	30.1	-1.6	29.7	1.2	30.9
Lower middle-income countries	14.4	12.8	-4.7	9.8	-4.1	9.9	3.7	11.0
Upper middle-income countries	4.9	5.1	2.2	5.6	1.5	7.1	4.5	7.9
CEN-SAD	15.0	13.6	-4.1	11.2	-2.6	11.6	3.4	12.8
COMESA	27.4	25.7	-2.8	20.7	-4.1	20.5	3.8	22.9
EAC	33.7	31.4	-2.9	28.4	-1.3	29.5	2.1	31.1
ECCAS	36.1	34.4	-2.2	27.9	-3.4	28.0	2.4	30.0
ECOWAS	14.8	13.0	-5.0	11.1	-0.7	11.5	3.2	12.9
IGAD	35.1	31.0	-4.6	20.9	-9.2	18.2	6.6	21.8
SADC	28.8	27.3	-2.1	23.7	-2.2	24.6	2.3	26.2
UMA	6.2	5.9	-2.6	4.4	-7.3	3.5	1.7	3.8
CAADP Compact 2007-09 (CC1)	20.7	18.3	-4.6	13.8	-4.5	13.4	5.6	16.0
CAADP Compact 2010-12 (CC2)	33.8	31.5	-2.9	27.2	-2.4	26.8	1.3	27.8
CAADP Compact 2013-15 (CC3)	31.3	28.5	-4.0	19.8	-6.7	19.9	4.0	22.0
CAADP Compact not yet (CC0)	5.7	5.7	-1.4	4.6	-3.9	4.8	3.1	5.2
CAADP Level 0 (CL0)	5.7	5.7	-1.4	4.6	-3.9	4.8	3.1	5.2
CAADP Level 1 (CL1)	33.5	31.0	-3.3	22.3	-6.3	22.5	4.0	25.0
CAADP Level 2 (CL2)	29.9	29.1	-1.6	27.4	0.1	29.4	1.9	31.1
CAADP Level 3 (CL3)	30.9	29.3	-2.2	22.2	-5.5	19.0	1.2	20.3
CAADP Level 4 (CL4)	23.9	20.9	-4.9	16.1	-4.4	15.6	4.1	17.6
NAIP00 (N00)	15.1	13.8	-3.5	8.4	-10.4	7.8	4.8	8.9
NAIP01 (N01)	11.7	11.6	-1.1	10.1	-1.7	12.0	4.3	13.4
NAIP10 (N10)	34.2	34.3	-0.3	34.4	0.8	36.9	1.7	39.0
NAIP11 (N11)	24.2	21.5	-4.5	16.4	-4.9	15.4	3.6	17.2

Source: ReSAKSS based on FAO (2022) and ILO (2022).
Note: Data are only available from 2000 to 2020.

ANNEX 1d: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.2.2A

TABLE L1.2.2A—PREVALENCE OF UNDERWEIGHT, WEIGHT FOR AGE (% of children under 5)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. change (%) (2014-2019)	2019
Africa	23.7	-1.2	22.4	21.6	-1.5	19.4	-2.2	17.6	-1.7	16.8
Central	27.1	-1.0	25.8	25.0	-1.5	23.1	-1.3	21.5	-1.6	20.7
Eastern	27.5	-1.4	25.6	24.8	-1.5	22.3	-2.1	20.0	-1.8	19.4
Northern	8.5	-1.5	8.2	7.0	-4.6	6.1	-1.6	5.3	-4.4	4.9
Southern	18.4	-1.5	17.2	15.8	-3.1	13.7	-2.6	11.5	-4.8	10.4
Western	27.4	-1.7	25.6	24.9	-1.0	22.5	-2.4	20.9	-0.8	20.0
Less favorable agriculture conditions	31.8	-1.4	30.2	29.6	-1.2	27.4	-0.5	26.6	-1.5	26.3
More favorable agriculture conditions	29.3	-2.0	26.4	24.8	-2.6	21.3	-2.8	17.9	-3.7	16.6
Mineral-rich countries	25.3	-0.1	25.0	24.6	-0.7	23.9	-0.6	23.3	-0.6	22.8
Lower middle-income countries	19.9	-1.3	19.0	18.3	-1.3	16.2	-3.1	14.7	-1.0	13.9
Upper middle-income countries	9.1	-1.4	8.5	8.3	0.4	7.6	-3.2	6.5	-1.4	6.4
CEN-SAD	22.5	-0.9	21.8	21.4	-0.6	19.9	-1.9	18.8	-0.4	18.3
COMESA	24.2	-0.9	23.1	22.3	-1.5	20.3	-1.7	18.3	-1.9	17.6
EAC	23.6	-1.9	21.4	20.7	-1.6	18.3	-2.7	16.3	-1.9	15.6
ECCAS	27.2	-1.6	25.4	24.1	-2.4	21.8	-1.9	19.7	-2.5	18.6
ECOWAS	27.4	-1.7	25.6	24.9	-1.0	22.5	-2.4	20.9	-0.8	20.0
IGAD	28.1	-1.2	26.4	25.8	-1.3	23.5	-1.7	21.4	-1.8	20.5
SADC	23.2	-1.4	21.6	20.4	-2.3	18.1	-2.3	16.1	-2.6	15.2
UMA	8.2	-0.8	8.2	6.7	-6.3	5.4	-3.4	4.5	-5.2	4.0
CAADP Compact 2007-09 (CC1)	31.6	-1.9	29.0	27.8	-1.8	24.6	-2.6	22.2	-1.6	21.0
CAADP Compact 2010-12 (CC2)	22.7	-1.6	20.9	20.1	-1.4	17.9	-2.4	15.9	-2.2	15.2
CAADP Compact 2013-15 (CC3)	22.7	-1.6	20.9	20.1	-1.4	17.9	-2.4	15.9	-2.2	15.2
CAADP Compact not yet (CC0)	10.1	-0.8	9.9	9.3	-1.5	8.5	-1.7	7.6	-1.8	7.4
CAADP Level 0 (CL0)	10.1	-0.8	9.9	9.3	-1.5	8.5	-1.7	7.6	-1.8	7.4
CAADP Level 1 (CL1)	25.4	0.0	25.6	24.9	-1.5	24.1	-0.8	23.2	-0.9	22.8
CAADP Level 2 (CL2)	25.4	-0.9	24.2	23.5	-1.5	21.8	-1.2	20.4	-1.8	19.4
CAADP Level 3 (CL3)	25.7	-1.6	23.9	22.8	-1.8	20.6	-1.6	18.7	-3.0	17.7
CAADP Level 4 (CL4)	27.8	-2.0	25.4	24.3	-1.6	21.2	-3.0	18.9	-1.6	17.9
NAIP00 (N00)	15.8	-0.8	15.4	14.3	-2.7	12.4	-3.2	10.6	-3.5	9.9
NAIP01 (N01)	15.0	-0.2	15.2	14.4	-2.2	13.3	-1.8	11.8	-1.7	11.5
NAIP10 (N10)	28.9	-1.0	27.3	26.3	-1.6	24.1	-1.6	22.3	-1.6	21.3
NAIP11 (N11)	26.2	-1.6	24.3	23.5	-1.4	21.1	-2.2	19.2	-1.6	18.3

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in population under 5 years for the region or group.

ANNEX 1e: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.2.2B

TABLE L1.2.2B—PREVALENCE OF STUNTING, HEIGHT FOR AGE (% of children under 5)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. change (%) (2014-2019)	2019
Africa	41.2	-1.1	39.5	38.3	-1.2	35.1	-2.0	32.2	-1.2	31.3
Central	45.0	-1.0	43.9	43.2	-0.7	41.1	-0.8	39.5	-0.8	38.8
Eastern	47.5	-1.4	44.7	43.1	-1.6	38.9	-2.1	34.9	-1.8	33.5
Northern	25.2	-2.9	23.0	22.4	2.0	20.5	-3.3	17.8	-3.4	16.6
Southern	43.0	-1.1	41.0	38.8	-2.2	35.5	-2.0	31.8	-2.4	30.3
Western	39.8	-0.9	38.3	37.4	-1.2	34.3	-2.0	32.6	0.0	32.3
Less favorable agriculture conditions	44.0	-0.6	42.5	42.4	-0.7	39.5	-0.9	38.4	-0.1	38.7
More favorable agriculture conditions	50.7	-1.7	47.3	44.9	-2.0	40.5	-2.3	35.2	-2.4	33.5
Mineral-rich countries	43.8	-0.8	42.7	42.2	-0.6	40.2	-0.6	38.7	-0.9	37.9
Lower middle-income countries	35.7	-1.1	34.2	33.3	-0.9	30.2	-2.7	27.8	-0.8	26.9
Upper middle-income countries	28.3	-0.8	27.3	26.5	-1.3	25.5	-0.5	24.3	-1.1	23.7
CEN-SAD	36.7	-1.0	35.3	34.9	-0.5	32.1	-2.0	30.2	-0.4	29.8
COMESA	44.1	-1.3	41.9	41.0	-0.6	37.7	-2.0	34.2	-1.5	33.1
EAC	45.3	-1.3	43.1	42.2	-1.1	39.0	-1.8	35.9	-1.4	34.6
ECCAS	46.5	-1.3	44.6	43.1	-1.6	40.4	-1.3	37.8	-1.6	36.4
ECOWAS	39.8	-0.9	38.3	37.4	-1.2	34.3	-2.0	32.6	0.0	32.3
IGAD	46.8	-1.4	43.9	42.4	-1.6	38.0	-2.0	34.2	-1.8	32.9
SADC	45.8	-1.2	43.8	42.1	-1.6	39.1	-1.8	35.7	-1.6	34.4
UMA	22.8	-1.3	21.5	19.5	-2.8	17.0	-2.4	14.9	-4.2	13.6
CAADP Compact 2007-09 (CC1)	46.7	-1.2	44.2	42.6	-1.7	38.3	-2.2	35.7	-0.4	35.1
CAADP Compact 2010-12 (CC2)	43.4	-1.3	41.3	40.2	-1.1	37.1	-1.8	33.8	-1.5	32.8
CAADP Compact 2013-15 (CC3)	43.4	-1.3	41.3	40.2	-1.1	37.1	-1.8	33.8	-1.5	32.8
CAADP Compact not yet (CC0)	26.7	-2.1	25.0	24.6	1.2	22.7	-2.4	20.4	-2.4	19.4
CAADP Level 0 (CL0)	26.7	-2.1	25.0	24.6	1.2	22.7	-2.4	20.4	-2.4	19.4
CAADP Level 1 (CL1)	43.3	-1.1	41.6	40.0	-2.0	37.3	-1.5	34.4	-2.2	32.9
CAADP Level 2 (CL2)	43.1	-1.0	42.1	41.6	-0.7	39.6	-0.7	38.0	-0.9	37.2
CAADP Level 3 (CL3)	44.7	-1.1	42.0	40.9	-1.3	37.6	-1.5	34.8	-1.6	33.7
CAADP Level 4 (CL4)	45.3	-1.3	42.9	41.3	-1.6	37.2	-2.4	33.9	-0.7	33.1
NAIP00 (N00)	32.7	-0.8	31.5	29.5	-2.8	26.4	-2.0	23.7	-3.3	22.1
NAIP01 (N01)	32.4	-2.1	30.6	30.4	1.3	28.4	-2.8	25.1	-2.1	24.1
NAIP10 (N10)	47.3	-1.1	45.9	45.2	-0.6	43.1	-0.8	41.3	-0.8	40.5
NAIP11 (N11)	43.8	-1.1	41.7	40.4	-1.5	36.7	-2.0	33.9	-0.9	33.0

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in population under 5 years for the region or group.

ANNEX 1f: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.2.2C

TABLE L1.2.2C—PREVALENCE OF WASTING, WEIGHT FOR HEIGHT (% of children under 5)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. change (%) (2014-2019)	2019
Africa	9.6	-1.1	9.1	8.8	-1.3	8.0	-2.0	7.2	-2.1	6.8
Central	11.2	-0.4	10.4	9.9	-2.2	8.5	-2.6	7.3	-3.0	6.9
Eastern	9.4	-0.9	9.0	8.9	-1.1	8.2	-1.7	7.5	-1.9	7.1
Northern	5.8	1.2	6.3	6.1	0.8	6.7	1.9	7.3	0.1	7.4
Southern	6.2	-2.1	5.7	5.4	-1.4	4.7	-1.5	4.0	-3.8	3.6
Western	12.3	-2.3	11.2	10.7	-1.6	9.4	-3.2	8.1	-2.4	7.5
Less favorable agriculture conditions	14.6	-2.6	13.4	12.5	-2.9	11.2	-1.5	10.0	-4.2	9.3
More favorable agriculture conditions	9.0	-1.9	8.3	8.0	-2.6	6.9	-2.1	6.0	-4.2	5.4
Mineral-rich countries	11.6	0.1	11.1	10.7	-1.4	9.8	-1.5	8.9	-1.8	8.6
Lower middle-income countries	9.0	-1.1	8.6	8.4	-0.3	7.7	-2.5	7.0	-0.7	6.7
Upper middle-income countries	4.5	-0.5	4.4	4.5	2.2	4.4	-2.5	4.0	-0.4	4.0
CEN-SAD	10.8	-1.2	10.3	10.1	-0.8	9.4	-2.0	8.7	-1.0	8.4
COMESA	9.1	-0.3	8.9	8.8	-0.6	8.2	-1.2	7.7	-1.8	7.3
EAC	8.4	-1.3	7.4	7.2	-1.2	6.2	-3.0	5.2	-2.9	4.9
ECCAS	10.4	-0.8	9.6	9.2	-2.0	7.8	-2.7	6.7	-2.8	6.3
ECOWAS	12.3	-2.3	11.2	10.7	-1.6	9.4	-3.2	8.1	-2.4	7.5
IGAD	10.0	-0.6	9.7	9.7	-0.6	9.1	-1.6	8.6	-1.4	8.2
SADC	8.2	-1.2	7.5	7.1	-2.1	6.1	-2.1	5.1	-4.0	4.7
UMA	6.0	1.4	6.7	5.6	-6.8	4.9	-0.6	4.6	-3.3	4.4
CAADP Compact 2007-09 (CC1)	12.0	-2.2	10.9	10.5	-1.9	9.2	-2.9	8.0	-3.4	7.2
CAADP Compact 2010-12 (CC2)	8.7	-1.5	7.9	7.6	-1.3	6.7	-2.6	5.7	-2.4	5.4
CAADP Compact 2013-15 (CC3)	8.7	-1.5	7.9	7.6	-1.3	6.7	-2.6	5.7	-2.4	5.4
CAADP Compact not yet (CC0)	6.4	0.4	6.7	6.5	0.5	6.6	0.0	6.7	-0.5	6.7
CAADP Level 0 (CL0)	6.4	0.4	6.7	6.5	0.5	6.6	0.0	6.7	-0.5	6.7
CAADP Level 1 (CL1)	10.3	0.4	10.7	10.6	-1.0	10.0	-0.5	9.8	0.1	9.8
CAADP Level 2 (CL2)	11.2	-0.4	10.3	9.7	-2.6	8.3	-2.6	7.0	-3.5	6.5
CAADP Level 3 (CL3)	9.2	-2.1	8.6	8.3	-2.0	7.5	-0.2	6.9	-4.3	6.4
CAADP Level 4 (CL4)	10.4	-2.2	9.4	9.1	-1.3	8.0	-3.4	6.8	-2.5	6.2
NAIP00 (N00)	7.5	-1.2	7.3	6.7	-1.2	5.8	-3.6	4.8	-3.2	4.5
NAIP01 (N01)	7.3	1.5	8.1	8.0	-0.1	8.3	0.8	8.7	0.5	8.9
NAIP10 (N10)	12.5	-0.3	11.2	10.5	-2.7	8.6	-3.3	6.9	-4.5	6.4
NAIP11 (N11)	10.1	-1.8	9.3	9.1	-1.3	8.2	-2.3	7.3	-2.3	6.8

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in population under 5 years for the region or group.

ANNEX 1g: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.2.3

TABLE L1.2.3—CEREAL IMPORT DEPENDENCY RATIO (%)

Region	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014–2018)	Annual avg. change (%) (2014–2018)	2018
Africa	25.1	25.6	1.2	26.7	0.3	27.2	-0.2	26.9
Central	30.5	29.8	-0.8	26.9	-4.2	23.1	0.3	23.4
Eastern	13.3	13.7	2.6	14.7	-3.4	15.7	3.4	16.2
Northern	44.0	45.9	3.8	50.4	0.3	55.4	1.8	56.5
Southern	25.0	26.0	-0.5	24.3	1.0	26.7	-1.8	25.2
Western	22.6	22.5	-0.7	24.6	3.3	23.0	-3.2	22.0
Less favorable agriculture conditions	10.3	10.8	0.8	10.6	1.5	12.4	2.9	12.7
More favorable agriculture conditions	13.4	13.4	-1.4	12.4	0.2	14.1	-0.2	13.7
Mineral-rich countries	23.0	19.6	-7.7	15.5	2.6	17.1	6.0	19.0
Lower middle-income countries	33.7	34.6	2.1	38.6	0.9	38.3	-0.9	37.8
Upper middle-income countries	16.9	19.0	3.1	19.7	6.1	27.9	3.1	27.6
CEN-SAD	25.8	26.7	2.6	30.6	1.9	31.6	0.0	31.6
COMESA	20.2	20.8	3.4	23.4	-1.3	24.9	2.6	25.8
EAC	13.8	16.4	6.2	18.8	-2.0	19.1	2.3	19.5
ECCAS	37.4	37.7	-0.2	33.3	-4.9	27.2	-0.4	27.1
ECOWAS	22.6	22.5	-0.7	24.6	3.3	23.0	-3.2	22.0
IGAD	13.4	13.7	3.6	15.5	-4.4	16.6	3.5	17.1
SADC	21.1	21.9	-0.6	20.1	0.2	20.8	-1.0	20.1
UMA	58.0	58.7	2.2	59.8	-0.1	65.4	0.7	65.0
CAADP Compact 2007-09 (CC1)	16.9	16.5	-1.1	18.4	2.9	17.9	-2.2	17.3
CAADP Compact 2010-12 (CC2)	22.3	22.9	0.3	22.7	-1.4	22.3	0.3	22.2
CAADP Compact 2013-15 (CC3)	22.3	22.9	0.3	22.7	-1.4	22.3	0.3	22.2
CAADP Compact not yet (CC0)	35.9	37.8	3.7	40.4	0.4	46.3	2.3	47.2
CAADP Level 0 (CL0)	35.9	37.8	3.7	40.4	0.4	46.3	2.3	47.2
CAADP Level 1 (CL1)	35.8	37.1	1.3	39.4	0.4	35.9	-3.0	34.1
CAADP Level 2 (CL2)	32.1	30.9	-0.8	27.0	-5.1	23.5	0.4	23.8
CAADP Level 3 (CL3)	15.1	14.7	-5.7	9.1	-4.4	9.6	11.6	11.5
CAADP Level 4 (CL4)	19.2	19.3	0.4	21.9	1.9	21.8	-2.2	20.9
NAIP00 (N00)	40.2	41.4	1.0	39.9	-0.6	41.1	-0.7	39.7
NAIP01 (N01)	32.0	33.8	4.9	38.4	1.1	43.8	3.2	45.7
NAIP10 (N10)	28.7	29.1	1.2	24.9	-9.0	19.2	1.1	19.5
NAIP11 (N11)	20.1	20.1	-0.2	21.5	1.2	21.3	-1.7	20.7

Source: ReSAKSS based on FAO (2022), World Bank (2022) and ILO (2022).

Note: Data are only available from 2000 to 2018. For regions or groups, level is weighted average, where weight is country's share in total population for the region or group.

ANNEX 1h: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.3.1A

TABLE L1.3.1A—EMPLOYMENT RATE (% of labor force, 15-64 years)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	92.2	0.0	92.4	93.0	0.3	93.4	-0.1	92.8	-0.2	92.1
Central	95.5	0.0	95.9	96.1	0.0	95.5	-0.1	95.2	-0.1	94.7
Eastern	95.1	0.0	95.3	95.5	0.1	95.7	0.0	95.5	-0.2	94.7
Northern	85.4	0.1	86.3	88.2	0.9	88.9	-0.5	88.7	0.2	88.7
Southern	84.6	-0.1	84.5	86.0	0.9	87.6	-0.1	86.4	-0.4	85.1
Western	95.7	-0.1	95.6	95.5	0.0	95.6	0.0	94.2	-0.4	93.1
Less favorable agriculture conditions	96.4	-0.2	95.7	95.3	-0.1	95.9	0.1	96.0	-0.1	95.7
More favorable agriculture conditions	96.5	0.0	96.7	96.9	0.1	97.1	0.1	97.2	-0.1	96.6
Mineral-rich countries	92.7	0.0	92.7	92.8	0.1	92.4	-0.2	91.4	-0.2	90.5
Lower middle-income countries	91.8	0.1	92.3	93.1	0.3	93.2	-0.2	92.2	-0.2	91.4
Upper middle-income countries	71.7	-0.4	70.9	74.0	1.9	77.2	-0.3	74.3	-1.1	71.3
CEN-SAD	93.4	0.0	93.3	93.4	0.1	93.4	-0.2	92.3	-0.2	91.6
COMESA	93.8	0.0	93.9	94.2	0.2	94.1	-0.1	93.9	-0.1	93.4
EAC	96.9	0.0	96.8	96.8	0.0	96.5	0.0	96.4	-0.2	95.6
ECCAS	95.9	0.0	96.2	96.3	0.0	95.5	-0.2	95.0	-0.1	94.4
ECOWAS	95.7	-0.1	95.6	95.5	0.0	95.6	0.0	94.2	-0.4	93.1
IGAD	94.4	0.0	94.6	94.9	0.1	94.9	0.0	94.5	-0.3	93.5
SADC	90.2	0.0	90.2	91.1	0.5	92.0	0.0	91.4	-0.2	90.6
UMA	81.0	0.4	83.6	86.7	1.2	88.8	-0.1	88.2	-0.3	86.8
CAADP Compact 2007-09 (CC1)	96.2	0.0	96.3	96.4	0.1	96.6	0.0	95.3	-0.4	94.2
CAADP Compact 2010-12 (CC2)	96.0	0.0	95.8	95.8	0.0	95.7	0.0	95.7	-0.2	95.0
CAADP Compact 2013-15 (CC3)	91.6	0.1	92.3	92.9	0.2	92.6	-0.1	92.2	-0.2	91.5
CAADP Compact not yet (CC0)	81.3	0.0	81.6	84.0	1.2	85.6	-0.4	84.3	-0.2	83.3
CAADP Level 0 (CL0)	81.3	0.0	81.6	84.0	1.2	85.6	-0.4	84.3	-0.2	83.3
CAADP Level 1 (CL1)	91.3	0.1	91.8	92.2	0.1	91.7	-0.1	91.3	-0.2	90.5
CAADP Level 2 (CL2)	95.4	0.1	95.8	96.0	0.0	95.5	-0.1	95.1	-0.1	94.5
CAADP Level 3 (CL3)	95.4	-0.2	94.6	94.7	0.2	95.7	0.2	95.8	-0.2	95.2
CAADP Level 4 (CL4)	96.2	0.0	96.3	96.4	0.0	96.5	0.0	95.6	-0.3	94.6
NAIP00 (N00)	75.8	0.1	76.9	80.5	1.8	83.6	-0.2	81.9	-0.6	80.0
NAIP01 (N01)	90.2	0.0	90.3	90.9	0.4	90.9	-0.4	91.0	0.3	91.2
NAIP10 (N10)	96.6	0.0	96.6	96.4	-0.1	95.5	-0.1	95.0	-0.1	94.4
NAIP11 (N11)	95.2	0.0	95.2	95.4	0.1	95.5	0.0	94.8	-0.3	93.9

Source: ReSAKSS based on ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in total labor force for the region or group.

