



AFRICA AGRICULTURE STATUS REPORT 2019



THE HIDDEN MIDDLE

A QUIET REVOLUTION IN THE PRIVATE SECTOR
DRIVING AGRICULTURAL TRANSFORMATION

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ISSN: 2313-5387

Correct Citation: AGRA. (2019). ***Africa Agriculture Status Report: The Hidden Middle: A Quiet Revolution in the Private Sector Driving Agricultural Transformation*** (Issue 7). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).

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AGRA acknowledges the following contributing institutions:



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Preface

We are poised on the edge of a breakthrough for agriculture in Africa. This is vital not only for the food security of hundreds of millions of Africans, but also for the African economy and sustainable development on the continent. We see a transformation underway from a subsistence-oriented agriculture sector into one that is more commercialized, profitably productive, and smallholder and entrepreneur-led. This comes at a time when food systems across the continent are responding to rapid urbanization, rising incomes, and changing diets.

Agricultural value chains are becoming more urbanized and consumer driven, with a greater emphasis on quality and food safety. These dynamics are creating many new growth opportunities within Africa's food systems. Output and employment in agriculture continue to grow, and a great deal of value addition and employment is being created along value chains in the form of agricultural trade, farm services, agroprocessing, urban retailing, and food services. However, these changes are not just happening on farms and in national governments.

This Report examines the crucial role played by small and medium enterprises (SMEs) in driving this transformation. The midstream of the food value chain is particularly important, as it is the closest the market gets to the farmer. This midstream consists of traders, truckers and processors. They connect the farmer with the downstream—retailers. The midstream constitutes about 40% of the total gross value of the value chains in sub-Saharan Africa. This is the same as the share from farms, and together, they are the essence of food value chains in Africa.

About 80% of the midstream of the value chains comprises SMEs. These are the motors of the value chain transformation, and of rural employment off farm. We call this sector the “Hidden Middle” because it is often hidden from the policy debate—but it is not a “missing middle”. Contrary to perceptions, this Report shows not only that the private sector is present, but that it has already “taken off”, and is ready for support and investment to thrive further. In fact, this Hidden Middle is dynamic, and undergoing and driving a “Quiet Revolution”.

We must learn from this, and help governments replicate it at scale across the continent, with improved support from public infrastructure and sound policies. Governments and donors need not “reinvent the wheel” and step in directly to provide warehouses or transport or aggregation facilities, for example. The private sector is already providing these services. The role of government is instead to remove the constraints facing them and help the Quiet Revolution proceed further and faster.

Infrastructure and policy investments are how governments can help. This amplifies the role of the private sector in driving agricultural productivity, opening up markets, and facilitating increased private investment in the sector. Roads

connect farmers to input and output markets, while public investment in more and improved wholesale markets in secondary cities and rural towns helps connect farmers products to where the demand is. As the processing sector grows, it will create value addition and markets, but it will need and seek more raw material supply—something the right policy and regulatory framework can help with.

This publication is a product of intense scholarly work on the core chapters that I hope will stimulate intense discussion and a productive synthesis of ideas that will lead us forward in this critical work. I am most grateful to the contributors for their efforts and support to the much needed transformation of agriculture in Africa.



Dr. Agnes Kalibata
President, AGRA

Acknowledgements

The *Hidden Middle: A Quiet Revolution in the Private Sector driving Agricultural Transformation* report received support and guidance from many contributors whom we acknowledge. Daudi Sumba, Andrew Cox, Waiganjo Njoroge, Jane Njuguna, and Josephine Njau, provided overall leadership for the development and production of this Report. Prof. Thomas Reardon provided the technical support to this publication in addition to authoring Chapters 1, 2, and 3, coauthoring Chapters 4, 6, and 9, and 11, and co-designing the chapter structure and themes with AGRA. Prof. Reardon also contributed extensive input to and edited all the other chapters. We appreciate the support the team received from the AGRA President, Dr. Agnes Kalibata, who also authored the Preface and has been a champion of engaging the private sector in driving the agricultural transformation. We also acknowledge all the other institutions represented in this publication for their contributions (AFDB, AGRA, Belvedere SL., BFAP, FAO, FAPRI, IFAD, IFPRI, Kofi Annan Foundation, MSU, Seed Systems Group, The World Bank, University of Missouri, University of Pretoria, WAFSA).