ANNEX 1i: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.3.1B

TABLE L1.3.1B—EMPLOYMENT RATE (% of population, 15+ years)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	60.0	-0.1	59.8	60.3	0.3	59.8	-0.5	58.2	-0.6	56.6
Central	71.0	-0.1	70.9	70.4	-0.6	66.4	-0.9	64.5	-0.4	63.3
Eastern	70.0	0.2	70.7	71.1	0.1	71.0	-0.1	70.0	-0.6	68.1
Northern	40.0	-0.6	39.3	40.9	1.6	41.7	-0.6	39.2	-1.3	37.2
Southern	59.0	-0.2	58.7	59.5	0.7	59.3	-0.4	58.7	-0.6	56.9
Western	61.6	-0.2	61.2	60.9	-0.2	59.4	-1.1	55.8	-0.7	54.3
Less favorable agriculture conditions	68.0	-0.3	67.1	66.6	-0.2	66.1	-0.4	64.2	-0.4	63.0
More favorable agriculture conditions	76.9	0.1	77.5	77.7	0.0	76.8	-0.2	75.5	-0.5	73.6
Mineral-rich countries	62.1	0.0	62.0	61.7	-0.4	59.2	-0.8	57.4	-0.6	56.0
Lower middle-income countries	53.9	-0.2	53.6	54.3	0.5	53.9	-0.8	51.3	-0.8	49.7
Upper middle-income countries	40.2	-0.7	39.3	40.8	1.8	41.0	-0.8	39.9	-1.6	36.9
CEN-SAD	54.8	-0.3	54.2	54.6	0.3	54.0	-0.8	51.2	-0.8	49.7
COMESA	61.7	-0.1	61.5	62.2	0.4	62.2	-0.2	61.1	-0.6	59.4
EAC	74.0	0.0	74.1	73.9	-0.2	72.0	-0.4	70.8	-0.5	69.3
ECCAS	72.5	0.0	72.4	71.9	-0.4	68.5	-0.8	66.8	-0.4	65.6
ECOWAS	61.6	-0.2	61.2	60.9	-0.2	59.4	-1.1	55.8	-0.7	54.3
IGAD	65.5	0.2	66.3	66.7	0.2	66.8	0.0	66.0	-0.7	63.7
SADC	66.6	0.0	66.6	67.1	0.2	65.9	-0.5	65.1	-0.4	63.7
UMA	38.6	0.0	39.1	40.2	0.9	40.5	-0.3	38.9	-1.1	37.0
CAADP Compact 2007-09 (CC1)	66.5	0.1	66.8	67.0	0.1	66.1	-0.8	63.0	-0.7	61.1
CAADP Compact 2010-12 (CC2)	70.8	-0.1	70.6	70.2	-0.3	68.3	-0.5	66.9	-0.4	65.6
CAADP Compact 2013-15 (CC3)	65.4	0.0	65.6	65.9	0.0	64.5	-0.3	63.5	-0.5	62.0
CAADP Compact not yet (CC0)	40.5	-0.5	39.8	41.4	1.6	42.1	-0.6	40.0	-1.4	37.7
CAADP Level 0 (CL0)	40.5	-0.5	39.8	41.4	1.6	42.1	-0.6	40.0	-1.4	37.7
CAADP Level 1 (CL1)	63.2	0.0	63.2	63.3	0.0	62.6	-0.2	61.6	-0.6	60.0
CAADP Level 2 (CL2)	69.1	0.0	69.4	68.9	-0.5	65.0	-0.9	63.4	-0.4	62.3
CAADP Level 3 (CL3)	69.4	-0.2	68.8	68.7	0.0	68.5	-0.2	66.9	-0.5	65.5
CAADP Level 4 (CL4)	68.6	0.0	68.8	68.8	0.0	67.7	-0.7	65.0	-0.6	63.3
NAIP00 (N00)	41.2	-0.3	41.3	42.9	1.6	43.6	-0.3	43.1	-0.9	41.0
NAIP01 (N01)	47.9	-0.5	46.9	48.2	1.2	49.1	-0.4	46.8	-1.1	44.9
NAIP10 (N10)	69.5	0.0	69.5	68.6	-0.8	64.3	-1.1	62.5	-0.4	61.4
NAIP11 (N11)	67.3	0.0	67.4	67.5	0.0	66.4	-0.6	64.2	-0.6	62.5

Source: ReSAKSS based on ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in total population for the region or group.

ANNEX 1j: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.3.3

TABLE L1.3.3—POVERTY GAP AT $1.90/ DAY (2011 PPP) (%)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. change (%) (2014-2019)	2019
Africa	19.3	-2.6	17.2	16.1	-3.0	13.3	-3.4	11.0	-4.2	10.0
Central	25.1	-3.4	22.2	20.5	-3.4	16.8	-3.6	13.2	-5.4	11.8
Eastern	23.1	-2.3	20.0	18.9	-2.0	16.0	-3.2	13.5	-4.2	12.4
Northern	1.1	-4.6	0.9	0.8	-5.7	0.4	-12.0	0.3	-9.2	0.2
Southern	20.1	-0.9	19.1	18.5	-2.9	17.5	0.6	16.8	-1.4	16.5
Western	24.0	-3.6	20.8	18.9	-4.2	14.2	-5.6	10.3	-6.6	8.8
Less favorable agriculture conditions	34.7	-3.7	29.9	27.2	-4.5	19.3	-7.6	12.8	-5.2	11.3
More favorable agriculture conditions	27.9	-2.8	23.9	22.2	-2.3	18.5	-3.7	15.0	-5.6	13.3
Mineral-rich countries	33.0	-2.6	29.4	28.3	-3.2	22.7	-4.5	17.7	-5.1	15.9
Lower middle-income countries	12.8	-2.3	11.8	11.1	-3.2	9.5	-2.1	8.5	-2.1	8.1
Upper middle-income countries	10.3	-3.1	8.5	7.3	-9.2	5.4	0.8	3.9	-12.4	3.0
CEN-SAD	16.7	-3.1	14.8	13.7	-3.6	10.7	-4.9	8.2	-5.2	7.2
COMESA	15.5	-1.6	14.1	13.8	-0.8	12.5	-2.1	11.6	-2.1	11.1
EAC	25.6	-1.4	23.2	21.7	-2.7	18.2	-2.7	15.9	-2.6	15.1
ECCAS	23.7	-2.1	21.8	20.3	-3.4	17.9	-1.4	16.1	-2.4	15.4
ECOWAS	24.0	-3.6	20.8	18.9	-4.2	14.2	-5.6	10.3	-6.6	8.8
IGAD	18.6	-3.4	15.3	14.3	-2.0	11.3	-4.7	8.8	-6.9	7.5
SADC	23.8	-0.7	22.4	21.6	-2.2	20.3	-0.2	19.4	-1.4	19.0
UMA	1.6	-5.7	1.2	0.9	-9.5	0.5	-15.4	0.1	-38.2	0.0
CAADP Compact 2007-09 (CC1)	24.1	-3.8	20.4	18.6	-4.0	14.1	-5.5	10.3	-6.9	8.8
CAADP Compact 2010-12 (CC2)	25.5	-2.0	23.0	21.7	-2.4	18.3	-3.2	15.3	-3.8	14.1
CAADP Compact 2013-15 (CC3)	25.5	-2.0	23.0	21.7	-2.4	18.3	-3.2	15.3	-3.8	14.1
CAADP Compact not yet (CC0)	3.9	-3.4	3.2	2.8	-8.5	2.0	-1.5	1.4	-11.4	1.1
CAADP Level 0 (CL0)	3.9	-3.4	3.2	2.8	-8.5	2.0	-1.5	1.4	-11.4	1.1
CAADP Level 1 (CL1)	22.8	0.8	23.3	22.9	-0.6	23.9	1.4	25.1	1.2	25.8
CAADP Level 2 (CL2)	20.9	-4.5	17.7	15.8	-4.7	11.4	-6.3	7.1	-12.1	5.4
CAADP Level 3 (CL3)	30.6	-2.7	27.4	25.3	-3.6	19.2	-5.6	14.7	-3.6	13.5
CAADP Level 4 (CL4)	23.2	-3.1	20.1	18.6	-3.2	15.1	-3.9	12.0	-5.6	10.6
NAIP00 (N00)	11.7	-1.0	10.8	9.9	-6.0	9.3	4.0	9.6	-1.3	9.6
NAIP01 (N01)	6.1	0.8	6.3	6.4	0.9	6.6	0.2	7.1	1.4	7.2
NAIP10 (N10)	42.9	-3.6	37.1	33.2	-4.6	24.6	-6.3	17.4	-5.2	15.4
NAIP11 (N11)	24.1	-3.1	21.0	19.4	-3.3	15.5	-4.3	12.1	-5.3	10.7

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in total population for the region or group.

ANNEX 1k: Level 1—Agriculture's Contribution to Economic Growth and Inclusive Development, Indicator 1.3.4

TABLE L1.3.4—POVERTY HEADCOUNT RATIO AT $1.90/ DAY (2011 PPP, % of population)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2019)	Annual avg. change (%) (2014-2019)	2019
Africa	45.9	-1.5	42.9	41.1	-1.9	36.5	-2.1	33.3	-1.5	32.2
Central	57.6	-2.6	53.1	50.3	-2.4	43.6	-2.4	37.5	-3.3	35.2
Eastern	58.0	-1.6	52.8	50.7	-1.4	45.3	-2.1	41.1	-2.3	38.9
Northern	5.6	-4.2	4.9	4.3	-4.4	2.6	-11.6	1.7	-3.4	1.4
Southern	45.4	-0.4	44.3	43.0	-1.8	40.6	-0.2	40.1	-0.1	40.3
Western	54.4	-2.0	50.4	47.7	-2.5	41.0	-2.9	34.8	-3.7	31.5
Less favorable agriculture conditions	73.2	-2.3	66.6	63.1	-2.5	52.3	-3.8	43.6	-3.4	39.4
More favorable agriculture conditions	65.7	-1.9	59.3	56.3	-1.7	49.7	-2.5	43.6	-3.1	40.8
Mineral-rich countries	61.7	-0.3	61.6	60.3	-1.5	54.1	-2.0	48.3	-1.9	46.1
Lower middle-income countries	32.4	-1.3	31.2	30.1	-1.9	27.5	-1.3	26.6	0.5	26.9
Upper middle-income countries	29.6	-2.7	25.4	22.7	-6.9	17.6	-0.3	13.7	-8.5	11.5
CEN-SAD	39.0	-1.6	36.9	35.3	-2.1	31.0	-2.5	27.8	-1.4	26.6
COMESA	40.3	-1.1	38.0	37.2	-0.8	34.1	-1.8	32.2	-1.1	31.1
EAC	59.3	-0.7	56.4	54.6	-1.4	49.8	-1.3	47.1	-1.0	46.3
ECCAS	53.4	-1.5	50.9	48.9	-1.9	45.2	-0.9	42.5	-1.4	41.5
ECOWAS	54.4	-2.0	50.4	47.7	-2.5	41.0	-2.9	34.8	-3.7	31.5
IGAD	52.0	-2.2	45.9	43.7	-1.7	37.5	-3.0	32.5	-3.4	29.8
SADC	53.1	-0.4	51.5	50.3	-1.3	47.5	-0.6	46.6	-0.3	46.5
UMA	6.8	-5.5	5.2	4.2	-8.5	2.2	-16.5	0.5	-50.5	0.1
CAADP Compact 2007-09 (CC1)	57.6	-2.3	52.0	49.1	-2.7	41.7	-3.1	35.0	-3.9	31.9
CAADP Compact 2010-12 (CC2)	56.6	-1.0	53.9	52.1	-1.1	47.8	-1.6	44.5	-1.5	42.8
CAADP Compact 2013-15 (CC3)	56.6	-1.0	53.9	52.1	-1.1	47.8	-1.6	44.5	-1.5	42.8
CAADP Compact not yet (CC0)	13.0	-3.3	11.2	9.9	-6.1	7.2	-3.4	6.3	-3.1	5.1
CAADP Level 0 (CL0)	13.0	-3.3	11.2	9.9	-6.1	7.2	-3.4	6.3	-3.1	5.1
CAADP Level 1 (CL1)	51.5	0.6	52.7	52.5	-0.2	50.7	-1.2	51.8	1.3	53.5
CAADP Level 2 (CL2)	48.0	-3.1	43.5	40.2	-2.6	32.7	-3.6	27.3	-4.6	24.3
CAADP Level 3 (CL3)	66.5	-1.4	62.9	59.8	-2.2	51.1	-3.0	44.6	-2.3	42.1
CAADP Level 4 (CL4)	55.3	-1.8	50.7	48.4	-2.0	42.9	-2.3	37.7	-2.9	35.2
NAIP00 (N00)	31.6	-1.2	29.3	27.6	-4.0	25.6	1.8	26.2	-1.0	24.7
NAIP01 (N01)	16.3	-0.3	16.4	16.3	-0.1	15.6	-1.1	16.6	4.9	18.8
NAIP10 (N10)	71.8	-1.8	67.0	63.8	-2.0	56.7	-2.3	49.5	-2.6	46.9
NAIP11 (N11)	56.4	-1.8	52.1	49.6	-2.1	43.3	-2.6	38.1	-2.7	35.7

Source: ReSAKSS based on World Bank (2022) and ILO (2022).

Note: For regions or groups, level is weighted average, where weight is country's share in total population for the region or group.

ANNEX 2a: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.1

TABLE L2.1.1—AGRICULTURE VALUE ADDED (billion, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	204.7	4.4	246.6	257.9	2.8	313.8	2.1	382.3	3.3	424.4
Central	13.6	-4.5	11.3	13.3	6.2	17.8	4.5	22.3	3.1	24.8
Eastern	54.9	1.9	58.4	66.4	6.0	81.5	1.6	93.0	1.9	99.5
Northern	43.2	7.8	54.5	55.1	0.4	65.6	2.6	84.0	4.0	93.4
Southern	16.3	1.0	16.7	17.7	4.0	21.0	2.5	25.7	0.5	26.0
Western	76.7	6.6	105.7	105.5	1.5	127.9	1.8	157.3	4.4	180.7
Less favorable agriculture conditions	7.2	3.8	8.2	10.6	9.5	13.9	5.1	17.9	3.0	19.6
More favorable agriculture conditions	26.3	-0.9	26.7	32.5	8.5	50.1	5.8	68.3	5.4	80.2
Mineral-rich countries	34.8	2.5	36.8	39.9	4.7	42.5	-2.6	35.1	-5.9	29.1
Lower middle-income countries	127.5	6.2	164.0	164.8	1.1	196.8	2.2	248.1	4.2	281.6
Upper middle-income countries	8.9	3.2	10.9	10.1	0.1	10.5	-0.3	13.0	2.4	14.0
CEN-SAD	149.8	5.5	188.7	194.3	2.3	225.8	0.9	261.7	3.0	288.2
COMESA	92.7	2.1	98.5	106.5	3.9	123.8	0.9	140.7	2.6	153.6
EAC	28.3	-3.0	25.8	28.0	3.6	37.5	4.7	51.3	5.2	59.2
ECCAS	14.5	-4.1	12.5	14.5	5.9	19.4	4.7	24.8	3.3	27.6
ECOWAS	76.7	6.6	105.7	105.5	1.5	127.9	1.8	157.3	4.4	180.7
IGAD	45.4	2.7	48.4	55.3	6.4	66.7	0.8	71.9	1.2	76.2
SADC	29.9	-2.7	27.7	29.5	3.6	35.4	2.6	44.9	3.2	48.7
UMA	16.9	13.9	25.0	24.2	-2.2	29.6	5.7	41.6	3.2	44.4
CAADP Compact 2007-09 (CC1)	76.7	6.4	105.2	108.2	2.9	137.4	2.5	169.3	4.4	196.2
CAADP Compact 2010-12 (CC2)	40.7	-1.4	39.2	41.7	2.6	54.0	4.2	76.3	6.0	89.0
CAADP Compact 2013-15 (CC3)	37.4	3.6	40.7	45.7	5.2	48.3	-1.3	44.3	-5.4	37.0
CAADP Compact not yet (CC0)	49.9	6.8	61.4	62.4	1.1	74.1	2.1	92.4	3.5	102.1
CAADP Level 0 (CL0)	49.9	6.8	61.4	62.4	1.1	74.1	2.1	92.4	3.5	102.1
CAADP Level 1 (CL1)	34.6	3.6	37.5	42.4	5.5	44.2	-1.8	38.7	-6.7	30.7
CAADP Level 2 (CL2)	12.6	-4.6	10.6	10.8	1.5	13.8	4.0	19.0	5.4	21.9
CAADP Level 3 (CL3)	12.5	3.7	14.0	15.5	4.8	21.5	3.9	25.2	3.2	27.7
CAADP Level 4 (CL4)	95.1	4.8	123.1	126.8	2.6	160.2	2.8	206.9	5.0	242.0
NAIP00 (N00)	14.7	13.8	20.1	20.0	0.5	25.5	5.6	37.3	2.2	39.6
NAIP01 (N01)	42.3	3.8	48.5	51.7	2.5	60.8	1.4	71.8	3.6	79.7
NAIP10 (N10)	7.5	-9.5	4.9	5.0	3.0	7.0	3.6	9.1	5.0	10.5
NAIP11 (N11)	140.0	4.5	172.8	180.8	3.1	220.1	1.8	263.8	3.4	294.3

Source: ReSAKSS based on World Bank (2022) and FAO (2022).

Note: Aggregate value for a group is the sum of agriculture value added for countries in the group.

ANNEX 2b: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.2

TABLE L2.1.2—AGRICULTURAL PRODUCTION INDEX (API) (2014-2016 = 100)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	62.1	3.0	70.5	77.0	3.0	88.8	3.0	104.7	2.2	110.5
Central	53.2	0.6	55.5	60.2	3.4	83.6	7.3	104.7	2.3	110.6
Eastern	59.3	3.1	67.9	74.4	3.3	88.9	3.9	105.3	2.7	113.6
Northern	63.8	2.6	72.5	79.6	3.2	92.6	2.3	102.4	1.0	105.2
Southern	69.9	1.7	72.8	77.8	2.5	94.9	3.4	106.5	2.6	113.2
Western	62.0	3.6	71.5	78.4	3.0	86.4	2.4	105.2	2.5	111.0
Less favorable agriculture conditions	54.0	3.4	62.0	67.1	3.7	87.1	4.3	110.7	4.9	122.4
More favorable agriculture conditions	57.2	3.3	65.8	71.2	2.8	88.1	4.6	106.6	3.1	116.5
Mineral-rich countries	52.6	1.4	56.6	60.6	2.8	86.0	7.4	106.0	2.7	113.0
Lower middle-income countries	63.5	2.9	71.8	79.3	3.3	88.8	2.4	103.7	1.7	107.9
Upper middle-income countries	73.6	2.6	81.2	84.4	1.8	95.8	2.0	102.5	1.0	105.4
CEN-SAD	63.1	3.6	72.7	79.7	3.2	89.0	2.3	104.3	2.0	109.2
COMESA	66.0	3.0	74.4	80.6	2.9	91.9	2.5	103.7	1.8	109.5
EAC	61.0	2.8	69.2	74.7	2.7	89.6	4.7	104.5	2.3	112.8
ECCAS	51.8	1.7	56.7	62.1	3.8	86.8	6.5	104.7	2.2	110.2
ECOWAS	62.0	3.6	71.5	78.4	3.0	86.4	2.4	105.2	2.5	111.0
IGAD	59.8	3.2	68.8	75.5	3.0	88.5	3.6	105.5	2.8	114.3
SADC	62.6	1.7	66.5	71.2	2.8	90.2	4.9	105.4	2.3	112.0
UMA	57.4	1.5	65.1	70.2	1.2	88.3	4.8	105.1	2.2	110.5
CAADP Compact 2007-09 (CC1)	60.3	3.9	70.9	77.5	3.0	86.4	2.7	103.6	2.3	109.8
CAADP Compact 2010-12 (CC2)	59.7	2.6	66.0	72.1	3.0	88.5	4.6	105.1	3.0	117.7
CAADP Compact 2013-15 (CC3)	59.7	2.6	66.0	72.1	3.0	88.5	4.6	105.1	3.0	117.7
CAADP Compact not yet (CC0)	64.9	2.4	73.0	79.9	3.2	92.9	2.3	102.1	1.1	105.3
CAADP Level 0 (CL0)	64.9	2.4	73.0	79.9	3.2	92.9	2.3	102.5	1.0	105.3
CAADP Level 1 (CL1)	74.8	0.9	75.9	79.0	1.3	91.4	3.1	105.7	2.6	111.9
CAADP Level 2 (CL2)	52.2	0.6	54.1	59.2	3.4	83.0	7.5	104.7	2.3	110.9
CAADP Level 3 (CL3)	67.5	2.4	74.8	79.6	1.9	92.5	3.1	108.0	3.6	119.0
CAADP Level 4 (CL4)	59.6	3.8	69.7	76.6	3.2	86.5	3.0	105.1	2.4	111.4
NAIP00 (N00)	55.8	0.5	60.5	66.7	3.3	87.7	5.1	104.5	2.1	110.3
NAIP01 (N01)	67.2	3.3	76.9	83.3	2.9	94.7	1.6	101.7	0.6	103.5
NAIP10 (N10)	53.2	-0.8	51.9	52.7	0.6	81.1	10.9	104.5	1.9	109.4
NAIP11 (N11)	61.6	3.3	70.4	77.0	3.0	87.3	3.1	105.5	2.6	112.4

Source: ReSAKSS based on FAO (2022) and World Bank (2022).

Note: Data only available up to 2020. For regions or groups, level is weighted average, where weight is country's share in total agriculture value added for the region or group.

ANNEX 2c: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.3

TABLE L2.1.3—LABOR PRODUCTIVITY (agriculture value-added per agricultural worker, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	1,442.7	1.5	1,550.8	1,504.5	-0.4	1,629.8	1.2	1,800.4	1.2	1,880.8
Central	647.8	-6.6	488.2	521.7	1.9	591.8	3.1	669.6	1.2	704.3
Eastern	984.3	-1.3	922.1	980.0	3.6	1,078.2	-0.1	1,037.5	-1.3	1,011.3
Northern	3,986.7	3.6	4,267.7	4,048.2	-1.4	4,812.7	3.6	6,973.5	7.0	8,375.9
Southern	918.9	-2.1	807.4	801.9	1.3	857.2	0.9	918.2	-2.1	858.8
Western	2,147.1	4.4	2,780.3	2,516.6	-3.6	2,658.9	2.5	3,286.2	3.2	3,650.3
Less favorable agriculture conditions	616.8	1.0	633.4	719.5	2.1	723.2	3.1	814.5	0.4	827.8
More favorable agriculture conditions	461.1	-3.6	419.2	481.4	6.4	660.0	3.4	751.7	2.3	811.8
Mineral-rich countries	1,362.8	-0.5	1,289.6	1,329.3	3.3	1,387.9	-1.2	1,073.8	-8.7	806.7
Lower middle-income countries	2,826.9	3.2	3,231.6	2,916.6	-3.8	3,045.3	2.4	3,912.5	4.0	4,411.5
Upper middle-income countries	5,151.6	1.1	5,617.2	5,664.0	3.1	6,187.0	-1.8	5,924.3	-1.1	5,830.0
CEN-SAD	2,628.2	3.0	3,018.9	2,802.7	-2.6	2,841.0	1.7	3,314.5	2.1	3,559.5
COMESA	1,255.9	-1.1	1,157.1	1,170.3	1.5	1,233.5	-0.5	1,208.3	-0.1	1,220.1
EAC	702.7	-5.6	570.3	587.5	1.5	705.1	2.6	830.2	2.7	896.3
ECCAS	687.2	-6.5	513.7	547.9	1.8	644.1	4.1	770.6	0.2	783.1
ECOWAS	2,147.1	4.4	2,780.3	2,516.6	-3.6	2,658.9	2.5	3,286.2	3.2	3,650.3
IGAD	1,224.0	-0.8	1,132.2	1,190.6	3.7	1,302.9	-0.4	1,217.7	-1.6	1,187.4
SADC	699.5	-5.0	579.7	590.8	1.9	661.6	1.4	722.1	-0.6	700.6
UMA	3,005.5	5.4	3,480.9	3,445.6	-0.8	4,550.0	7.2	6,908.4	4.1	7,576.9
CAADP Compact 2007-09 (CC1)	1,395.2	3.4	1,734.3	1,622.3	-1.1	1,830.9	1.8	2,108.5	2.6	2,325.9
CAADP Compact 2010-12 (CC2)	745.9	-3.8	651.7	657.0	0.2	746.2	2.7	933.2	3.9	1,029.4
CAADP Compact 2013-15 (CC3)	1,898.2	0.4	1,753.5	1,765.8	0.5	1,609.9	-1.5	1,250.9	-9.7	896.0
CAADP Compact not yet (CC0)	4,144.0	3.3	4,438.7	4,260.9	-0.5	5,101.2	3.0	7,014.4	6.0	8,278.5
CAADP Level 0 (CL0)	4,144.0	3.3	4,438.7	4,260.9	-0.5	5,101.2	3.0	7,014.4	6.0	8,278.5
CAADP Level 1 (CL1)	2,427.5	-0.2	2,162.0	2,140.2	-0.5	1,822.5	-2.5	1,300.1	-11.7	861.0
CAADP Level 2 (CL2)	621.9	-7.0	465.4	457.8	0.4	542.4	3.0	688.1	3.7	756.1
CAADP Level 3 (CL3)	656.3	0.8	658.0	676.9	1.7	814.0	1.4	793.6	0.0	793.6
CAADP Level 4 (CL4)	1,255.8	2.2	1,486.8	1,414.3	-1.0	1,581.4	2.2	1,916.9	3.5	2,149.6
NAIP00 (N00)	5,214.8	-2.4	3,973.7	3,736.4	-1.9	4,196.9	3.0	4,996.4	-1.5	4,765.3
NAIP01 (N01)	3,273.1	1.4	3,277.8	3,037.9	-4.2	2,767.8	-0.9	2,779.5	1.2	2,875.4
NAIP10 (N10)	598.4	-11.9	342.1	339.7	1.5	420.3	1.9	486.6	3.4	537.1
NAIP11 (N11)	1,239.6	2.0	1,396.4	1,358.2	0.0	1,497.0	1.4	1,653.0	1.3	1,739.3

Source: ReSAKSS based on World Bank (2022).

ANNEX 2d: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.4

TABLE L2.1.4—LAND PRODUCTIVITY (agriculture value-added per hectare of arable land, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	205.2	3.1	236.7	244.1	2.3	297.8	3.1	369.7	3.2	409.7
Central	138.3	-4.5	115.6	134.8	6.1	164.7	2.5	196.5	2.7	216.4
Eastern	197.6	1.4	205.4	228.6	5.3	311.9	7.2	402.0	2.0	433.4
Northern	398.9	-0.4	391.9	395.0	0.3	468.0	2.6	598.7	3.9	665.1
Southern	55.9	0.6	56.5	59.2	3.7	69.1	2.2	83.5	0.3	84.2
Western	350.5	5.8	470.9	458.9	0.7	538.9	1.4	652.1	4.2	745.9
Less favorable agriculture conditions	54.0	3.3	60.7	75.7	8.3	99.2	5.1	126.0	2.9	137.5
More favorable agriculture conditions	149.9	-1.9	146.7	173.6	7.5	256.4	5.2	340.8	5.0	396.4
Mineral-rich countries	176.4	2.0	182.9	195.7	4.3	235.6	4.8	232.9	-5.7	195.3
Lower middle-income countries	390.6	3.8	473.6	471.4	0.7	551.7	1.8	683.4	4.0	772.2
Upper middle-income countries	52.5	2.1	60.5	56.2	0.2	58.4	-0.2	72.7	2.4	78.4
CEN-SAD	291.1	4.7	353.5	358.9	1.8	431.1	3.4	531.2	3.1	587.3
COMESA	280.4	1.0	281.2	299.5	3.4	372.1	4.9	463.7	2.6	508.6
EAC	277.2	-3.2	248.9	265.9	2.8	332.9	3.3	433.8	4.8	494.9
ECCAS	114.0	-3.6	99.4	114.6	5.6	147.7	4.0	187.5	1.9	200.5
ECOWAS	350.5	5.8	470.9	458.9	0.7	538.9	1.4	652.1	4.2	745.9
IGAD	223.8	2.4	234.3	261.4	5.7	372.2	9.0	481.8	1.4	518.2
SADC	82.1	-2.8	75.6	80.2	3.6	97.4	2.9	124.1	2.4	131.7
UMA	156.2	5.0	184.0	178.2	-2.2	216.7	5.6	304.9	3.2	325.1
CAADP Compact 2007-09 (CC1)	383.9	5.6	511.4	509.6	1.9	624.6	1.9	751.0	4.1	864.1
CAADP Compact 2010-12 (CC2)	158.5	-1.8	150.5	157.7	2.0	192.2	3.2	262.9	5.7	304.8
CAADP Compact 2013-15 (CC3)	122.3	3.0	130.5	144.4	4.7	167.2	3.7	172.3	-5.3	144.8
CAADP Compact not yet (CC0)	212.5	3.0	233.4	236.6	1.1	282.4	2.2	353.1	3.5	390.0
CAADP Level 0 (CL0)	212.5	3.0	233.4	236.6	1.1	282.4	2.2	353.1	3.5	390.0
CAADP Level 1 (CL1)	116.2	3.0	123.4	137.5	5.0	157.6	3.3	155.6	-6.7	124.4
CAADP Level 2 (CL2)	141.1	-4.6	118.2	120.7	1.5	139.4	1.8	181.3	5.1	207.1
CAADP Level 3 (CL3)	104.5	2.4	111.7	119.5	3.6	158.2	3.3	182.6	3.1	199.6
CAADP Level 4 (CL4)	371.6	4.4	473.3	478.0	1.8	583.2	2.4	736.2	4.7	854.0
NAIP00 (N00)	68.8	10.0	88.4	87.2	0.2	109.7	5.4	158.5	2.0	167.6
NAIP01 (N01)	257.1	2.3	273.0	290.1	2.5	341.3	1.3	401.5	3.6	445.0
NAIP10 (N10)	278.2	-9.4	180.9	187.6	2.8	201.1	-1.4	228.1	4.2	258.5
NAIP11 (N11)	234.9	4.0	284.0	291.3	2.4	363.0	3.9	455.1	3.3	508.2

Source: ReSAKSS based on World Bank (2022) and FAO (2022).

ANNEX 2e: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.5A

TABLE L2.1.5A—YIELD, CASSAVA (metric tons per hectare)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	8.6	1.0	8.9	9.3	1.8	9.0	-2.3	8.7	-0.4	8.5
Central	7.8	-0.2	7.6	7.8	1.3	8.1	0.3	8.3	0.1	8.3
Eastern	8.0	0.1	7.7	7.6	1.0	6.2	-3.2	5.4	0.8	5.6
Northern										
Southern	6.4	8.3	8.1	8.5	2.8	9.4	0.6	10.1	5.5	11.5
Western	10.1	-0.4	10.3	10.8	1.5	10.4	-4.5	9.6	-1.7	9.0
Less favorable agriculture conditions	7.1	7.1	8.3	7.4	-6.0	7.4	5.8	8.8	-1.7	8.4
More favorable agriculture conditions	7.5	3.0	7.7	7.6	0.6	6.9	-0.9	6.7	2.1	7.1
Mineral-rich countries	7.5	-0.4	7.4	7.3	-0.2	7.8	1.6	8.4	1.1	8.5
Lower middle-income countries	9.9	0.2	10.4	11.1	2.8	11.0	-5.2	9.7	-1.7	9.2
Upper middle-income countries	4.2	0.5	4.3	4.3	0.9	4.5	0.9	4.6	-0.1	4.6
CEN-SAD	9.8	-0.3	10.0	10.5	1.4	10.1	-4.2	9.4	-1.6	8.9
COMESA	8.1	2.4	8.6	8.7	-0.4	8.1	-0.8	8.1	-0.1	7.9
EAC	8.2	0.1	8.1	7.9	-0.2	7.3	-0.4	7.1	-0.1	7.1
ECCAS	7.6	1.9	8.3	8.7	2.4	9.1	-1.6	8.3	0.0	8.4
ECOWAS	10.1	-0.4	10.3	10.8	1.5	10.4	-4.5	9.6	-1.7	9.0
IGAD	10.3	9.2	12.8	12.1	-7.3	5.7	-12.2	3.8	0.0	3.8
SADC	7.3	1.3	7.5	7.8	2.7	8.2	0.3	8.4	2.3	8.9
UMA										
CAADP Compact 2007-09 (CC1)	10.3	-0.7	10.4	10.9	1.5	10.6	-4.4	9.9	-1.7	9.3
CAADP Compact 2010-12 (CC2)	7.4	1.4	7.5	7.4	0.0	7.1	0.4	7.4	1.4	7.6
CAADP Compact 2013-15 (CC3)	7.3	4.3	8.5	9.7	6.5	11.2	-2.5	9.4	0.7	9.8
CAADP Compact not yet (CC0)	7.1	0.7	7.3	7.3	-0.1	7.4	0.3	7.4	0.1	7.5
CAADP Level 0 (CL0)	7.1	0.7	7.3	7.3	-0.1	7.4	0.3	7.4	0.1	7.5
CAADP Level 1 (CL1)	6.9	6.5	8.9	9.6	4.6	10.7	-3.3	8.5	0.5	8.8
CAADP Level 2 (CL2)	7.8	-0.5	7.6	7.9	1.7	8.2	0.1	8.2	0.2	8.3
CAADP Level 3 (CL3)	8.2	5.3	9.1	8.6	-4.7	6.2	-3.1	6.4	1.0	6.1
CAADP Level 4 (CL4)	9.2	0.1	9.4	9.8	2.1	9.6	-2.6	9.4	-0.8	9.1
NAIP00 (N00)	7.0	11.9	10.8	11.7	5.6	13.0	-5.9	8.9	0.3	9.4
NAIP01 (N01)	6.6	0.5	6.1	6.8	4.4	7.2	0.7	7.4	0.3	7.5
NAIP10 (N10)	7.7	-0.1	7.7	7.6	-0.2	7.8	0.6	7.9	0.1	7.9
NAIP11 (N11)	9.1	0.4	9.2	9.6	1.7	9.2	-2.6	9.0	-0.6	8.7

Source: ReSAKSS based on FAO (2022).

Note: Data only available up to 2020. Cassava production data are not available in Northern Africa and UMA.

ANNEX 2f: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.5B

TABLE L2.1.5B—YIELD, YAMS (metric tons per hectare)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	10.0	-0.5	10.3	10.6	0.3	9.3	-5.4	8.5	-0.8	8.4
Central	7.4	0.1	7.2	7.7	3.4	8.3	-0.2	8.5	0.5	8.6
Eastern	4.4	0.3	4.3	4.2	0.8	4.1	-8.1	3.0	0.5	3.0
Northern	6.3	-0.1	6.3	6.3	0.0	6.3	-0.1	6.3	0.1	6.3
Southern										
Western	10.3	-0.6	10.5	10.8	0.2	9.4	-5.6	8.6	-0.9	8.4
Less favorable agriculture conditions	8.8	1.7	9.3	9.8	2.3	10.3	1.1	10.2	0.0	10.2
More favorable agriculture conditions	10.3	2.2	11.5	11.1	-0.1	12.1	0.4	12.3	0.0	12.3
Mineral-rich countries	5.1	-1.9	4.7	4.7	1.0	5.0	-1.6	4.9	2.1	5.1
Lower middle-income countries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upper middle-income countries	10.2	-0.8	10.4	10.8	0.2	9.3	-5.9	8.5	-0.9	8.3
CEN-SAD	10.1	-0.5	10.4	10.7	0.2	9.3	-5.5	8.5	-0.9	8.4
COMESA	4.6	-0.7	4.3	4.3	0.6	4.2	-6.0	3.3	0.4	3.4
EAC	5.3	0.5	5.4	5.6	-0.3	5.6	-2.4	4.5	-0.8	4.5
ECCAS	7.4	0.1	7.1	7.7	3.3	8.3	0.1	8.5	0.5	8.6
ECOWAS	10.3	-0.6	10.5	10.8	0.2	9.4	-5.6	8.6	-0.9	8.4
IGAD	4.4	0.3	4.3	4.2	0.7	3.9	-11.3	2.6	0.5	2.6
SADC	5.9	-5.6	4.5	4.5	0.1	4.5	-0.1	4.5	-0.2	4.5
UMA	6.3	-0.1	6.3	6.3	0.0	6.3	-0.1	6.3	0.1	6.3
CAADP Compact 2007-09 (CC1)	10.4	-0.4	10.8	11.3	0.8	10.0	-6.4	9.1	-0.8	8.9
CAADP Compact 2010-12 (CC2)	8.8	-1.2	8.4	8.1	-2.3	6.8	-1.5	6.1	-0.7	6.1
CAADP Compact 2013-15 (CC3)	5.8	0.9	5.8	6.4	4.0	6.8	-1.4	6.7	0.8	6.8
CAADP Compact not yet (CC0)	5.3	0.2	5.3	5.4	0.2	4.2	-14.3	2.6	0.1	2.6
CAADP Level 0 (CL0)	5.3	0.2	5.3	5.4	0.2	4.2	-14.3	2.6	0.1	2.6
CAADP Level 1 (CL1)	5.2	-0.1	5.2	5.3	1.4	5.3	-1.5	5.1	0.1	5.1
CAADP Level 2 (CL2)	7.3	-0.6	6.8	7.5	4.7	8.6	0.0	8.8	1.1	9.0
CAADP Level 3 (CL3)	10.0	3.2	10.6	10.7	0.6	9.9	-3.4	9.3	1.4	9.3
CAADP Level 4 (CL4)	10.2	-0.6	10.5	10.8	0.2	9.4	-5.6	8.6	-1.2	8.4
NAIP00 (N00)										
NAIP01 (N01)	8.4	0.4	8.5	8.6	0.5	8.3	-1.0	8.1	0.0	8.1
NAIP10 (N10)	6.5	-1.2	6.1	6.3	1.4	6.8	0.7	7.1	0.2	7.2
NAIP11 (N11)	10.1	-0.5	10.4	10.7	0.3	9.3	-5.5	8.6	-0.9	8.4

Source: ReSAKSS based on FAO (2022).

Note: Data only available up to 2020. Yam production data are not available for Southern Africa.

ANNEX 2g: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.5C

TABLE L2.1.5C—YIELD, MAIZE (metric tons per hectare)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	1.7	1.5	1.7	1.7	2.2	2.0	0.6	2.0	0.9	2.1
Central	1.1	0.3	1.1	1.1	1.6	1.1	-0.9	1.1	-0.1	1.1
Eastern	1.6	0.2	1.6	1.5	4.5	1.8	3.7	2.2	3.2	2.3
Northern	5.5	3.6	6.1	6.3	0.8	6.5	1.4	6.1	-6.1	4.8
Southern	1.6	2.0	1.6	1.7	2.2	2.2	2.9	2.2	1.4	2.3
Western	1.4	1.9	1.5	1.6	2.0	1.7	-2.6	1.7	1.2	1.7
Less favorable agriculture conditions	1.1	0.4	1.2	1.3	2.4	1.8	2.5	2.0	3.1	2.1
More favorable agriculture conditions	1.4	0.2	1.3	1.3	5.5	1.7	3.7	1.9	1.8	2.0
Mineral-rich countries	0.9	0.9	0.9	0.9	0.0	0.9	-1.1	0.9	0.6	0.9
Lower middle-income countries	1.8	1.9	1.9	1.9	0.2	2.0	-0.2	1.9	-0.7	1.9
Upper middle-income countries	2.4	5.1	2.8	3.3	6.7	4.5	0.3	4.9	4.1	5.2
CEN-SAD	1.9	2.3	2.0	2.1	0.6	2.1	-2.1	2.0	-0.5	1.9
COMESA	1.8	0.7	1.8	1.9	1.8	2.2	3.4	2.3	1.0	2.4
EAC	1.6	-0.6	1.5	1.4	4.3	1.6	2.2	1.8	0.4	1.8
ECCAS	0.9	0.5	0.9	1.0	1.3	1.1	1.6	1.1	-0.4	1.1
ECOWAS	1.4	1.9	1.5	1.6	2.0	1.7	-2.6	1.7	1.2	1.7
IGAD	1.6	1.3	1.6	1.7	2.4	2.1	4.4	2.6	4.7	2.8
SADC	1.5	1.1	1.5	1.5	3.0	1.8	1.6	1.9	1.2	1.9
UMA	0.6	2.9	0.8	0.7	-1.9	0.8	-1.1	0.8	-3.6	0.6
CAADP Compact 2007-09 (CC1)	1.4	1.4	1.5	1.6	3.7	1.8	-0.2	2.0	2.1	2.1
CAADP Compact 2010-12 (CC2)	1.4	-0.2	1.3	1.3	3.3	1.5	2.2	1.6	0.1	1.6
CAADP Compact 2013-15 (CC3)	1.0	0.0	1.0	1.0	-3.2	1.1	5.9	1.2	1.8	1.3
CAADP Compact not yet (CC0)	3.0	4.6	3.5	4.0	5.8	4.9	-0.8	5.0	0.8	4.8
CAADP Level 0 (CL0)	3.0	4.6	3.5	4.0	5.8	4.9	-0.8	5.0	0.8	4.8
CAADP Level 1 (CL1)	0.9	-1.5	0.8	0.8	-6.0	0.9	8.9	1.1	2.8	1.1
CAADP Level 2 (CL2)	1.1	1.3	1.1	1.1	0.9	1.1	-1.5	1.1	0.4	1.1
CAADP Level 3 (CL3)	1.4	1.5	1.5	1.6	3.2	2.1	1.8	2.3	0.6	2.4
CAADP Level 4 (CL4)	1.4	0.4	1.4	1.5	3.9	1.7	1.5	1.8	1.2	1.8
NAIP00 (N00)	2.0	4.4	2.3	2.5	4.6	3.2	-0.1	3.0	1.8	3.2
NAIP01 (N01)	4.3	3.2	4.8	4.8	-1.0	4.7	0.8	4.5	-4.6	3.9
NAIP10 (N10)	0.8	-0.9	0.8	0.8	-0.5	0.8	0.0	0.8	-0.2	0.8
NAIP11 (N11)	1.4	0.5	1.4	1.4	2.9	1.7	1.9	1.8	1.5	1.9

Source: ReSAKSS based on FAO (2022).
Note: Data only available up to 2020.

ANNEX 2h: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.5D

TABLE L2.1.5D—YIELD, MEAT (cattle, kilograms per head)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014–2020)	Annual avg. change (%) (2014–2020)	2020
Africa	146.1	0.7	153.3	157.5	0.9	158.1	-0.5	155.8	-0.7	153.4
Central	134.4	-0.2	133.0	132.4	0.0	127.8	-0.9	124.6	-0.4	123.6
Eastern	115.8	1.1	125.5	130.0	1.0	128.1	-1.1	124.8	-1.1	122.1
Northern	191.7	3.0	223.6	228.6	1.7	237.0	-0.1	250.2	0.0	240.7
Southern	223.4	-0.3	218.5	230.1	1.2	236.8	0.2	241.6	0.6	248.0
Western	128.4	0.3	129.8	130.0	0.1	127.9	-0.4	123.5	-0.6	123.3
Less favorable agriculture conditions	123.4	1.1	127.6	127.4	-0.3	124.0	-0.3	123.3	-0.1	122.9
More favorable agriculture conditions	114.2	-0.5	111.2	112.5	0.5	113.2	0.0	118.5	2.3	125.5
Mineral-rich countries	121.6	1.3	127.1	126.9	0.1	130.1	0.1	130.6	0.6	133.3
Lower middle-income countries	157.0	2.1	179.0	186.4	1.5	184.1	-1.4	172.9	-3.3	157.8
Upper middle-income countries	244.9	-0.5	240.9	258.8	1.6	285.6	1.4	298.2	1.4	316.2
CEN-SAD	136.1	1.7	150.7	154.9	1.2	154.7	-1.1	145.2	-2.4	136.5
COMESA	136.5	1.7	152.3	157.2	1.2	157.7	-1.2	145.1	-2.9	134.8
EAC	122.9	1.7	142.4	152.4	2.0	147.6	-1.8	141.7	-1.8	136.8
ECCAS	139.9	0.2	138.3	135.7	-0.4	130.3	-0.8	126.9	-0.5	125.5
ECOWAS	128.4	0.3	129.8	130.0	0.1	127.9	-0.4	123.5	-0.6	123.3
IGAD	118.2	1.7	132.4	138.2	1.2	137.0	-1.3	125.6	-3.4	115.9
SADC	181.2	-0.2	178.5	186.0	1.0	188.8	0.1	200.0	1.9	211.1
UMA	180.5	1.1	184.4	185.6	0.8	189.4	0.9	218.0	0.5	207.5
CAADP Compact 2007-09 (CC1)	123.5	0.2	124.4	124.7	0.0	120.8	-0.8	117.2	-0.9	115.9
CAADP Compact 2010-12 (CC2)	125.4	0.8	135.8	141.9	1.5	142.3	-0.7	139.5	-1.1	136.7
CAADP Compact 2013-15 (CC3)	131.9	1.1	135.0	133.3	-0.4	127.7	-1.6	121.2	-0.4	119.9
CAADP Compact not yet (CC0)	206.6	1.2	222.2	232.9	1.7	245.9	0.1	251.3	0.4	252.5
CAADP Level 0 (CL0)	206.6	1.2	222.2	232.9	1.7	245.9	0.1	251.3	0.4	252.5
CAADP Level 1 (CL1)	131.2	1.3	134.8	133.0	-0.4	129.1	-1.2	123.7	-0.2	123.0
CAADP Level 2 (CL2)	136.6	-0.7	133.0	131.3	-0.1	128.5	-0.3	129.9	0.2	130.6
CAADP Level 3 (CL3)	147.2	2.7	160.2	162.2	0.4	161.3	-0.5	157.4	-0.1	158.6
CAADP Level 4 (CL4)	119.3	0.4	125.5	129.9	1.2	127.5	-1.2	123.2	-1.5	119.5
NAIP00 (N00)	213.7	-0.1	213.7	225.9	1.4	243.5	1.0	257.2	1.5	270.6
NAIP01 (N01)	165.0	1.8	182.3	182.4	0.7	184.4	-0.4	180.4	-1.3	171.3
NAIP10 (N10)	163.7	0.0	162.7	160.6	0.2	164.0	0.5	167.8	0.5	170.8
NAIP11 (N11)	124.4	0.8	130.5	133.5	0.7	131.4	-1.0	127.1	-0.9	125.0

Source: ReSAKSS based on FAO (2022).
Note: Data only available up to 2020.

ANNEX 2i: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.1.5E

TABLE L2.1.5E—YIELD, MILK (whole fresh cow, kilograms per head)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	516.9	1.5	553.2	545.5	-0.6	532.6	0.3	546.4	2.4	589.0
Central	339.2	-0.9	328.0	329.3	0.5	335.2	1.1	340.9	-0.8	333.6
Eastern	378.9	2.8	436.6	409.2	-2.5	377.7	-0.5	392.4	4.1	439.7
Northern	1,104.5	5.0	1,302.2	1,510.4	5.4	1,824.9	2.7	1,855.4	1.7	1,994.4
Southern	1,325.9	-1.1	1,336.7	1,402.6	0.9	1,420.0	1.4	1,502.8	0.8	1,539.9
Western	225.1	-0.9	217.2	228.5	2.9	238.8	-0.6	241.1	-0.1	241.3
Less favorable agriculture conditions	283.0	-1.7	260.9	274.9	2.7	279.5	-1.1	279.1	0.0	277.3
More favorable agriculture conditions	303.9	4.7	401.3	382.3	-2.5	330.3	-0.8	361.8	6.8	436.7
Mineral-rich countries	465.4	-1.7	431.6	392.2	-2.1	383.8	0.0	363.2	-1.5	348.5
Lower middle-income countries	651.2	4.6	762.0	810.6	2.1	914.0	1.2	945.5	2.5	1,030.8
Upper middle-income countries	2,292.6	-1.8	2,280.9	2,432.5	0.5	2,331.8	1.6	2,658.7	1.7	2,763.5
CEN-SAD	473.9	1.2	489.3	483.0	0.2	515.8	1.5	545.2	2.2	582.0
COMESA	483.8	2.5	548.9	528.8	-1.5	497.5	0.0	532.8	5.6	621.8
EAC	389.7	3.1	433.3	422.0	-1.8	419.1	-0.2	433.3	2.0	455.5
ECCAS	394.1	-0.4	384.2	385.7	0.4	399.0	1.8	394.1	-0.6	389.0
ECOWAS	225.1	-0.9	217.2	228.5	2.9	238.8	-0.6	241.1	-0.1	241.3
IGAD	417.2	2.7	482.7	448.5	-2.7	403.3	-1.2	405.8	3.9	452.7
SADC	668.1	-0.7	641.5	631.5	-1.2	622.0	1.4	695.2	2.5	744.5
UMA	1,066.9	5.4	1,240.8	1,415.9	5.8	1,804.9	4.6	1,854.5	-1.0	1,842.6
CAADP Compact 2007-09 (CC1)	279.4	6.1	410.0	391.8	-2.4	316.7	-2.7	323.4	7.5	402.3
CAADP Compact 2010-12 (CC2)	394.4	2.2	425.9	414.4	-1.4	419.5	0.8	457.0	3.3	498.6
CAADP Compact 2013-15 (CC3)	426.3	-0.4	413.5	381.2	-1.9	375.0	0.5	370.7	0.4	374.6
CAADP Compact not yet (CC0)	1,210.0	2.0	1,300.4	1,460.4	3.7	1,375.9	-7.6	1,053.3	-0.4	1,055.3
CAADP Level 0 (CL0)	1,210.0	2.0	1,300.4	1,460.4	3.7	1,375.9	-7.6	1,053.3	-0.4	1,055.3
CAADP Level 1 (CL1)	421.2	-0.3	409.5	377.1	-1.9	369.8	0.4	364.4	0.5	368.3
CAADP Level 2 (CL2)	331.0	-0.5	321.8	322.7	0.7	337.0	1.3	340.7	-0.2	343.3
CAADP Level 3 (CL3)	427.6	-1.2	406.3	408.5	0.8	403.3	-0.6	407.8	-0.3	393.8
CAADP Level 4 (CL4)	334.5	5.1	434.9	415.3	-2.9	368.8	-0.8	400.3	7.0	487.7
NAIP00 (N00)	1,322.8	1.3	1,424.3	1,606.2	3.3	1,818.1	3.1	1,846.3	-0.6	1,849.4
NAIP01 (N01)	757.9	3.6	855.7	933.4	3.1	1,030.2	1.0	1,091.2	3.5	1,211.5
NAIP10 (N10)	286.5	0.0	281.6	281.9	0.5	289.3	0.5	276.9	-0.2	275.9
NAIP11 (N11)	378.3	2.2	423.0	399.8	-2.0	373.2	-0.6	383.3	3.2	420.0

Source: ReSAKSS based on FAO (2022).
Note: Data only available up to 2020.

ANNEX 2j: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.2.1A

TABLE L2.2.1A—INTRA-AFRICAN AGRICULTURAL TRADE, EXPORTS (billion, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	5.0	4.8	5.7	6.3	8.0	11.1	8.6	14.1	1.5	14.4
Central	0.1	0.6	0.2	0.2	0.6	0.2	-3.2	0.2	0.1	0.2
Eastern	1.1	2.7	1.3	1.4	9.6	2.1	6.8	3.2	9.8	4.1
Northern	0.5	8.0	0.7	1.1	17.7	2.0	5.3	2.5	4.3	2.8
Southern	2.4	4.6	2.5	2.5	4.8	5.0	13.0	6.1	-5.7	5.0
Western	0.8	7.0	1.0	1.1	6.0	1.8	4.4	2.1	4.4	2.4
Less favorable agriculture conditions	0.2	3.1	0.2	0.2	14.3	0.3	-9.0	0.3	5.0	0.3
More favorable agriculture conditions	0.5	8.1	0.8	1.0	12.1	1.7	9.5	2.4	6.2	2.8
Mineral-rich countries	0.3	6.9	0.4	0.5	3.4	0.7	10.8	1.2	13.8	1.7
Lower middle-income countries	2.5	5.7	2.8	3.2	8.1	4.9	5.4	6.1	3.7	6.8
Upper middle-income countries	1.4	1.8	1.4	1.4	5.5	3.5	14.4	4.1	-12.3	2.7
CEN-SAD	2.1	5.0	2.5	2.9	9.3	4.7	3.3	5.7	6.1	6.7
COMESA	2.3	7.4	2.7	3.1	8.7	4.7	6.9	6.2	5.6	7.3
EAC	3.1	5.5	3.7	4.3	9.4	6.5	6.0	8.4	5.5	9.8
ECCAS	1.0	1.0	1.3	1.5	9.9	2.0	3.3	2.6	5.0	2.9
ECOWAS	1.0	5.6	1.2	1.4	5.7	2.1	3.8	2.4	4.2	2.7
IGAD	1.7	5.3	2.0	2.2	7.7	3.2	3.6	4.3	8.0	5.3
SADC	3.0	3.4	3.4	3.6	6.7	6.6	10.4	8.5	-0.5	8.2
UMA	3.3	4.9	3.7	4.0	8.3	7.6	11.0	9.7	-0.8	9.3
CAADP Compact 2007-09 (CC1)	0.4	5.3	0.6	0.6	10.1	1.2	6.6	1.4	5.3	1.6
CAADP Compact 2010-12 (CC2)	1.9	4.1	2.3	2.8	8.1	3.8	5.2	4.8	3.9	5.5
CAADP Compact 2013-15 (CC3)	0.8	6.3	0.8	0.7	-1.7	0.8	12.9	1.6	11.8	2.1
CAADP Compact not yet (CC0)	1.8	4.4	2.0	2.3	10.1	5.3	11.1	6.2	-4.6	5.1
CAADP Level 0 (CL0)	1.8	4.4	2.0	2.3	10.1	5.3	11.1	6.2	-4.6	5.1
CAADP Level 1 (CL1)	1.0	6.4	1.0	0.8	-1.5	1.0	9.3	1.9	11.6	2.5
CAADP Level 2 (CL2)	0.2	-7.2	0.2	0.3	8.6	0.4	3.6	0.4	1.2	0.4
CAADP Level 3 (CL3)	0.4	9.7	0.6	0.9	15.8	1.3	6.0	1.8	2.9	1.9
CAADP Level 4 (CL4)	1.5	4.6	1.8	2.0	6.5	3.1	6.4	3.7	4.7	4.5
NAIP00 (N00)	1.4	1.3	1.4	1.4	5.8	3.5	14.6	4.2	-12.1	2.8
NAIP01 (N01)	0.5	13.9	0.7	1.1	15.5	1.9	5.0	2.3	4.2	2.6
NAIP10 (N10)	0.3	3.5	0.3	0.3	-1.9	0.3	-2.8	0.4	6.6	0.5
NAIP11 (N11)	2.8	5.1	3.3	3.5	7.7	5.4	7.1	7.2	5.8	8.5

Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

Note: Aggregate value for a group is the sum of intra-African agricultural exports for countries in the group. The values of intra-African agricultural exports and imports for Africa as a whole are expected to be equal. However, Tables TL2.2.1A and TL2.2.1B show differing values due to differences in commodities categorized as agricultural by different countries, year of shipment of exports and arrival of imports, treatment of the origin of export versus shipment, and valuation of exports and imports (for details see UNCTAD: https://unctadstat.unctad.org/EN/FAQ.html).

ANNEX 2k: Level 2—Agricultural Transformation and Sustained Inclusive Agricultural Growth, Indicator 2.2.1B

TABLE L2.2.1B—INTRA-AFRICAN AGRICULTURAL TRADE, IMPORTS (billion, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	5.5	10.2	7.7	8.1	3.1	12.0	5.6	15.0	4.5	16.5
Central	0.5	1.3	0.7	0.9	7.2	1.2	5.6	1.1	-5.2	0.9
Eastern	0.9	10.3	1.3	1.4	3.3	2.0	5.0	2.6	6.9	3.0
Northern	0.8	14.0	1.1	1.1	4.1	1.7	4.8	3.2	17.0	4.1
Southern	2.4	10.9	3.3	3.4	2.5	5.2	5.2	5.6	-1.1	5.5
Western	1.0	10.9	1.2	1.3	1.6	2.0	8.1	2.6	5.8	3.0
Less favorable agriculture conditions	0.3	10.5	0.4	0.5	8.2	0.8	7.5	1.0	1.6	1.0
More favorable agriculture conditions	0.7	5.3	0.9	1.1	3.0	1.3	7.8	1.8	3.7	2.0
Mineral-rich countries	0.7	5.7	1.0	1.0	2.6	1.6	7.1	1.7	1.7	1.8
Lower middle-income countries	2.7	12.3	3.8	4.0	3.4	5.8	2.2	7.1	7.1	8.2
Upper middle-income countries	1.1	11.5	1.6	1.5	1.2	2.6	11.4	3.4	2.1	3.5
CEN-SAD	2.1	13.4	3.0	3.1	2.7	4.7	5.4	5.9	5.8	6.7
COMESA	2.4	11.5	3.7	4.1	4.6	5.8	4.0	6.2	2.2	6.6
EAC	0.7	4.4	1.1	1.4	8.0	1.9	3.0	1.9	1.2	1.9
ECCAS	0.5	1.2	0.7	0.9	8.5	1.4	7.0	1.3	-4.4	1.2
ECOWAS	1.0	10.9	1.2	1.3	1.6	2.0	8.1	2.6	5.8	3.0
IGAD	0.6	12.1	0.9	1.0	6.5	1.4	1.0	1.8	8.7	2.1
SADC	2.5	6.2	3.5	3.7	4.0	5.9	6.7	6.3	-0.8	6.3
UMA	0.5	18.1	0.8	0.7	1.8	1.1	8.5	2.5	20.0	3.5
CAADP Compact 2007-09 (CC1)	0.8	10.4	1.0	1.0	0.5	1.6	9.4	2.1	6.4	2.5
CAADP Compact 2010-12 (CC2)	1.6	7.3	2.3	2.7	4.3	3.4	4.5	4.1	1.9	4.3
CAADP Compact 2013-15 (CC3)	1.5	14.7	2.3	2.2	0.7	3.4	3.7	3.2	-1.4	3.1
CAADP Compact not yet (CC0)	1.6	9.2	2.1	2.2	5.6	3.6	7.0	5.6	9.5	6.6
CAADP Level 0 (CL0)	1.6	9.2	2.1	2.2	5.6	3.6	7.0	5.6	9.5	6.6
CAADP Level 1 (CL1)	1.7	13.5	2.5	2.4	0.1	3.5	3.6	3.4	-1.3	3.3
CAADP Level 2 (CL2)	0.3	0.6	0.5	0.7	11.2	1.0	5.0	0.9	-1.6	0.9
CAADP Level 3 (CL3)	0.5	9.2	0.7	0.8	3.8	1.0	5.3	1.4	4.9	1.7
CAADP Level 4 (CL4)	1.3	10.7	1.8	2.0	1.8	3.0	6.8	3.7	4.3	4.1
NAIP00 (N00)	1.3	11.8	1.6	1.4	-2.0	2.4	7.9	4.0	8.5	4.5
NAIP01 (N01)	1.2	13.4	1.7	1.7	2.6	2.4	4.7	3.0	4.9	3.3
NAIP10 (N10)	0.5	2.0	0.7	0.8	6.3	1.0	3.1	0.8	-2.6	0.8
NAIP11 (N11)	2.6	10.1	3.7	4.2	4.8	6.3	5.6	7.2	3.1	7.9

Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

Note: Aggregate value for a group is the sum of intra-African agricultural imports for countries in the group. The values of intra-African agricultural exports and imports for Africa as a whole are expected to be equal. However, Tables TL2.2.1A and TL2.2.1B show differing values due to differences in commodities categorized as agricultural by different countries, year of shipment of exports and arrival of imports, treatment of the origin of export versus shipment, and valuation of exports and imports (for details see UNCTAD: https://unctadstat.unctad.org/EN/FAQ.html).

ANNEX 3a: Level 3—Strengthening Systemic Capacity to Deliver Results, Indicator 3.5.1

TABLE L3.5.1—GOVERNMENT AGRICULTURE EXPENDITURE (billion, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	10.6	2.0	11.7	13.3	5.3	14.6	1.7	16.3	0.1	16.8
Central	0.5	-27.5	0.2	0.3	12.5	0.5	10.0	0.7	4.6	0.9
Eastern	1.9	2.3	2.4	3.1	9.4	3.3	-1.1	4.0	3.1	4.3
Northern	5.2	4.1	5.6	5.1	-4.2	4.0	-0.9	4.0	-0.7	4.1
Southern	1.3	3.3	1.6	2.4	15.6	3.2	1.7	3.2	-3.5	3.1
Western	1.7	4.5	2.0	2.5	11.1	3.5	6.4	4.4	0.2	4.5
Less favorable agriculture conditions	0.4	0.6	0.4	0.5	2.0	0.5	9.7	0.9	6.1	1.2
More favorable agriculture conditions	1.1	5.1	1.5	2.1	13.0	2.9	4.5	4.1	3.0	4.4
Mineral-rich countries	1.2	-14.2	0.9	1.2	11.1	1.1	-0.6	1.6	4.8	1.9
Lower middle-income countries	7.0	3.3	7.6	7.8	2.2	8.1	1.0	8.0	-2.4	7.5
Upper middle-income countries	0.9	14.0	1.3	1.7	8.2	1.9	-0.4	1.8	-2.7	1.8
CEN-SAD	7.2	1.8	7.4	7.4	0.6	7.6	2.6	8.9	0.7	9.3
COMESA	5.7	-1.2	5.5	5.8	2.0	5.9	1.2	6.6	-1.3	6.4
EAC	1.1	-11.7	0.8	0.9	6.0	1.2	-0.2	1.6	5.8	1.8
ECCAS	0.6	-25.9	0.2	0.3	12.6	0.6	12.1	0.9	6.4	1.2
ECOWAS	1.7	4.5	2.0	2.5	11.1	3.5	6.4	4.4	0.2	4.5
IGAD	1.5	2.3	2.0	2.6	10.5	2.7	-0.4	3.1	1.3	3.2
SADC	2.0	-5.1	1.9	2.5	10.5	3.4	1.4	3.7	-0.9	3.8
UMA	2.6	3.7	3.0	3.1	0.6	2.5	-3.1	2.5	2.1	2.7
CAADP Compact 2007-09 (CC1)	1.5	12.7	2.3	3.2	13.0	4.3	6.1	5.5	0.2	5.6
CAADP Compact 2010-12 (CC2)	2.5	-7.3	2.1	2.3	5.9	2.9	3.1	3.9	2.4	4.2
CAADP Compact 2013-15 (CC3)	1.2	-7.9	1.1	1.6	16.0	1.8	-5.5	1.4	-0.4	1.5
CAADP Compact not yet (CC0)	5.4	6.5	6.3	6.2	-0.8	5.6	0.02	5.5	-1.5	5.6
CAADP Level 0 (CL0)	5.4	6.5	6.3	6.2	-0.8	5.6	0.02	5.5	-1.5	5.6
CAADP Level 1 (CL1)	1.1	-8.6	1.0	1.5	15.2	1.5	-8.9	1.0	-0.4	1.1
CAADP Level 2 (CL2)	1.4	-13.0	0.9	0.8	-2.3	0.7	0.6	0.8	1.2	0.8
CAADP Level 3 (CL3)	0.4	8.3	0.6	0.8	11.9	1.2	10.3	2.3	3.9	2.6
CAADP Level 4 (CL4)	2.3	6.3	3.0	4.0	12.4	5.6	4.6	6.7	0.0	6.7
NAIP00 (N00)	1.6	14.1	2.6	3.4	10.1	3.1	-5.0	2.3	-5.0	2.1
NAIP01 (N01)	4.1	2.8	4.0	3.3	-7.4	3.2	3.2	3.7	1.7	4.1
NAIP10 (N10)	0.5	-38.6	0.1	0.05	-5.3	0.1	13.5	0.1	10.5	0.1
NAIP11 (N11)	4.4	1.2	5.1	6.5	10.2	8.2	3.7	10.2	0.5	10.4

Source: ReSAKSS based on IFPRI (2019), World Bank (2022), and national sources.
Note: Aggregate value for a group is the sum of government agriculture expenditure for countries in the group.

ANNEX 3b: Level 3—Strengthening Systemic Capacity to Deliver Results, Indicator 3.5.2

TABLE L3.5.2—GOVERNMENT AGRICULTURE EXPENDITURE AS SHARE OF TOTAL GOVERNMENT EXPENDITURE (%)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	3.8	3.4	3.8	3.7	-3.1	2.7	-2.3	2.5	-2.6	2.3
Central	3.1	-0.2	2.3	2.4	-4.0	2.1	0.5	2.3	4.4	2.6
Eastern	5.5	2.6	6.1	6.5	2.3	6.2	-4.4	5.3	-1.8	4.8
Northern	5.2	-1.2	4.2	3.5	-9.6	2.0	-3.9	1.8	-1.0	1.8
Southern	1.8	5.3	2.3	2.6	4.1	2.3	-3.6	2.0	-3.1	1.9
Western	3.9	-3.6	3.7	4.0	0.2	2.9	3.2	2.8	-8.0	2.2
Less favorable agriculture conditions	14.7	-4.5	11.5	10.5	-4.9	6.6	0.7	7.9	2.2	8.3
More favorable agriculture conditions	7.6	-1.4	8.0	9.6	5.9	9.9	-3.5	7.8	-2.1	7.6
Mineral-rich countries	4.4	10.5	5.3	5.2	-10.5	1.7	-3.3	1.6	-9.0	1.2
Lower middle-income countries	4.2	-1.1	3.6	3.3	-3.9	2.5	-2.9	2.3	-1.8	2.2
Upper middle-income countries	1.6	13.6	2.4	2.4	-2.5	1.8	-3.9	1.4	-4.8	1.3
CEN-SAD	5.2	-2.6	4.3	3.7	-6.6	2.6	-0.1	2.5	-4.0	2.3
COMESA	5.2	6.7	4.9	4.4	-4.2	3.5	-2.1	3.3	-2.6	3.2
EAC	4.5	8.2	3.7	3.2	-0.7	3.6	-7.6	3.0	1.2	3.1
ECCAS	2.1	-4.2	1.5	2.1	8.4	1.8	-6.3	1.9	7.0	2.1
ECOWAS	3.9	-3.6	3.7	4.0	0.2	2.9	3.2	2.8	-8.0	2.3
IGAD	5.4	3.4	6.4	7.0	3.5	6.5	-2.3	5.9	-3.4	5.1
SADC	2.1	5.9	2.5	2.7	2.1	2.4	-5.2	2.1	-1.6	2.0
UMA	5.0	-2.6	4.3	3.9	-5.1	2.3	-5.7	2.2	2.0	2.3
CAADP Compact 2007-09 (CC1)	3.7	1.2	4.4	5.2	1.7	3.7	2.6	3.6	-7.4	2.9
CAADP Compact 2010-12 (CC2)	6.4	5.3	4.9	4.6	0.7	4.6	-3.6	3.9	-3.2	3.5
CAADP Compact 2013-15 (CC3)	3.0	-1.5	3.3	3.9	1.9	2.7	-10.7	2.0	2.1	2.1
CAADP Compact not yet (CC0)	3.5	3.5	3.5	3.0	-7.8	2.0	-3.1	1.7	-2.2	1.7
CAADP Level 0 (CL0)	3.5	3.5	3.5	3.0	-7.8	2.0	-3.1	1.7	-2.2	1.7
CAADP Level 1 (CL1)	3.0	-1.4	3.4	3.9	0.7	2.3	-13.7	1.5	1.9	1.5
CAADP Level 2 (CL2)	10.8	10.8	5.4	4.5	-6.0	3.3	-5.5	2.7	-0.2	2.6
CAADP Level 3 (CL3)	5.7	-0.5	5.9	6.1	-9.8	2.2	3.4	2.4	-9.9	1.8
CAADP Level 4 (CL4)	4.1	-1.4	4.3	4.9	6.3	5.2	1.0	5.2	-2.5	4.8
NAIP00 (N00)	1.7	11.7	2.6	2.8	-0.2	1.7	-9.1	1.1	-4.7	1.0
NAIP01 (N01)	5.6	-1.5	4.2	3.2	-12.8	2.2	-0.1	2.3	1.1	2.5
NAIP10 (N10)	4.0	-2.4	1.6	1.2	-18.6	0.7	5.7	1.2	13.0	1.3
NAIP11 (N11)	4.8	-1.2	4.8	5.1	1.4	4.2	-0.3	3.8	-5.8	3.2

Source: ReSAKSS based on IFPRI (2019), World Bank (2022), and national sources.

ANNEX 3c: Level 3—Strengthening Systemic Capacity to Deliver Results, Indicator 3.5.3

TABLE L3.5.3—GOVERNMENT AGRICULTURE EXPENDITURE AS SHARE OF AGRICULTURE GDP (%)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	5.3	-2.0	4.9	5.2	2.1	4.7	-0.3	4.6	0.7	5.2
Central	4.0	-24.1	1.7	1.9	4.1	2.8	6.0	3.2	1.7	3.6
Eastern	3.4	0.4	4.1	4.6	3.3	4.2	-2.7	4.2	-0.6	3.9
Northern	12.3	-2.9	10.7	9.5	-5.2	6.3	-3.4	5.1	0.0	4.5
Southern	9.0	5.3	11.4	15.1	8.8	15.4	-0.7	12.9	-1.6	14.0
Western	2.3	-2.0	1.9	2.4	9.5	2.7	4.5	2.9	0.0	2.5
Less favorable agriculture conditions	5.1	-3.2	5.1	4.7	-6.8	3.9	4.3	5.6	6.3	7.3
More favorable agriculture conditions	4.1	6.1	5.4	6.3	4.1	5.9	-1.2	6.0	-1.7	5.7
Mineral-rich countries	3.7	-16.3	2.5	3.1	6.1	2.7	2.3	4.2	3.5	4.3
Lower middle-income countries	5.7	-2.4	4.7	4.8	0.9	4.1	-1.2	3.4	-3.0	3.4
Upper middle-income countries	11.9	13.7	17.5	21.5	3.2	21.6	0.4	16.7	-3.6	17.2
CEN-SAD	4.9	-3.3	4.0	3.9	-1.8	3.4	1.8	3.3	-4.6	2.8
COMESA	6.3	-2.5	5.9	5.6	-2.5	4.8	0.3	4.8	-3.6	4.2
EAC	3.7	-9.0	3.0	3.0	2.7	3.4	-4.8	3.2	0.2	3.1
ECCAS	4.1	-18.4	2.2	3.5	17.2	4.1	-1.9	3.4	0.6	3.6
ECOWAS	2.3	-2.0	1.9	2.4	9.5	2.7	4.5	2.9	0.0	2.5
IGAD	3.4	-0.3	4.1	4.8	4.1	4.1	-1.1	4.1	-3.9	3.3
SADC	6.8	-1.0	7.3	9.2	7.8	9.5	-3.1	7.5	-2.5	7.8
UMA	17.1	-7.7	13.7	13.6	1.7	9.1	-8.4	6.4	0.0	6.2
CAADP Compact 2007-09 (CC1)	2.0	5.8	2.2	2.9	9.8	3.1	3.5	4.0	5.7	5.9
CAADP Compact 2010-12 (CC2)	6.1	-5.9	5.3	5.4	2.9	5.5	-0.8	5.2	-3.7	4.6
CAADP Compact 2013-15 (CC3)	3.4	-10.2	2.9	3.8	9.1	3.7	-4.3	3.2	5.4	4.3
CAADP Compact not yet (CC0)	11.0	0.2	10.7	10.3	-2.2	7.8	-2.1	8.0	5.7	13.1
CAADP Level 0 (CL0)	11.0	0.2	10.7	10.3	-2.2	7.8	-2.1	8.0	5.7	13.1
CAADP Level 1 (CL1)	3.6	-10.8	3.0	3.8	7.9	3.3	-7.2	2.6	6.3	3.4
CAADP Level 2 (CL2)	10.5	-8.7	8.1	7.3	-4.9	5.3	-2.2	4.2	-4.6	3.7
CAADP Level 3 (CL3)	3.5	4.4	4.3	5.2	6.7	5.4	6.2	9.0	-0.9	8.5
CAADP Level 4 (CL4)	2.4	1.4	2.4	3.1	9.6	3.5	1.7	3.5	-0.4	3.7
NAIP00 (N00)	11.0	0.2	12.7	16.9	9.6	12.5	-10.1	6.9	-1.8	8.2
NAIP01 (N01)	10.1	-0.4	8.8	6.9	-10.5	5.4	1.8	15.6	24.1	45.9
NAIP10 (N10)	5.5	-32.2	1.1	1.0	-10.0	0.8	11.4	1.1	5.0	1.3
NAIP11 (N11)	3.2	-3.0	3.0	3.6	6.7	3.8	1.9	4.1	0.7	4.5

Source: ReSAKSS based on IFPRI (2019), World Bank (2022), and national sources.

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results

TABLE L 3(a)—PROGRESS IN CAADP IMPLEMENTATION PROCESS AS OF SEPTEMBER 2022

Country/Region	JSR assessment conducted/ initiated	First generation NAIP drafted, reviewed, and validated	Second generation investment plan			
			Malabo domestication event held	Malabo status assessment and profile finalized	Malabo goals and milestones report finalized	Malabo compliant NAIP drafted, reviewed, and/or validated
AFRICA*	**21**	**36**	**25**	**31**	**25**	**42**
Central Africa*	**1**	**6**	**2**	**2**	**2**	**5**
Burundi		Yes				Yes
Cameroon		Yes		Yes	Yes	Yes
Central African Republic		Yes				
Chad						Yes
Congo, Dem. Republic	Yes	Yes	Yes			
Congo, Rep. of		Yes				Yes
Equatorial Guinea						
Gabon			Yes	Yes	Yes	Yes
Sao Tome and Principe		Yes				
Eastern Africa*	**6**	**9**	**5**	**6**	**1**	**12**
Comoros						Yes
Djibouti		Yes				Yes
Eritrea						Yes
Ethiopia	Yes	Yes	Yes	Yes		Yes
Kenya	Yes	Yes	Yes	Yes	Yes	Yes
Madagascar						Yes
Mauritius	Yes					Yes
Rwanda		Yes	Yes	Yes		Yes
Seychelles	Yes	Yes		Yes		
Somalia						
South Sudan		Yes				Yes
Sudan		Yes				Yes
Tanzania	Yes	Yes	Yes	Yes		Yes
Uganda	Yes	Yes	Yes	Yes		Yes

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(a)—PROGRESS IN CAADP IMPLEMENTATION PROCESS AS OF SEPTEMBER 2022 *continued*

Country/Region	JSR assessment conducted/ initiated	First generation NAIP drafted, reviewed, and validated	Second generation investment plan			
			Malabo domestication event held	Malabo status assessment and profile finalized	Malabo goals and milestones report finalized	Malabo compliant NAIP drafted, reviewed, and/or validated
Northern Africa*		**1**				**5**
Algeria						
Egypt						Yes
Libya						Yes
Mauritania		Yes				Yes
Morocco						Yes
Tunisia						Yes
Southern Africa*	**6**	**5**	**9**	**8**	**7**	**5**
Angola	Yes		Yes	Yes	Yes	
Botswana			Yes	Yes	Yes	Yes
Eswatini	Yes	Yes	Yes	Yes	Yes	
Lesotho			Yes	Yes	Yes	
Malawi	Yes	Yes	Yes	Yes		Yes
Mozambique	Yes	Yes	Yes			Yes
Namibia			Yes	Yes	Yes	
South Africa						
Zambia	Yes	Yes	Yes	Yes	Yes	Yes
Zimbabwe	Yes	Yes	Yes	Yes	Yes	Yes
Western Africa*	**8**	**15**	**9**	**15**	**15**	**15**
Benin	Yes	Yes	Yes	Yes	Yes	Yes
Burkina Faso	Yes	Yes	Yes	Yes	Yes	Yes
Cabo Verde		Yes		Yes	Yes	Yes
Côte d'Ivoire	Yes	Yes	Yes	Yes	Yes	Yes
Gambia		Yes		Yes	Yes	Yes
Ghana	Yes	Yes	Yes	Yes	Yes	Yes
Guinea		Yes		Yes	Yes	Yes
Guinea-Bissau		Yes		Yes	Yes	Yes

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(a)—PROGRESS IN CAADP IMPLEMENTATION PROCESS AS OF SEPTEMBER 2021 *continued*

Country/Region	JSR assessment conducted/ initiated	First generation NAIP drafted, reviewed, and validated	Second generation investment plan			
			Malabo domestication event held	Malabo status assessment and profile finalized	Malabo goals and milestones report finalized	Malabo compliant NAIP drafted, reviewed, and/or validated
Western Africa* cont'd	**8**	**15**	**9**	**15**	**15**	**15**
Liberia		Yes		Yes	Yes	Yes
Mali	Yes	Yes	Yes	Yes	Yes	Yes
Niger	Yes	Yes	Yes	Yes	Yes	Yes
Nigeria		Yes	Yes	Yes	Yes	Yes
Senegal	Yes	Yes	Yes	Yes	Yes	Yes
Sierra Leone		Yes		Yes	Yes	Yes
Togo	Yes	Yes	Yes	Yes	Yes	Yes
RECS**	**2**	**3**				
CEN-SAD						
COMESA						
EAC	Yes					
ECCAS		Yes				
ECOWAS	Yes	Yes				
IGAD		Yes				
SADC						
UMA						

Source: Authors' compilation based on NEPAD (November 2015) and ReSAKSS (2022).

Note: * The items in this row are the number of countries in the subregion that have achieved the milestone. ** The items in this row are the number of RECs that have achieved the milestone.

JSR=Joint Sector Review.

NAIP= National Agriculture Investment Plan.

BR=Biennial Review.

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results

TABLE L 3(b)—PROGRESS IN STRENGTHENING SYSTEMIC CAPACITY

Country/region	L2.4.2-Existence of food reserves, local purchases for relief programs, early warning systems, and school feeding programs**	L3.1.1-Existence of a new NAIP/NAFSIP developed through an inclusive and participatory process	L3.2.1-Existence of inclusive institutionalized mechanisms for mutual accountability and peer review	L3.3.1-Existence of and quality in the implementation of evidence-informed policies and corresponding human resources	L3.4.1-Existence of a functional multisectoral and multistakeholder coordination body	L3.4.2-Cumulative number of agriculture-related public-private partnerships (PPPs) that are successfully undertaken	L3.4.3-Cumulative value of investments in the PPPs	L3.4.6-Existence of an operational country SAKSS***
AFRICA*	**42**	**42**	**28**	**36**	**31**	**22**	**22**	**14**
Central Africa*	**4**	**5**	**2**	**3**	**1**	**3**	**3**	**1**
Burundi	Yes	Yes	Yes	Yes	Yes	Several PPPs	€18 million	
Cameroon		Yes						
Central African Republic	Yes					2	US$1.25	
Chad		Yes						
Congo, Dem. Rep.	Yes		Yes	Yes		Several PPPs	Not stated	Yes
Congo, Rep.	Yes	Yes		Yes				
Equatorial Guinea								
Gabon		Yes						
Sao Tome and Principe								
Eastern Africa*	**14**	**12**	**6**	**12**	**8**	**8**	**8**	**4**
Comoros	Yes	Yes		Yes				
Djibouti	Yes	Yes		Yes		Several PPPs	Not stated	
Eritrea	Yes	Yes						
Ethiopia	Yes	Yes	Yes	Yes	Yes	Several PPPs	Over US$10 million	
Kenya	Yes	Yes		Yes	Yes	Several PPPs	Over US$200 million	Yes
Madagascar	Yes	Yes	Yes	Yes	Yes	4	Not stated	
Mauritius	Yes	Yes	Yes	Yes	Yes	1	Not stated	
Rwanda	Yes	Yes	Yes	Yes	Yes	Several PPPs	Over US$20 million	Yes
Seychelles	Yes			Yes	Yes			
Somalia	Yes							
South Sudan	Yes	Yes		Yes				
Sudan	Yes	Yes		Yes				

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(b)—PROGRESS IN STRENGTHENING SYSTEMIC CAPACITY *continued*

Country/region	L2.4.2-Existence of food reserves, local purchases for relief programs, early warning systems, and school feeding programs**	L3.1.1-Existence of a new NAIP/NAFSIP developed through an inclusive and participatory process	L3.2.1-Existence of inclusive institutionalized mechanisms for mutual accountability and peer review	L3.3.1-Existence of and quality in the implementation of evidence-informed policies and corresponding human resources	L3.4.1-Existence of a functional multisectoral and multistakeholder coordination body	L3.4.2-Cumulative number of agriculture-related public-private partnerships (PPPs) that are successfully undertaken	L3.4.3-Cumulative value of investments in the PPPs	L3.4.6-Existence of an operational country SAKSS***
Eastern Africa* *cont'd*	**14**	**12**	**6**	**12**	**8**	**8**	**8**	**4**
Tanzania	Yes	Yes	Yes	Yes	Several PPPs across the country and many of them in SAGCOT with several projects	US$ 3.2 billion by 2030	Yes	Yes
Uganda	Yes	Yes	Yes	Yes	Several PPPs	Over US$ 218 million	Yes	Yes
Northern Africa*	**2**	**5**		**2**	**1**	**1**	**1**	
Algeria								
Egypt	Yes	Yes		Yes	Yes	Several PPPs	Over US$30 million	
Libya	Yes	Yes		Yes				
Mauritania		Yes						
Morocco		Yes						
Tunisia		Yes						
Southern Africa*	**10**	**5**	**10**	**10**	**9**	**7**	**7**	**2**
Angola	Yes		Yes	Yes	Yes	5	Not stated	
Botswana	Yes	Yes	Yes	Yes	Yes	3	Not stated	
Eswatini	Yes		Yes	Yes	Yes	4	Not stated	
Lesotho	Yes		Yes	Yes	Yes	4	Over US$87 million	
Malawi	Yes	Yes	Yes	Yes	Yes	4	Not stated	
Mozambique	Yes	Yes	Yes	Yes	Yes	4	Not stated	Yes
Namibia	Yes		Yes	Yes		1	Not stated	
South Africa	Yes		Yes	Yes	Yes			
Zambia	Yes	Yes	Yes	Yes	Yes			
Zimbabwe	Yes	Yes	Yes	Yes	Yes			Yes

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(b)—PROGRESS IN STRENGTHENING SYSTEMIC CAPACITY *continued*

Country/region	L2.4.2-Existence of food reserves, local purchases for relief programs, early warning systems, and school feeding programs**	L3.1.1-Existence of a new NAIP/NAFSIP developed through an inclusive and participatory process	L3.2.1-Existence of inclusive institutionalized mechanisms for mutual accountability and peer review	L3.3.1-Existence of and quality in the implementation of evidence-informed policies and corresponding human resources	L3.4.1-Existence of a functional multisectoral and multistakeholder coordination body	L3.4.2-Cumulative number of agriculture-related public-private partnerships (PPPs) that are successfully undertaken	L3.4.3-Cumulative value of investments in the PPPs	L3.4.6-Existence of an operational country SAKSS***
Western Africa*	**12**	**15**	**10**	**9**	**12**	**3**	**3**	**7**
Benin	Yes	Yes	Yes		Yes			Yes
Burkina Faso	Yes	Yes		Yes	Yes			Yes
Cabo Verde		Yes						
Côte d'Ivoire		Yes		Yes	Yes	2	Not stated	
Gambia	Yes	Yes	Yes	Yes	Yes			
Ghana	Yes	Yes	Yes	Yes	Yes			Yes
Guinea	Yes	Yes	Yes	Yes				
Guinea-Bissau		Yes						
Liberia	Yes	Yes			Yes			
Mali	Yes	Yes	Yes	Yes	Yes	3	More than 50 billion FCFA	Yes
Niger	Yes	Yes	Yes	Yes	Yes			Yes
Nigeria	Yes	Yes	Yes		Yes			
Senegal	Yes	Yes	Yes	Yes	Yes			Yes
Sierra Leone	Yes	Yes	Yes		Yes			
Togo	Yes	Yes	Yes	Yes	Yes	4	Not stated	Yes

Note: * The items in this row are the number of countries in Africa of the sub region corresponding to each indicator.

** This indicator is from level 2 of the CAADP Results Framework.

*** This refers to SAKSS platforms established between 2010 and 2017. Due to limited resources, the SAKSS platforms are not fully operational.

SAKSS = Strategic Analysis and Knowledge Support System

NAIP = National Agriculture Investment Plan

NAFSIP = National Agriculture and Food Security Investment Plan

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(c)—PROGRESS IN BIENNIAL REVIEW PROCESS AS OF SEPTEMBER 2022

Country/Region	Inaugural Biennial Review process			Second Biennial Review process			Third Biennial Review process		
	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments
AFRICA*	**46**	**3.6**	**20**	**49**	**4.03**	**4**	**51**	**4.32**	**1**
Central Africa*	**9**	**2.35**	**1**	**8**	**3.22**		**8**	**3.33**	
Burundi	Yes	4.71	On track	Yes	5.82		Yes	5.63	
Cameroon	Yes	2.14		Yes	4.21		Yes	4.58	
Central African Republic	Yes	2.4		Yes	4.41		Yes	2.61	
Chad	Yes	2.22		Yes	3.89		Yes	3.88	
Congo, Dem. Republic	Yes	1.44		Yes	3.33		Yes	4.46	
Congo, Rep. of	Yes	2.8		Yes	3.46		Yes	3.32	
Equatorial Guinea	Yes	3.61		Yes	2.46		Yes	2.82	
Gabon	Yes	2.86		Yes	3.99		Yes	4.98	
Sao Tome and Principe	Yes	1.54							
Eastern Africa*	**10**	**4.19**	**6**	**13**	**4**	**1**	**12**	**4.56**	**1**
Comoros							Yes	1.5	
Djibouti	Yes	3.19		Yes	2.82		Yes	4	
Eritrea				Yes	3.89		Yes	3.17	
Ethiopia	Yes	5.35	On track	Yes	5.31		Yes	6.03	
Kenya	Yes	4.77	On track	Yes	4.88		Yes	5.62	
Madagascar	Yes	3.1		Yes	4.92		Yes	4.37	
Mauritius	Yes	5	On track	Yes	5.95				
Rwanda	Yes	6.09	On track	Yes	7.23	On track	Yes	7.43	On track
Seychelles	Yes	4.01	On track	Yes	4.53		Yes	4.92	
Somalia				Yes	0.55				
South Sudan	Yes (after the continental BR)			Yes	2.89		Yes	4.05	
Sudan	Yes	1.91		Yes	3.33		Yes	3.32	
Tanzania	Yes	3.08		Yes	5.08		Yes	6.14	
Uganda	Yes	4.45	On track	Yes	5.68		Yes	5.89	

ANNEX 3d: Level 3—Strengthening Systemic Capacity to Deliver Results, continued

TABLE L 3(c)—PROGRESS IN BIENNIAL REVIEW PROCESS AS OF SEPTEMBER 2022

Country/Region	Inaugural Biennial Review process			Second Biennial Review process			Third Biennial Review process		
	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments
Northern Africa*	**4**	**3.83**	**2**	**3**	**2.65**	**1**	**6**	**4.62**	
Algeria							Yes	1.47	
Egypt	Yes	3.37					Yes	6.52	
Libya							Yes	1.14	
Mauritania	Yes	4.78	On track	Yes	5.37		Yes	5.4	
Morocco	Yes	5.54	On track	Yes	6.96	On track	Yes	6.89	
Tunisia					6.2		Yes	6.28	
Southern Africa*	**10**	**4.02**	**6**	**10**	**4.27**		**10**	**4.11**	
Angola	Yes	2.1		Yes	4.77		Yes	3.77	
Botswana	Yes	4.38	On track	Yes	3.35		Yes	4.95	
Eswatini	Yes	3.74	On track	Yes	3.25		Yes	5.73	
Lesotho	Yes	4.92		Yes	4.81		Yes	3.98	
Malawi	Yes	4.13	On track	Yes	4.05		Yes	5.33	
Mozambique	Yes	4.11	On track	Yes	3.38		Yes	4.14	
Namibia	Yes	4.08	On track	Yes	2.88		Yes	4.08	
South Africa	Yes	4	On track	Yes	4.19		Yes	4.05	
Zambia	Yes	3.6		Yes	5.11		Yes	5.55	
Zimbabwe	Yes	3.2		Yes	4.58		Yes	5.17	
Western Africa*	**13**	**3.62**	**5**	**15**	**4.94**	**2**	**15**	**4.75**	
Benin	Yes	4.32	On track	Yes	5.76		Yes	4.78	
Burkina Faso	Yes	4.24	On track	Yes	5.31		Yes	5.2	
Cabo Verde	Yes	4.61	On track	Yes	4.82		Yes	4.55	
Côte d'Ivoire	Yes	3.51		Yes	4.79		Yes	4.62	
Gambia	Yes	3.13		Yes	4.95		Yes	5.56	
Ghana	Yes	3.91		Yes	6.67	On track	Yes	6.61	
Guinea	Yes	3.26		Yes	4.43		Yes	4.02	
Guinea-Bissau				Yes	2.49		Yes	2.18	

TABLE L 3(c)—PROGRESS IN BIENNIAL REVIEW PROCESS AS OF SEPTEMBER 2022

Country/Region	Inaugural Biennial Review process			Second Biennial Review process			Third Biennial Review process		
	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments	BR report drafted, validated, and submitted to REC	BR Score (out of 10)	Country on track to meet Malabo Commitments
Western Africa* cont'd	**13**	**3.62**	**5**	**15**	**4.94**	**2**	**15**	**4.75**	
Liberia	Yes	0.95		Yes	3.05		Yes	3.93	
Mali	Yes	5.57	On track	Yes	6.82	On track	Yes	6.66	
Niger	Yes	3.52		Yes	4.11		Yes	3.64	
Nigeria	Yes	3.36		Yes	5.18		Yes	5.42	
Senegal	Yes	3.84		Yes	5.18		Yes	5.07	
Sierra Leone	Yes	1.53		Yes	5.34		Yes	4.33	
Togo	Yes	4.92	On track	Yes	5.14		Yes	4.67	

Source: Authors' compilation based on AUC (2018, 2020, and 2022).

Note: * The items in this row are the number of countries in the subregion corresponding to each indicator.

The BR benchmark scores (or the minimum score out of 10) required to be on track are 3.94 for the first BR, 6.66 for the second BR, and 7.28 for the third BR.

ANNEX 4: Country Categories by Geographic Regions, Economic Classification, and Regional Economic Communities

TABLE 4.1—GEOGRAPHIC REGIONS

Western Africa	Eastern Africa	Southern Africa	Central Africa	Northern Africa
Benin	Comoros	Angola	Burundi	Algeria
Burkina Faso	Djibouti	Botswana	Cameroon	Egypt
Cabo Verde	Eritrea	Eswatini	Central African Republic	Libya
Côte d'Ivoire	Ethiopia	Lesotho	Chad	Mauritania
Gambia	Kenya	Malawi	Congo, Dem. Rep.	Morocco
Ghana	Madagascar	Mozambique	Congo, Rep.	Tunisia
Guinea	Mauritius	Namibia	Equatorial Guinea	
Guinea-Bissau	Rwanda	South Africa	Gabon	
Liberia	Seychelles	Zambia	Sao Tome and Principe	
Mali	Somalia	Zimbabwe		
Niger	South Sudan			
Nigeria	Sudan			
Senegal	Tanzania			
Sierra Leone	Uganda			
Togo				

ANNEX 4: Country Categories by Geographic Regions, Economic Classification, and Regional Economic Communities

TABLE 4.2—ECONOMIC CLASSIFICATIONS

Mineral-rich countries	Less favorable agriculture conditions	More favorable agriculture conditions	Lower middle-income countries	Upper middle-income countries
Central African Republic	Burundi	Benin	Algeria	Botswana
Congo, Dem. Rep.	Chad	Burkina Faso	Angola	Equatorial Guinea
Guinea	Eritrea	Ethiopia	Cameroon	Gabon
Liberia	Mali	Gambia	Cabo Verde	Libya
Sierra Leone	Niger	Guinea-Bissau	Comoros	Mauritius
South Sudan	Rwanda	Madagascar	Congo, Rep.	Namibia
Sudan	Somalia	Malawi	Côte d'Ivoire	South Africa
Zambia		Mozambique	Djibouti	Seychelles
		Tanzania	Egypt	
		Togo	Eswatini	
		Uganda	Ghana	
			Kenya	
			Lesotho	
			Mauritania	
			Morocco	
			Nigeria	
			Sao Tome and Principe	
			Senegal	
			Tunisia	
			Zimbabwe	
			Zambia	
			Zimbabwe	

Note: To avoid overlapping categories, countries were first placed into the lower middle-income and upper middle-income categories; remaining countries were then classified as having more favorable or less favorable agricultural conditions; finally, a subset of countries with more favorable agricultural conditions were categorized as mineral-rich countries. See Benin et al. (2010) for further methodological details and criteria for classification by income, agricultural conditions, and mineral wealth.

ANNEX 4: Country Categories by Geographic Regions, Economic Classification, and Regional Economic Communities

TABLE 4.3—REGIONAL ECONOMIC COMMUNITIES

CEN-SAD	COMESA	SADC	ECOWAS	ECCAS	IGAD	EAC	UMA
Benin	Burundi	Angola	Benin	Angola	Djibouti	Burundi	Algeria
Burkina Faso	Comoros	Botswana	Burkina Faso	Burundi	Eritrea	Congo, Dem. Rep.	Libya
Cape Verde	Congo, Dem. Rep.	Comoros	Cape Verde	Cameroon	Ethiopia	Kenya	Mauritania
Central African Republic	Djibouti	Congo, Dem. Rep.	Côte d'Ivoire	Central African Republic	Kenya	Rwanda	Morocco
Chad	Egypt	Eswatini	Gambia	Chad	Somalia	Tanzania	Tunisia
Comoros	Eritrea	Lesotho	Ghana	Congo, Dem. Rep.	South Sudan	Uganda	
Côte d'Ivoire	Eswatini	Madagascar	Guinea	Congo, Rep.	Sudan	South Sudan	
Djibouti	Ethiopia	Malawi	Guinea-Bissau	Equatorial Guinea	Uganda		
Egypt	Kenya	Mauritius	Liberia	Gabon			
Eritrea	Libya	Mozambique	Mali	Rwanda			
Gambia	Madagascar	Namibia	Niger	Sao Tome and Principe			
Ghana	Malawi	Seychelles	Nigeria				
Guinea	Mauritius	South Africa	Senegal				
Guinea-Bissau	Rwanda	Tanzania	Sierra Leone				
Kenya	Seychelles	Zambia	Togo				
Liberia	Somalia	Zimbabwe					
Libya	Sudan						
Mali	Tunisia						
Mauritania	Uganda						
Morocco	Zambia						
Niger	Zimbabwe						
Nigeria							
Sao Tome and Principe							
Senegal							
Sierra Leone							
Somalia							
Sudan							
Togo							
Tunisia							

Note: CEN-SAD = Community of Sahel-Saharan States; COMESA = Common Market for Eastern and Southern Africa; EAC = East African Community; ECCAS = Economic Community of Central African States; ECOWAS = Economic Community of West African States; IGAD = Intergovernmental Authority for Development; SADC = Southern African Development Community; UMA = Arab Maghreb Union.

ANNEX 5: Distribution of Countries by Year of Signing CAADP Compact and Level of CAADP Implementation Reached by End of 2015

TABLE 5.1—CAADP COMPACT SIGNING AND LEVEL OF CAADP IMPLEMENTATION

Period when CAADP compact was signed				Level or stage of CAADP implementation reached by end of 2015				
2007–2009	2010–2012	2013–2015	Not signed	LEVEL 0 Not started or pre-compact	LEVEL 1 Signed compact	LEVEL 2 Level 1 plus NAIP	LEVEL 3 Level 2 plus one external funding source	LEVEL 4 Level 3 plus other external funding source
CC1	CC2	CC3	CC0	CL0	CL1	CL2	CL3	CL4
Benin	Burkina Faso	Angola	Algeria	Algeria	Angola	Cameroon	Burundi	Benin
Burundi	Central Afr. Rep.	Cameroon	Comoros	Comoros	Chad	Cabo Verde	Gambia	Burkina Faso
Cabo Verde	Congo, Dem. Rep.	Chad	Egypt	Egypt	Congo, Rep.	Central Afr. Rep.	Liberia	Côte d'Ivoire
Ethiopia	Côte d'Ivoire	Congo, Rep.	Eritrea	Eritrea	Eswatini	Congo, Dem. Rep.	Mali	Ethiopia
Gambia	Djibouti	Eq. Guinea	Libya	Libya	Eq. Guinea	Djibouti	Niger	Ghana
Ghana	Eswatini	Gabon	Morocco	Morocco	Gabon	Guinea	Sierra Leone	Kenya
Liberia	Guinea	Lesotho	Somalia	Somalia	Lesotho	Guinea Bissau	Togo	Malawi
Mali	Guinea Bissau	Madagascar	South Africa	South Africa	Madagascar	Mauritania	Uganda	Mozambique
Niger	Kenya	Mauritius	South Sudan	South Sudan	Mauritius	Sao Tome and Principe	Zambia	Nigeria
Nigeria	Malawi	Sudan	Tunisia	Tunisia	Seychelles			Rwanda
Rwanda	Mauritania	Sao Tome and Principe			Sudan			Senegal
Sierra Leone	Mozambique	Zimbabwe			Zimbabwe			Tanzania
Togo	Senegal							
	Seychelles							
	Tanzania							
	Uganda							
	Zambia							
Count								
13	17	12	10	10	12	9	9	12
AgShare in GDP (%)								
26.6	20.6	17.4	7.8	7.8	17.2	19.1	26.7	24.6

Note: NAIP = national agricultural investment plan. There are three external funding sources considered—Grow Africa, New Alliance Cooperation, and the Global Agriculture and Food Security Program (GAFSP). AgShare in GDP is the average share of agricultural GDP in total GDP for 2003–2021.

ANNEX 6: Distribution of Countries in Formulating First-Generation Investment Plan (NAIP1.0) and Second-Generation Investment Plan (NAIP2.0) Reached by September of 2022

TABLE 6.1—PROGRESS IN NAIP FORMULATION

NAIP00	NAIP00	NAIP10	NAIP11	
Algeria	Botswana	Central African Republic	Benin	Mali
Angola	Chad	Congo, Dem. Republic	Burkina Faso	Mauritania
Equatorial Guinea	Comoros	Eswatini	Burundi	Mozambique
Lesotho	Egypt	Sao Tome and Principe	Cabo Verde	Niger
Namibia	Eritrea	Seychelles	Cameroon	Nigeria
Somalia	Gabon		Congo Rep.	Rwanda
South Africa	Libya		Côte d'Ivoire	Senegal
	Madagascar		Djibouti	Sierra Leone
	Mauritius		Ethiopia	South Sudan
	Morocco		Gambia	Sudan
	Tunisia		Ghana	Tanzania
			Guinea	Togo
			Guinea Bissau	Uganda
			Kenya	Zambia
			Liberia	Zimbabwe
			Malawi	
Count				
7	11	5	31	
AgShare in GDP (%)				
5.0	11.4	19.5	24.2	

Note: NAIP00 = countries that have neither NAIP1.0 nor NAIP2.0, NAIP01= countries that do not have a NAIP1.0 but have NAIP2.0, NAIP10 = countries that have a NAIP1.0 but do not have NAIP2.0, NAIP11 = countries that have both NAIP1.0 and NAIP2.0.

ANNEX 7: Supplementary Data Tables

TABLE O.1.1A—AGRICULTURAL ODA (% total ODA)

Region	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	3.7	3.5	3.1	5.5	5.6	6.5	-2.1	6.1
Central	1.8	2.1	25.7	3.2	17.2	4.3	1.2	4.3
Eastern	4.6	4.2	-1.6	5.9	4.1	6.8	-2.8	6.5
Northern	3.6	3.6	-1.7	4.8	7.9	5.5	-5.0	4.4
Southern	2.9	3.4	3.4	5.5	6.3	5.9	-5.7	4.8
Western	5.1	4.1	-0.8	6.8	3.6	7.8	-0.3	7.8
Less favorable agriculture conditions	6.2	5.7	0.3	8.1	3.5	7.9	1.2	8.2
More favorable agriculture conditions	4.9	5.1	-2.1	6.8	3.6	7.7	-3.9	6.6
Mineral-rich countries	1.4	1.4	12.2	3.5	17.8	3.8	-6.8	3.3
Lower middle-income countries	3.9	3.3	3.7	5.5	3.4	6.6	-0.3	6.8
Upper middle-income countries	4.0	3.8	-12.7	2.0	2.0	1.6	-4.4	1.5
CEN-SAD	4.7	3.7	-2.3	5.8	5.0	6.4	-1.6	6.3
COMESA	3.2	3.4	6.9	5.3	7.6	6.5	-4.7	5.8
EAC	2.8	3.9	20.5	5.0	2.4	6.7	5.7	8.1
ECCAS	1.8	2.3	28.7	3.9	12.7	5.4	1.2	5.4
ECOWAS	5.1	4.1	-0.8	6.8	3.6	7.8	-0.3	7.8
IGAD	4.3	3.8	-1.9	5.9	7.1	6.5	-3.3	6.4
SADC	2.6	3.3	12.0	4.7	3.5	5.4	-4.8	4.5
UMA	5.1	4.0	-11.2	4.8	7.7	4.5	6.6	5.0
CAADP Compact 2007-09 (CC1)	4.2	3.4	-2.8	6.7	7.2	8.1	0.5	8.3
CAADP Compact 2010-12 (CC2)	3.7	4.5	12.3	5.4	1.2	6.7	-0.6	6.7
CAADP Compact 2013-15 (CC3)	3.6	2.6	-5.3	5.5	17.6	5.4	-11.2	3.9
CAADP Compact not yet (CC0)	3.4	3.3	-4.8	4.0	11.0	4.5	-5.1	3.7
CAADP Level 0 (CL0)	3.4	3.3	-4.8	4.0	11.0	4.5	-5.1	3.7
CAADP Level 1 (CL1)	3.6	2.7	-4.9	5.7	17.1	5.3	-12.7	3.7
CAADP Level 2 (CL2)	2.5	2.5	16.2	3.0	3.6	3.6	2.9	3.7
CAADP Level 3 (CL3)	4.2	4.5	2.2	6.9	8.1	7.7	3.3	8.3
CAADP Level 4 (CL4)	4.5	4.2	1.4	6.5	2.1	8.0	-1.6	7.9
NAIP00 (N00)	2.2	2.2	6.9	2.5	-2.0	2.3	9.2	3.2
NAIP01 (N01)	4.5	4.1	-5.0	4.9	8.1	5.6	-5.2	4.5
NAIP10 (N10)	0.9	1.7	54.1	2.7	8.9	2.8	-5.5	2.3
NAIP11 (N11)	4.3	3.9	-0.3	6.3	5.7	7.4	-2.2	7.1

Source: ReSAKSS based on OECD (2022) and World Bank (2022).
Note: ODA refers to gross disbursements.

ANNEX 7: Supplementary Data Tables

TABLE O.1.1B—AGRICULTURAL ODA DISBURSEMENTS (as % of agricultural ODA commitments)

Region	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014-2020)	2020
Africa	80.5	75.5	-5.2	73.9	2.7	77.0	0.7	81.8
Central	67.7	78.1	13.6	71.6	2.6	76.9	3.8	90.5
Eastern	71.7	77.1	-2.4	78.3	3.7	75.7	1.4	81.5
Northern	121.9	71.4	-18.7	65.3	16.8	131.0	8.6	93.1
Southern	85.7	88.6	-1.8	84.0	0.9	88.3	-6.4	84.3
Western	85.9	76.4	-7.6	75.5	-2.6	73.5	0.0	78.9
Less favorable agriculture conditions	92.7	89.2	-8.4	78.2	4.7	76.0	6.7	100.4
More favorable agriculture conditions	81.4	87.5	-2.7	82.6	-1.8	74.0	-0.6	70.8
Mineral-rich countries	55.8	58.9	-2.2	79.2	14.4	78.1	-10.3	66.9
Lower middle-income countries	88.4	65.6	-7.3	70.4	3.3	85.6	1.7	90.5
Upper middle-income countries	85.9	120.7	5.9	105.9	14.6	108.8	-7.0	103.8
CEN-SAD	88.2	67.9	-9.1	70.2	4.9	76.3	0.7	82.5
COMESA	76.3	77.4	-5.3	72.7	3.4	77.3	1.9	82.1
EAC	59.0	82.0	16.0	85.8	-0.3	76.6	5.3	91.6
ECCAS	70.4	77.3	7.9	73.4	2.2	77.0	2.3	100.3
ECOWAS	85.9	76.4	-7.6	75.5	-2.6	74.4	1.4	78.9
IGAD	66.2	73.1	-5.0	77.5	6.6	73.5	-1.7	74.6
SADC	81.2	87.4	2.8	86.9	-1.0	83.8	-3.0	91.0
UMA	99.6	77.4	-22.8	106.5	48.2	111.5	-16.9	138.8
CAADP Compact 2007-09 (CC1)	81.2	76.0	-11.6	75.3	-0.7	74.0	3.0	88.2
CAADP Compact 2010-12 (CC2)	72.4	84.3	8.4	82.0	-1.4	80.1	-1.4	80.7
CAADP Compact 2013-15 (CC3)	88.6	77.0	-9.3	72.7	11.7	69.8	-4.4	69.6
CAADP Compact not yet (CC0)	127.9	88.0	-24.5	65.7	20.4	137.3	7.2	92.3
CAADP Level 0 (CL0)	127.9	88.0	-24.5	65.7	20.4	137.3	7.2	92.3
CAADP Level 1 (CL1)	79.0	73.1	-10.1	80.4	16.9	70.1	-6.8	73.8
CAADP Level 2 (CL2)	80.8	87.4	7.5	78.3	-7.8	69.3	-2.3	75.7
CAADP Level 3 (CL3)	78.6	100.9	-0.2	79.7	0.6	65.9	1.8	78.5
CAADP Level 4 (CL4)	77.6	70.5	-2.5	78.6	-2.1	83.0	1.2	78.1
NAIP00 (N00)	79.1	86.9	2.3	96.8	2.0	93.0	-12.8	75.0
NAIP01 (N01)	122.7	88.9	-19.9	65.5	14.3	110.3	9.1	94.1
NAIP10 (N10)	57.6	66.8	6.3	83.7	7.7	83.6	-3.0	73.7
NAIP11 (N11)	75.7	75.0	-2.6	75.2	0.5	75.9	0.1	81.5

Source: ReSAKSS based on OECD (2022) and World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.1.1C—EMERGENCY FOOD AID (% of total ODA)

Region	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014–2020)	2020
Africa	5.1	5.7	-0.7	5.0	-11.1	4.5	4.2	4.8
Central	1.8	3.2	26.1	4.8	0.3	6.2	9.4	7.9
Eastern	11.4	12.0	-9.4	8.9	-12.6	6.5	-2.4	6.2
Northern	1.2	1.6	8.6	1.6	-15.0	1.2	7.7	1.2
Southern	4.4	4.3	8.5	3.1	-22.0	2.3	17.7	3.9
Western	1.0	0.9	-8.5	1.5	24.0	3.3	6.1	2.6
Less favorable agriculture conditions	4.7	5.3	-16.6	6.6	15.7	7.5	-1.7	6.4
More favorable agriculture conditions	6.4	6.3	-15.9	4.3	-13.3	4.1	2.1	4.3
Mineral-rich countries	7.3	10.4	13.6	8.3	-9.1	6.1	3.5	7.4
Lower middle-income countries	3.1	3.4	18.1	3.6	-18.1	3.0	10.9	3.0
Upper middle-income countries	0.2	0.1	-11.1	0.4	19.3	0.5	45.8	0.8
CEN-SAD	5.4	6.5	1.4	5.8	-9.2	5.1	2.6	4.9
COMESA	8.2	10.4	3.3	8.5	-13.4	6.3	0.5	6.7
EAC	2.6	3.7	11.2	3.6	-7.1	3.3	4.5	3.6
ECCAS	3.5	3.3	5.2	4.1	0.1	5.1	8.8	6.4
ECOWAS	1.0	0.9	-8.5	1.5	24.0	3.3	6.1	2.6
IGAD	15.7	16.7	-9.5	12.0	-12.8	8.4	-4.9	7.5
SADC	2.6	2.9	17.6	2.8	-14.7	2.7	17.5	4.3
UMA	1.2	1.6	8.6	1.6	-15.0	1.2	7.7	1.2
CAADP Compact 2007-09 (CC1)	6.5	5.5	-14.7	4.7	-7.8	5.7	10.7	6.1
CAADP Compact 2010-12 (CC2)	1.8	2.5	11.7	2.8	-4.0	2.9	6.8	3.2
CAADP Compact 2013-15 (CC3)	14.3	14.8	3.7	14.4	-12.2	8.4	2.5	9.9
CAADP Compact not yet (CC0)	6.0	4.7	-46.7	1.5	31.8	4.9	35.0	7.9
CAADP Level 0 (CL0)	6.0	4.7	-46.7	1.5	31.8	4.5	13.5	5.4
CAADP Level 1 (CL1)	17.8	17.8	3.8	16.1	-11.5	9.1	-1.3	9.8
CAADP Level 2 (CL2)	1.4	2.3	23.8	3.4	0.4	4.9	7.8	6.2
CAADP Level 3 (CL3)	3.5	3.3	-10.7	2.9	9.5	3.4	-3.8	2.8
CAADP Level 4 (CL4)	4.5	4.4	-9.7	3.9	-12.2	3.8	1.6	3.4
NAIP00 (N00)	9.2	4.2	-39.6	2.4	39.5	7.7	8.1	7.8
NAIP01 (N01)	4.9	4.6	-21.7	3.6	-17.6	2.5	15.3	3.1
NAIP10 (N10)	1.6	3.6	45.0	4.5	-1.6	6.5	12.8	9.1
NAIP11 (N11)	5.8	6.4	-2.8	5.4	-12.8	4.3	1.7	4.3

Source: ReSAKSS based on OECD (2022) and World Bank (2022).
Note: ODA and food aid refer to gross disbursements.

ANNEX 7: Supplementary Data Tables

TABLE O.1.2A—GENERAL GOVERNMENT GROSS DEBT (% of GDP)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	51.0	-2.4	46.2	31.8	-14.8	23.6	2.3	30.9	4.3	33.2
Central	82.9	-0.6	79.7	51.8	-19.3	20.4	-6.8	31.9	13.3	38.5
Eastern	88.4	-4.2	79.8	53.4	-19.1	39.7	4.6	43.6	-1.3	40.4
Northern	43.9	-6.2	37.7	26.6	-15.4	16.9	-0.2	21.2	8.3	23.3
Southern	37.7	-3.2	34.3	27.2	-5.0	31.5	6.6	45.9	3.5	48.1
Western	45.9	3.7	48.6	29.3	-20.7	15.5	-3.1	19.4	6.2	20.4
Less favorable agriculture conditions	73.4	-2.2	60.4	38.7	-21.1	25.7	7.5	40.3	4.1	44.5
More favorable agriculture conditions	67.8	-5.2	58.0	39.3	-22.0	24.9	5.9	39.8	5.4	45.1
Mineral-rich countries	138.2	-2.3	118.0	79.8	-17.0	51.8	0.2	80.0	11.7	100.3
Lower middle-income countries	46.2	-3.5	38.2	25.7	-17.8	15.7	-0.2	27.6	10.9	34.1
Upper middle-income countries	24.7	-0.3	21.9	19.8	4.0	29.7	8.9	43.9	3.0	47.1
CEN-SAD	52.4	-1.8	46.3	32.5	-16.2	21.4	0.8	35.0	10.4	42.1
COMESA	61.8	-3.5	56.7	41.6	-14.9	29.4	1.9	45.9	9.2	54.4
EAC	49.6	1.9	52.3	38.4	-15.4	26.4	0.3	37.0	4.9	42.4
ECCAS	87.5	-3.7	68.7	44.2	-18.8	20.5	-5.4	35.6	11.3	48.0
ECOWAS	45.9	3.9	42.3	26.8	-21.1	13.6	-2.8	23.9	11.0	29.3
IGAD	95.1	-5.7	75.6	50.3	-18.5	42.3	7.1	64.9	8.1	75.8
SADC	42.4	-2.5	35.9	28.3	-6.7	29.6	4.8	46.4	5.7	54.3
UMA	53.2	-6.4	38.6	24.4	-18.5	17.0	2.3	23.5	6.3	27.9
CAADP Compact 2007-09 (CC1)	39.3	6.1	39.3	23.4	-26.2	11.2	2.3	23.4	11.3	28.8
CAADP Compact 2010-12 (CC2)	72.6	-0.6	66.1	47.2	-15.0	31.7	-1.2	44.6	5.2	50.7
CAADP Compact 2013-15 (CC3)	105.3	-7.2	75.4	50.2	-16.7	38.5	3.3	67.7	13.2	91.4
CAADP Compact not yet (CC0)	34.8	-4.4	29.6	23.2	-8.4	20.8	4.2	31.5	6.2	35.0
CAADP Level 0 (CL0)	34.8	-4.4	29.6	23.2	-8.4	20.8	4.2	31.5	6.2	35.0
CAADP Level 1 (CL1)	108.2	-7.0	78.0	52.6	-15.9	41.7	3.5	73.9	13.5	100.7
CAADP Level 2 (CL2)	78.8	5.3	84.7	61.5	-15.0	27.1	-11.9	25.8	1.8	27.0
CAADP Level 3 (CL3)	95.0	1.9	91.0	54.7	-25.5	22.6	0.0	43.2	9.9	55.7
CAADP Level 4 (CL4)	44.6	0.4	39.5	25.2	-21.3	16.0	2.8	29.3	9.2	35.0
NAIP00 (N00)	37.8	-6.2	26.7	18.9	-8.6	20.5	7.0	32.5	5.1	37.0
NAIP01 (N01)	40.4	-4.6	36.9	29.5	-11.3	21.9	2.0	34.4	9.6	40.8
NAIP10 (N10)	77.2	15.2	105.1	82.5	-11.1	36.1	-15.6	26.1	-2.6	25.1
NAIP11 (N11)	65.6	-1.8	55.7	36.3	-19.7	22.6	1.2	38.0	9.6	46.1

Source: ReSAKSS based on AfDB (2022) and World Bank (2022).

TABLE O.1.2B—GENERAL GOVERNMENT GROSS REVENUE (% OF GDP)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	20.8	3.4	22.9	25.1	2.3	22.6	-3.5	18.5	-1.1	17.6
Central	16.2	5.2	18.5	23.8	8.7	21.2	-0.1	16.1	-4.3	14.5
Eastern	13.6	3.5	16.3	17.9	1.3	16.2	-3.3	13.7	-1.4	13.2
Northern	26.3	2.1	28.8	32.3	4.0	31.1	-1.5	27.1	-0.3	26.0
Southern	23.7	0.9	23.3	25.4	3.4	28.2	0.8	25.9	-1.6	25.1
Western	15.6	8.9	19.2	19.4	-3.3	11.5	-16.5	6.4	0.3	6.4
Less favorable agriculture conditions	16.0	1.2	18.4	22.0	5.9	19.0	-1.9	17.2	1.3	18.2
More favorable agriculture conditions	15.1	2.7	17.2	18.1	1.9	16.4	-3.9	14.7	-1.0	14.1
Mineral-rich countries	9.0	7.3	12.4	15.0	3.3	15.2	-0.1	11.8	-3.9	11.1
Lower middle-income countries	21.4	3.1	23.0	24.4	0.6	20.8	-5.5	15.6	-1.5	14.8
Upper middle-income countries	25.1	3.5	28.0	32.2	5.4	32.8	0.6	32.5	0.8	32.5
CEN-SAD	18.6	5.1	21.8	23.7	1.6	19.4	-6.5	15.1	0.4	14.8
COMESA	19.9	3.1	22.8	25.5	3.3	24.0	-2.5	20.8	-0.5	19.9
EAC	14.6	2.7	16.6	17.4	0.7	17.6	1.4	15.9	-3.1	14.8
ECCAS	21.3	4.6	21.9	27.9	9.3	28.3	-1.8	18.4	-4.1	16.5
ECOWAS	15.6	8.9	19.2	19.4	-3.3	11.5	-16.5	6.4	0.3	6.4
IGAD	13.3	3.8	16.3	18.0	1.5	16.1	-4.1	12.8	-2.0	12.3
SADC	21.8	1.3	21.8	23.9	3.3	26.1	0.7	23.7	-2.0	22.6
UMA	29.3	4.1	34.0	39.5	5.6	37.6	-1.0	33.4	1.9	33.5
CAADP Compact 2007-09 (CC1)	15.5	10.8	19.8	19.9	-3.6	11.5	-16.9	6.1	-1.0	5.8
CAADP Compact 2010-12 (CC2)	16.0	1.2	17.1	18.1	1.6	17.3	-1.1	16.4	-1.0	15.9
CAADP Compact 2013-15 (CC3)	17.3	4.3	19.3	23.9	6.3	23.6	-2.3	15.9	-2.5	15.3
CAADP Compact not yet (CC0)	25.1	1.8	26.7	29.5	3.6	29.9	-0.4	27.4	-0.7	26.3
CAADP Level 0 (CL0)	25.1	1.8	26.7	29.5	3.6	29.9	-0.4	27.4	-0.7	26.3
CAADP Level 1 (CL1)	17.9	3.6	19.8	23.7	5.2	24.5	-2.3	16.4	-2.2	16.0
CAADP Level 2 (CL2)	11.2	7.3	13.3	18.8	10.5	15.3	2.9	14.3	-4.3	12.5
CAADP Level 3 (CL3)	16.7	1.2	18.0	19.7	2.8	16.1	-1.4	16.4	0.1	16.7
CAADP Level 4 (CL4)	16.1	7.4	19.4	19.5	-2.9	12.9	-12.6	8.5	-0.2	8.3
NAIP00 (N00)	26.1	1.8	26.9	29.8	3.4	30.9	-0.3	27.2	-1.1	26.3
NAIP01 (N01)	24.2	2.1	26.3	29.4	4.3	29.0	-1.4	25.8	-0.3	24.8
NAIP10 (N10)	8.9	4.7	9.6	12.8	10.4	16.1	4.3	14.7	-6.0	12.6
NAIP11 (N11)	15.2	6.7	18.4	19.4	-1.0	13.8	-9.1	9.8	-0.7	9.6

Source: ReSAKSS based on AfDB (2022) and World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.1.3—ANNUAL INFLATION, GDP DEFLATOR (%)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	11.4	-2.6	9.7	10.5	0.7	8.7	-0.6	10.3	1.5	15.8
Central	5.0	-0.6	3.1	8.9	2.4	4.1	-1.9	1.0	1.1	2.5
Eastern	16.6	-4.7	8.6	11.2	1.0	15.2	0.1	20.0	4.6	40.3
Northern	6.9	-1.0	8.0	9.9	1.2	8.2	-1.1	8.0	1.2	8.7
Southern	9.0	-0.7	8.7	7.0	0.2	6.8	-0.3	12.4	1.0	22.0
Western	18.0	-5.8	14.4	13.9	-0.1	8.1	-0.5	7.3	0.4	7.6
Less favorable agriculture conditions	6.6	-1.8	3.0	7.3	1.9	4.7	-1.2	2.1	0.2	3.0
More favorable agriculture conditions	11.7	-2.2	7.5	8.8	1.7	11.9	-1.2	7.5	0.4	9.1
Mineral-rich countries	25.4	-9.1	12.7	13.9	-0.3	18.5	2.1	47.8	15.8	113.9
Lower middle-income countries	11.0	-3.0	9.5	10.8	0.6	8.5	-0.6	9.2	0.5	10.7
Upper middle-income countries	8.9	-0.3	10.3	9.4	0.8	6.1	-1.0	6.2	2.0	11.8
CEN-SAD	13.2	-3.8	11.0	11.7	0.5	9.4	-0.4	11.4	1.7	16.6
COMESA	10.4	-2.2	9.6	11.1	1.0	12.4	-0.3	18.8	3.1	32.1
EAC	11.9	-1.0	6.1	9.5	1.2	12.0	-1.1	5.0	-0.3	3.8
ECCAS	5.4	-0.7	3.4	9.1	2.2	4.2	-1.8	1.2	1.0	2.7
ECOWAS	18.0	-5.8	14.4	13.9	-0.1	8.1	-0.5	7.3	0.4	7.6
IGAD	17.2	-5.4	8.8	11.9	0.9	17.3	0.5	25.1	6.2	52.3
SADC	9.6	-0.9	8.6	7.2	0.4	7.0	-0.4	11.1	0.8	18.8
UMA	8.3	-1.4	8.6	10.2	1.3	5.0	-1.9	4.3	3.2	12.1
CAADP Compact 2007-09 (CC1)	18.9	-6.4	15.7	15.2	0.0	9.5	-0.6	8.7	0.6	10.0
CAADP Compact 2010-12 (CC2)	11.6	-1.2	6.4	8.4	1.0	8.9	-0.9	4.7	0.0	4.3
CAADP Compact 2013-15 (CC3)	11.6	-1.2	6.4	8.4	1.0	8.9	-0.9	4.7	0.0	4.3
CAADP Compact not yet (CC0)	7.5	-0.8	8.1	8.8	0.9	7.5	-0.8	7.2	0.9	7.9
CAADP Level 0 (CL0)	7.5	-0.8	8.1	8.8	0.9	7.5	-0.8	7.2	0.9	7.9
CAADP Level 1 (CL1)	16.3	-5.8	9.4	11.5	0.8	14.2	0.8	49.4	13.6	118.8
CAADP Level 2 (CL2)	4.2	-0.3	3.6	8.0	0.7	4.3	-1.0	2.5	0.5	3.2
CAADP Level 3 (CL3)	10.0	-1.2	8.0	8.3	0.6	10.4	-0.8	5.3	0.5	6.4
CAADP Level 4 (CL4)	17.4	-5.1	13.4	13.4	0.3	9.2	-0.6	7.7	0.4	8.4
NAIP00 (N00)	9.3	-6.7	7.9	8.4	4.9	6.4	-1.0	4.5	0.9	6.2
NAIP01 (N01)	5.6	-4.2	8.0	9.4	6.6	8.3	-0.8	8.9	0.8	8.8
NAIP10 (N10)	6.6	-0.8	4.6	6.3	16.6	7.5	-0.8	3.7	-0.5	2.9
NAIP11 (N11)	16.5	-13.2	12.0	12.5	-1.7	10.3	-0.4	13.7	2.2	23.9

Source: ReSAKSS based on World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.2.1A—AGRICULTURAL EXPORTS (% of total merchandise exports)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	13.0	-5.5	10.4	8.3	-7.2	9.1	3.5	12.8	1.4	13.5
Central	5.9	-10.8	3.6	3.0	-5.8	3.0	-4.5	3.1	-1.1	3.1
Eastern	46.4	-7.5	32.9	27.9	-5.9	32.0	10.3	43.4	0.2	43.1
Northern	7.0	-11.0	4.8	4.6	0.0	6.5	6.1	10.7	1.8	11.5
Southern	11.9	-2.3	10.6	8.0	-9.8	8.1	3.8	9.2	-2.2	8.7
Western	13.8	-0.3	13.8	10.7	-7.6	10.3	-2.8	14.9	1.8	15.7
Less favorable agriculture conditions	15.0	-8.9	8.9	6.7	5.1	9.8	1.5	13.0	-4.7	9.4
More favorable agriculture conditions	51.7	-3.8	42.8	40.9	-0.3	38.5	-1.8	34.9	-2.7	32.4
Mineral-rich countries	18.0	-7.8	11.7	7.1	-19.7	6.2	12.6	12.3	9.5	14.7
Lower middle-income countries	12.6	-3.8	11.0	8.7	-7.7	8.9	0.9	12.6	3.0	14.1
Upper middle-income countries	8.6	-7.2	6.1	4.6	-8.3	6.2	9.3	8.9	-3.0	8.3
CEN-SAD	15.9	-6.1	12.1	9.5	-7.2	10.3	2.6	16.5	2.2	17.8
COMESA	24.1	-11.0	13.7	10.8	-7.5	13.3	9.6	19.3	-1.5	19.2
EAC	41.8	-0.8	35.9	32.9	-2.2	28.6	-2.1	23.5	-5.5	20.2
ECCAS	3.5	-11.3	2.2	1.7	-8.8	1.6	-1.3	1.9	0.7	2.1
ECOWAS	13.8	-0.3	13.8	10.7	-7.6	10.3	-2.8	14.9	1.8	15.7
IGAD	48.5	-8.9	31.5	26.0	-7.0	32.4	14.5	47.0	0.0	46.8
SADC	13.4	-2.7	12.1	9.3	-10.4	9.1	4.0	10.2	-2.3	9.6
UMA	6.6	-14.0	3.6	3.4	-0.5	4.4	8.4	8.6	3.2	9.8
CAADP Compact 2007-09 (CC1)	8.4	0.4	8.8	7.3	-6.5	7.8	-1.8	10.5	2.6	11.9
CAADP Compact 2010-12 (CC2)	42.8	-1.2	38.4	34.1	-4.0	30.5	-2.4	27.8	-4.7	23.4
CAADP Compact 2013-15 (CC3)	12.6	-6.8	8.9	5.1	-21.3	4.1	12.1	9.3	13.0	13.1
CAADP Compact not yet (CC0)	8.0	-6.5	6.3	5.5	-2.9	7.4	5.5	10.5	-0.1	10.5
CAADP Level 0 (CL0)	8.0	-6.5	6.3	5.5	-2.9	7.4	5.5	10.5	-0.1	10.5
CAADP Level 1 (CL1)	13.0	-6.4	9.2	5.3	-21.0	4.3	13.1	9.5	13.0	13.4
CAADP Level 2 (CL2)	16.5	-4.3	14.6	12.9	-6.2	11.7	-4.3	11.3	-3.9	9.2
CAADP Level 3 (CL3)	23.4	-3.4	22.2	22.7	0.7	19.3	-6.4	17.8	-4.4	13.9
CAADP Level 4 (CL4)	51.3	-2.0	47.8	44.5	-2.4	40.4	-4.0	37.5	-2.4	35.0
NAIP00 (N00)	5.4	-4.6	4.4	3.3	-7.3	4.4	8.1	6.2	-0.7	6.2
NAIP01 (N01)	10.8	-9.0	7.5	6.6	-3.7	8.7	6.4	13.4	0.5	13.9
NAIP10 (N10)	17.1	1.8	15.1	12.9	-3.9	11.4	-5.3	6.7	-8.4	5.6
NAIP11 (N11)	21.4	-3.4	18.1	14.6	-6.4	14.2	0.4	20.0	2.0	21.3

Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.2.1B—AGRICULTURAL IMPORTS (% of total merchandise imports)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	15.6	-0.2	15.3	13.8	-3.4	14.6	1.5	15.3	1.8	16.4
Central	17.6	-2.0	17.6	18.2	-0.8	16.7	0.0	17.0	3.5	18.7
Eastern	14.7	0.0	14.2	12.4	-4.7	14.4	2.5	16.8	4.2	18.6
Northern	20.2	-2.7	17.9	15.8	-2.5	16.4	2.1	17.3	1.1	18.4
Southern	9.4	1.8	10.1	9.0	-3.9	10.0	-0.4	10.7	2.3	11.4
Western	17.3	2.5	18.3	16.7	-4.8	16.7	2.3	16.3	-0.6	16.2
Less favorable agriculture conditions	21.1	-0.7	19.5	19.6	-3.2	18.7	1.4	20.6	1.1	20.9
More favorable agriculture conditions	15.9	-1.4	16.3	14.2	-6.7	12.7	-0.8	14.4	3.4	15.6
Mineral-rich countries	17.3	-2.6	15.5	14.1	-1.1	18.1	2.6	19.0	2.0	20.3
Lower middle-income countries	18.0	0.0	17.8	15.8	-3.2	16.5	1.6	16.3	0.7	17.0
Upper middle-income countries	8.1	3.9	9.0	7.8	-5.2	8.9	4.3	11.4	3.7	12.7
CEN-SAD	17.1	0.0	16.5	14.9	-3.0	16.2	2.5	16.9	1.1	17.9
COMESA	16.3	-0.2	16.3	14.7	-2.5	16.5	2.3	17.4	1.6	18.7
EAC	14.6	-3.3	13.5	13.1	-1.7	13.6	-0.1	12.8	-0.1	13.1
ECCAS	19.7	-0.5	19.5	18.4	-2.7	16.8	0.4	17.7	4.5	19.6
ECOWAS	17.3	2.5	18.3	16.7	-4.8	16.7	2.3	16.3	-0.6	16.2
IGAD	14.3	0.7	13.6	12.1	-3.7	14.8	1.7	17.3	4.8	19.5
SADC	10.5	0.8	11.2	10.1	-4.3	10.9	0.4	11.3	1.7	12.0
UMA	19.5	-3.7	16.5	14.8	-1.4	14.5	1.5	16.3	1.5	17.5
CAADP Compact 2007-09 (CC1)	15.9	3.2	17.0	15.2	-6.1	15.3	2.8	14.8	0.4	15.3
CAADP Compact 2010-12 (CC2)	17.3	-0.9	17.0	15.6	-2.8	15.0	-1.9	15.2	1.2	15.9
CAADP Compact 2013-15 (CC3)	16.2	1.3	16.9	15.4	-2.2	17.6	2.6	20.1	4.7	22.6
CAADP Compact not yet (CC0)	14.8	-1.7	13.9	12.5	-2.6	13.5	1.7	14.5	1.7	15.5
CAADP Level 0 (CL0)	14.8	-1.7	13.9	12.5	-2.6	13.5	1.7	14.5	1.7	15.5
CAADP Level 1 (CL1)	16.4	1.3	17.0	15.4	-2.5	17.6	3.0	20.1	4.6	22.5
CAADP Level 2 (CL2)	22.1	-0.8	22.4	22.5	0.6	22.4	-1.9	20.1	0.0	20.9
CAADP Level 3 (CL3)	16.0	-2.5	15.5	13.9	-4.7	12.2	-1.9	13.3	3.1	14.4
CAADP Level 4 (CL4)	15.8	2.2	16.4	14.7	-5.3	14.8	1.2	14.6	0.7	15.2
NAIP00 (N00)	13.5	-1.7	12.7	10.9	-4.4	11.7	1.8	13.4	2.0	13.9
NAIP01 (N01)	17.3	-1.4	16.3	14.7	-2.5	15.6	2.2	16.5	1.4	17.8
NAIP10 (N10)	21.5	-0.1	22.6	22.6	1.7	23.4	0.1	17.0	-4.5	16.1
NAIP11 (N11)	15.6	1.7	16.3	14.8	-4.1	15.4	0.9	15.7	1.9	16.8

Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.2.2—RATIO OF AGRICULTURAL EXPORTS TO AGRICULTURAL IMPORTS

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	0.8	-2.6	0.8	0.7	-5.2	0.6	-1.4	0.7	0.6	0.7
Central	0.5	-8.4	0.4	0.3	-5.8	0.3	-9.9	0.2	2.3	0.3
Eastern	1.7	-4.7	1.4	1.2	-4.3	1.0	-0.5	1.1	-0.5	1.0
Northern	0.3	0.2	0.3	0.4	1.2	0.3	-3.3	0.4	3.3	0.4
Southern	1.3	-4.0	1.1	0.9	-4.3	0.9	3.3	1.0	-0.8	0.9
Western	1.1	-2.0	1.2	0.9	-7.2	0.8	-4.7	0.9	-2.2	0.7
Less favorable agriculture conditions	0.3	-9.0	0.2	0.3	10.5	0.3	0.6	0.4	-4.2	0.3
More favorable agriculture conditions	1.6	-4.5	1.2	1.2	3.5	1.2	-0.4	1.1	-1.9	1.1
Mineral-rich countries	0.9	-5.0	0.7	0.4	-14.5	0.3	4.0	0.6	12.3	0.7
Lower middle-income countries	0.7	-1.2	0.7	0.6	-7.1	0.5	-3.0	0.6	1.3	0.6
Upper middle-income countries	1.2	-6.7	0.9	0.8	-2.7	0.8	-0.9	0.8	-2.7	0.8
CEN-SAD	0.8	-2.5	0.8	0.7	-7.1	0.6	-3.8	0.7	0.8	0.7
COMESA	0.9	-3.9	0.8	0.7	-5.5	0.6	-1.1	0.6	1.1	0.7
EAC	1.9	-1.2	1.7	1.4	-6.7	1.0	-3.8	1.2	0.6	1.1
ECCAS	0.3	-11.6	0.2	0.2	-1.2	0.2	-6.1	0.2	2.0	0.2
ECOWAS	1.1	-2.0	1.2	0.9	-7.2	0.8	-4.7	0.9	-2.2	0.7
IGAD	1.8	-6.0	1.4	1.2	-4.3	0.9	0.3	1.0	0.0	1.0
SADC	1.3	-3.6	1.1	0.9	-5.0	0.8	2.6	1.0	0.0	1.0
UMA	0.4	-3.6	0.3	0.4	2.9	0.3	-2.4	0.4	4.5	0.4
CAADP Compact 2007-09 (CC1)	0.7	-2.6	0.8	0.7	-5.1	0.6	-4.3	0.6	-2.8	0.5
CAADP Compact 2010-12 (CC2)	2.0	-2.3	1.8	1.5	-5.0	1.3	-2.2	1.4	-0.6	1.3
CAADP Compact 2013-15 (CC3)	1.0	-5.6	0.7	0.5	-14.0	0.3	3.3	0.5	7.8	0.6
CAADP Compact not yet (CC0)	0.5	0.5	0.5	0.5	-1.9	0.5	-0.5	0.5	1.0	0.6
CAADP Level 0 (CL0)	0.5	0.5	0.5	0.5	-1.9	0.5	-0.5	0.5	1.0	0.6
CAADP Level 1 (CL1)	1.0	-4.8	0.8	0.5	-13.2	0.3	4.3	0.5	7.9	0.7
CAADP Level 2 (CL2)	0.8	-9.0	0.6	0.5	-5.7	0.4	-5.1	0.6	5.4	0.6
CAADP Level 3 (CL3)	0.9	-3.0	0.9	1.0	6.3	1.0	-1.0	0.9	-4.4	0.7
CAADP Level 4 (CL4)	1.4	-3.5	1.4	1.2	-5.3	1.0	-3.7	1.0	-2.3	0.9
NAIP00 (N00)	0.5	-0.1	0.4	0.4	-1.7	0.5	3.7	0.5	0.8	0.5
NAIP01 (N01)	0.4	-0.6	0.4	0.5	-2.9	0.4	-2.4	0.5	1.5	0.5
NAIP10 (N10)	0.9	-3.1	0.7	0.5	-6.6	0.5	-3.7	0.5	3.5	0.6
NAIP11 (N11)	1.4	-3.9	1.3	1.1	-5.8	0.9	-2.8	1.0	-0.9	0.9

Source: ReSAKSS based on UNCTAD (2022) and World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.3.1—TOTAL FERTILIZER CONSUMPTION (kilograms per hectare)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2020)	Annual avg. change (%) (2014–2020)	2020
Africa	17.8	1.5	19.2	18.2	-1.1	19.1	2.5	23.5	4.2	25.5
Central	3.2	5.8	4.1	3.0	-3.5	3.0	5.2	4.5	4.6	4.9
Eastern	7.9	-0.9	7.4	7.9	6.2	12.0	5.5	16.7	6.4	18.5
Northern	65.6	3.9	79.4	76.1	-2.5	74.2	2.1	82.9	1.2	86.2
Southern	34.4	-0.6	34.3	32.8	1.0	33.7	2.4	37.8	1.5	39.0
Western	4.9	1.6	5.1	5.6	-0.8	6.9	6.9	12.2	12.9	15.1
Less favorable agriculture conditions	2.9	7.9	4.1	4.3	5.5	4.6	0.7	8.1	4.8	9.3
More favorable agriculture conditions	7.5	-2.6	7.1	8.0	10.3	11.6	5.2	16.4	6.2	18.2
Mineral-rich countries	4.0	0.2	5.1	4.8	3.2	7.0	-0.4	9.7	6.4	10.7
Lower middle-income countries	25.0	3.4	28.4	27.0	-3.3	27.8	3.2	34.6	5.0	38.3
Upper middle-income countries	50.5	-0.9	51.1	49.4	1.1	52.3	3.5	54.2	-0.3	53.0
CEN-SAD	18.1	2.8	20.4	19.6	-2.8	19.9	1.8	24.9	5.6	27.7
COMESA	28.1	1.0	29.8	27.0	-1.7	27.3	0.1	32.3	3.7	34.6
EAC	6.2	3.5	7.0	7.2	2.3	9.1	7.5	12.0	7.3	14.1
ECCAS	2.8	4.8	3.5	3.2	4.0	4.0	6.1	5.5	3.7	5.9
ECOWAS	4.9	1.6	5.1	5.6	-0.8	6.9	6.9	12.2	12.9	15.1
IGAD	8.9	-0.4	8.2	8.7	7.8	13.4	4.4	18.3	5.9	20.0
SADC	23.5	-0.2	24.2	21.8	0.2	21.7	1.6	23.9	1.7	24.8
UMA	24.9	5.7	31.0	30.5	-0.1	31.8	5.9	32.4	-1.8	31.4
CAADP Compact 2007-09 (CC1)	5.6	-0.3	5.3	6.1	8.7	8.9	5.6	15.0	11.5	18.3
CAADP Compact 2010-12 (CC2)	7.7	2.9	9.5	9.8	1.0	11.6	6.6	15.7	5.0	17.6
CAADP Compact 2013-15 (CC3)	7.7	2.9	9.5	9.8	1.0	11.6	6.6	15.7	5.0	17.6
CAADP Compact not yet (CC0)	60.0	2.3	68.8	66.2	-1.2	66.1	2.4	72.9	0.9	74.6
CAADP Level 0 (CL0)	60.0	2.3	68.8	66.2	-1.2	66.1	2.4	72.9	0.9	74.6
CAADP Level 1 (CL1)	9.9	-2.1	8.1	7.3	-2.3	8.9	-3.1	10.5	5.4	10.8
CAADP Level 2 (CL2)	2.8	5.6	3.6	2.8	-3.5	2.8	4.4	3.8	5.8	4.2
CAADP Level 3 (CL3)	4.1	4.5	5.8	6.0	4.9	7.6	4.4	12.0	5.0	13.4
CAADP Level 4 (CL4)	7.9	0.4	8.0	9.0	4.6	12.5	7.4	19.1	9.4	22.7
NAIP00 (N00)	34.0	-0.1	35.0	33.3	0.6	35.0	4.2	37.4	-0.6	36.6
NAIP01 (N01)	75.8	3.8	90.6	87.5	-2.0	83.0	0.9	92.2	1.7	96.5
NAIP10 (N10)	0.3	-19.8	0.1	0.3	34.2	0.7	6.1	1.2	0.1	1.4
NAIP11 (N11)	7.3	0.6	7.5	7.9	3.1	10.5	5.1	15.6	8.3	18.1

Source: ReSAKSS based on FAO (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.3.2—AGRICULTURAL VALUE ADDED (% GDP)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	18.6	-1.6	17.7	16.1	-3.1	15.2	-1.4	15.3	1.2	16.2
Central	24.2	-5.6	18.4	17.6	-2.4	16.8	-0.5	17.5	2.1	19.1
Eastern	34.4	-2.8	30.3	29.1	-1.5	26.9	-0.8	24.7	-1.5	24.1
Northern	14.0	-3.9	11.7	10.4	-4.7	10.2	0.7	11.1	1.0	11.6
Southern	5.5	-2.0	5.0	4.6	-1.7	4.4	-0.9	4.8	-0.3	4.8
Western	27.8	1.9	31.3	27.0	-4.3	23.5	-4.0	22.3	2.2	24.2
Less favorable agriculture conditions	34.9	-0.9	32.3	35.5	3.5	36.8	0.9	36.3	-0.4	36.4
More favorable agriculture conditions	34.7	-5.4	28.8	29.3	0.9	31.1	-0.9	28.2	-0.5	28.3
Mineral-rich countries	37.8	-2.0	33.2	30.5	-2.8	25.3	-2.2	20.3	-6.2	16.7
Lower middle-income countries	19.5	-0.6	19.9	17.5	-4.4	15.7	-2.4	15.9	1.9	17.1
Upper middle-income countries	3.4	-1.9	3.2	2.6	-5.6	2.3	-1.2	2.8	2.0	3.0
CEN-SAD	23.6	-0.2	23.2	20.8	-3.4	18.8	-2.5	17.8	0.4	18.4
COMESA	23.3	-3.3	19.3	18.2	-1.9	17.1	-1.4	15.8	-1.1	15.8
EAC	32.2	-5.2	25.7	23.5	-4.5	21.1	0.4	22.5	1.5	23.5
ECCAS	19.1	-6.0	14.4	13.4	-3.9	12.9	0.6	14.5	2.0	15.8
ECOWAS	27.8	1.9	31.3	27.0	-4.3	23.5	-4.0	22.3	2.2	24.2
IGAD	36.4	-2.0	32.3	30.9	-1.5	28.2	-0.9	25.3	-1.9	24.6
SADC	9.3	-5.1	7.6	7.2	-1.7	7.1	-0.3	7.9	1.4	8.3
UMA	12.4	-6.7	9.3	8.0	-6.6	8.5	4.6	10.8	1.7	11.5
CAADP Compact 2007-09 (CC1)	31.0	1.4	33.9	29.5	-3.7	25.9	-3.8	24.3	2.0	26.5
CAADP Compact 2010-12 (CC2)	26.3	-4.0	22.6	21.1	-2.8	20.3	-1.4	20.2	1.1	20.9
CAADP Compact 2013-15 (CC3)	23.6	-0.8	21.9	20.8	-2.1	17.7	-3.3	14.9	-5.0	12.9
CAADP Compact not yet (CC0)	9.2	-1.2	8.5	7.6	-4.2	7.4	0.3	8.2	1.6	8.7
CAADP Level 0 (CL0)	9.2	-1.2	8.5	7.6	-4.2	7.4	0.3	8.2	1.6	8.7
CAADP Level 1 (CL1)	23.8	-0.7	22.1	21.0	-2.1	17.6	-3.7	14.4	-5.9	12.0
CAADP Level 2 (CL2)	28.4	-5.7	21.7	19.6	-3.3	18.9	-1.7	18.6	1.2	19.3
CAADP Level 3 (CL3)	32.3	-1.6	29.3	28.2	-1.3	27.9	-1.8	24.6	-0.4	24.6
CAADP Level 4 (CL4)	28.6	0.4	30.5	26.8	-3.6	24.0	-3.3	23.0	1.9	24.8
NAIP00 (N00)	4.6	4.6	5.0	4.3	-5.3	4.5	2.7	5.9	2.2	6.4
NAIP01 (N01)	14.5	-2.6	12.4	11.6	-3.0	11.2	-0.4	11.1	0.2	11.4
NAIP10 (N10)	34.8	-8.0	22.7	20.5	-2.7	19.9	-2.9	18.2	1.1	19.0
NAIP11 (N11)	29.1	0.1	29.8	26.9	-3.0	23.9	-3.0	22.5	0.8	23.5

Source: ReSAKSS based on World Bank (2022).

ANNEX 7: Supplementary Data Tables

TABLE O.4.1—GROSS DOMESTIC PRODUCT (trillion, constant 2015 US$)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	1.2	4.8	1.4	1.6	5.9	2.1	3.6	2.5	2.1	2.6
Central	0.1	2.3	0.1	0.1	5.9	0.1	4.8	0.1	1.5	0.1
Eastern	0.2	4.8	0.2	0.2	7.6	0.3	2.6	0.4	3.4	0.4
Northern	0.4	6.9	0.5	0.5	5.3	0.6	1.9	0.8	2.9	0.8
Southern	0.3	3.0	0.3	0.4	5.7	0.5	3.4	0.5	0.2	0.5
Western	0.3	4.6	0.3	0.4	6.0	0.5	6.1	0.7	2.2	0.7
Less favorable agriculture conditions	0.0	4.8	0.0	0.0	5.8	0.0	5.9	0.1	3.7	0.1
More favorable agriculture conditions	0.1	4.7	0.1	0.1	7.6	0.2	6.8	0.2	5.7	0.3
Mineral-rich countries	0.1	4.6	0.1	0.1	7.7	0.2	-0.5	0.2	0.4	0.2
Lower middle-income countries	0.7	4.2	0.8	1.0	5.7	1.3	4.7	1.6	2.3	1.7
Upper middle-income countries	0.3	6.5	0.3	0.4	5.4	0.4	0.9	0.5	0.4	0.5
CEN-SAD	0.7	6.1	0.8	0.9	5.9	1.2	3.5	1.5	2.7	1.6
COMESA	0.4	6.3	0.5	0.6	5.9	0.7	2.4	0.9	3.7	1.0
EAC	0.1	2.4	0.1	0.1	8.5	0.2	4.3	0.2	3.7	0.3
ECCAS	0.1	3.5	0.1	0.1	8.4	0.2	4.9	0.2	0.6	0.2
ECOWAS	0.3	4.6	0.3	0.4	6.0	0.5	6.1	0.7	2.2	0.7
IGAD	0.1	4.8	0.2	0.2	8.0	0.2	2.0	0.3	3.2	0.3
SADC	0.3	2.8	0.4	0.5	5.8	0.6	3.7	0.7	0.9	0.7
UMA	0.2	8.6	0.3	0.3	4.8	0.3	1.1	0.4	1.4	0.4
CAADP Compact 2007-09 (CC1)	0.2	5.0	0.3	0.4	6.9	0.5	6.6	0.7	2.3	0.7
CAADP Compact 2010-12 (CC2)	0.2	2.6	0.2	0.2	5.5	0.3	5.6	0.4	4.7	0.4
CAADP Compact 2013-15 (CC3)	0.2	4.8	0.2	0.2	6.4	0.3	2.1	0.3	-0.4	0.3
CAADP Compact not yet (CC0)	0.6	5.4	0.7	0.8	5.5	1.0	1.9	1.1	1.9	1.2
CAADP Level 0 (CL0)	0.6	5.4	0.7	0.8	5.5	1.0	1.9	1.1	1.9	1.2
CAADP Level 1 (CL1)	0.1	4.8	0.2	0.2	6.6	0.3	1.9	0.3	-0.9	0.3
CAADP Level 2 (CL2)	0.0	1.2	0.1	0.1	4.9	0.1	5.4	0.1	4.1	0.1
CAADP Level 3 (CL3)	0.0	5.4	0.0	0.1	6.3	0.1	5.8	0.1	3.7	0.1
CAADP Level 4 (CL4)	0.3	4.4	0.4	0.5	6.5	0.7	6.3	0.9	3.0	1.0
NAIP00 (N00)	0.4	3.5	0.4	0.5	5.6	0.6	2.9	0.6	0.1	0.6
NAIP01 (N01)	0.3	7.5	0.4	0.4	5.7	0.5	1.8	0.6	3.3	0.7
NAIP10 (N10)	0.0	-1.4	0.0	0.0	5.7	0.0	5.9	0.0	3.9	0.1
NAIP11 (N11)	0.5	4.5	0.6	0.7	6.3	0.9	5.0	1.2	2.5	1.3

Source: ReSAKSS based on World Bank (2022).
Note: Aggregate value for a group is the sum of gross domestic product for countries in the group.

ANNEX 7: Supplementary Data Tables

TABLE O.5.1—GLOBAL HUNGER INDEX (GHI)

Region	Annual avg. level (1995–2003)	Annual avg. change (%) (1995–2003)	2003	Annual avg. level (2003–2008)	Annual avg. change (%) (2003–2008)	Annual avg. level (2008–2014)	Annual avg. change (%) (2008–2014)	Annual avg. level (2014-2021)	Annual avg. change (%) (2014-2021)	2021
Africa	35.7	-1.5	33.4	32.0	-1.8	28.7	-2.2	25.1	-2.1	23.7
Central	45.3	-1.1	43.3	42.2	-1.1	39.3	-1.3	36.3	-1.3	34.9
Eastern	45.0	-1.9	41.4	39.2	-2.2	34.3	-2.7	28.8	-2.8	26.5
Northern	15.9	-1.6	14.9	14.3	-1.7	12.8	-2.0	11.3	-2.1	10.5
Southern	34.2	-1.7	31.6	29.9	-2.1	25.8	-3.2	21.8	-2.5	20.4
Western	37.7	-1.5	35.2	33.5	-1.9	30.1	-2.2	26.5	-1.9	25.1
Less favorable agriculture conditions	50.3	-1.4	47.5	45.9	-1.5	42.0	-1.7	37.5	-1.8	35.4
More favorable agriculture conditions	46.4	-2.1	42.3	39.7	-2.5	34.0	-3.1	28.0	-3.0	25.6
Mineral-rich countries	45.0	-1.1	43.0	41.8	-1.1	38.9	-1.3	35.9	-1.3	34.6
Lower middle-income countries	29.8	-1.5	27.9	26.6	-1.8	23.9	-2.2	21.0	-2.0	19.8
Upper middle-income countries	19.0	-1.4	17.9	17.4	-1.4	15.5	-2.1	14.0	-1.5	13.5
CEN-SAD	32.6	-1.3	30.7	29.5	-1.5	27.0	-1.8	24.1	-1.7	22.9
COMESA	38.0	-1.4	35.7	34.2	-1.7	30.9	-2.0	27.1	-2.1	25.5
EAC	42.7	-1.4	40.2	38.6	-1.6	35.2	-1.8	31.7	-1.6	30.2
ECCAS	48.2	-1.5	45.1	43.2	-1.7	38.7	-2.2	34.2	-1.9	32.4
ECOWAS	37.7	-1.5	35.2	33.5	-1.9	30.1	-2.2	26.5	-1.9	25.1
IGAD	46.6	-2.0	42.7	40.2	-2.4	34.8	-2.8	28.7	-3.1	26.1
SADC	39.1	-1.3	36.8	35.5	-1.5	32.1	-2.0	28.8	-1.6	27.5
UMA	15.5	-2.3	14.1	13.4	-2.4	11.1	-3.5	9.1	-3.4	8.2
CAADP Compact 2007-09 (CC1)	33.8	-1.6	31.6	30.3	-1.7	28.3	-2.2	24.4	-1.9	22.7
CAADP Compact 2010-12 (CC2)	37.7	-1.4	35.4	34.0	-1.7	31.4	-3.1	26.6	-2.2	24.7
CAADP Compact 2013-15 (CC3)	17.2	-1.3	16.3	15.8	-1.4	15.0	-1.8	13.3	-1.6	12.4
CAADP Compact not yet (CC0)	40.5	-2.3	36.5	34.0	-2.9	30.2	-4.0	23.0	-3.9	19.7
CAADP Level 0 (CL0)	17.2	-1.3	16.3	15.8	-1.4	14.5	-1.6	13.5	-0.2	13.5
CAADP Level 1 (CL1)	37.8	-1.3	35.8	34.5	-1.5	30.8	-2.3	29.2	0.1	28.9
CAADP Level 2 (CL2)	39.2	-1.1	37.5	36.6	-1.1	34.2	-1.3	34.0	0.8	34.1
CAADP Level 3 (CL3)	14.3	-2.0	13.1	12.5	-2.3	10.4	-3.6	20.0	19.7	25.7
CAADP Level 4 (CL4)	41.2	-1.8	37.9	35.8	-2.3	31.4	-2.6	26.7	-2.5	24.8
NAIP00 (N00)	39.4	-1.6	36.6	35.0	-1.9	32.1	-3.2	26.3	-2.4	24.5
NAIP01 (N01)	20.2	-0.9	19.5	19.2	-0.9	18.5	-1.5	16.8	-1.1	16.3
NAIP10 (N10)	47.4	-0.8	45.8	44.9	-0.9	43.4	-1.1	40.1	-1.0	38.9
NAIP11 (N11)	93.0	-1.8	85.6	80.9	-2.2	74.2	-2.7	51.8	-8.8	39.6

Source: ReSAKSS based on von Grebmer et al. (2021), World Bank (2022), and ILO (2022).

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