We extend our gratitude to the project coordinator, Jane Njuguna, assisted by Josephine Njau, and Alice Thuita. We also thank AGRA staff and the Internal Steering Committee Members (Agnes Kalibata, Andrew Cox, Adam Gerstenmier, Daudi Sumba, Waiganjo Njoroge, Jane Njuguna, Josephine Njau, and Alice Thuita) for providing input and logistical support for the production and launching of the Report.

We thank all the people and institutions that might have been missed who provided support in various ways towards the production of this Report. A special thank you to the following chapter authors and contributors:

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Valuable comments, suggestions and insights were provided by the following peer reviewers: Christopher Ian Brett (The World Bank), David Atwood (USAID), Issoufou Kapran (ICRISAT-Mali), Jane Ininda (AGRA), Joshua Ariga (The Bill & Melinda Gates Foundation), Louise

Fox (USAID), Njack Kane (Intervalle Genève), Peter Hazell (Consultant), Rob Vos (IFPRI), Rui Benfica (IFPRI), Sara Boettiger (McKinsey & Company), Steven Haggblade (MSU), Vos Rob (IFPRI)

The Report also profited from an AGRA-sponsored writeshop Convening held on March 25 and 26, 2019 in Nairobi, Kenya, that brought together the main authors, contributors and thought leaders. We appreciate all those who attended the writeshop and contributed to the framing and shaping the content of this report.

Finally, we thank Anne Marie Nyamu for meticulous editorial support. We also thank Conrad Mudibo (Ecomedia) for the design and layout of the report. We recognize Jane Njuguna for preparing the data tables. We also recognize the Communications Team who provided various forms of support.

We recognize and express our gratitude to everyone who contributed to the production of this report. We apologize to any individuals or organizations that we may have inadvertently omitted.

The Africa Agriculture Status Report 2019 is an important accomplishment and we are grateful to all those who made it possible. We hope the Report serves as a useful contribution to the understanding of the role of private sector in sub-Saharan Africa.

Daudi Sumba

Head, Monitoring & Evaluation/Knowledge Management

Acronymns

AASR	Africa Agriculture Status Report
AfCFTA	African Continental Free Trade Agreement
AfDB	African Development Bank
AFS	Agri-Food System
AGOA	African Growth and Opportunity Act
AGRA	Alliance for a Green Revolution in Africa
BRAC	Building Resources Across Communities
COMESA	Common Market for Eastern and Southern Africa
CSR	Corporate Social Responsibility
DRC	Democratic Republic of Congo
EAC	East African Community
EBA	Enabling the Business of Agriculture
ECOWAS	Economic Community of West African States
EPZ	Export Processing Zone
EU	European Union
FDI	Foreign Direct Investment
FEPSAN	Fertilizer suppliers Association of Nigeria
FTE	Full Time Equivalent
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
JSE	Johannesburg Securities Exchange
JV	Joint Venture
LSMS-ISA	Living Standards Measurement Study-Integrated Surveys on Agriculture
MNC	Multinational Corporations
MSME	Micro, Small, and Medium Enterprises
NAIP	National Agricultural Investment Plans
NARS	National Agricultural Research Systems
NGO	Non-Governmental Organization
PFI	Presidential Fertilizer Initiative

PPP	Public–Private Partnership
R&D	Research and Development
REC	Regional Economic Community
SADC	Southern African Development Community
SEZ	Special Economic Zone
SMADF	Small and Medium Agribusiness Development Fund (Uganda)
SME	Small and Medium Enterprise
SMS	Short Message Service
USAID	United States Agency for International Development

01 Private Sector's Role in Agricultural Transformation in Africa: Overview

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Key Messages

- 1** Dynamic and inclusive agricultural transformation depends on whether farms, especially small-scale farms, are “sandwiched” between small-scale enterprise driven output and input value chains. The performance of those value chains determines the profitability and, therefore, the investment incentives and productive capacity of small farms. Farm investments affect rural jobs, as 40% of rural employment time is in self-employed farming. Food system employment in the midstream (processing, wholesale, and logistics) and downstream (farming) generates another 25% of rural employment. These two sources of job creation are inter-dependent.
- 2** The output value chain post-farmgate is composed nearly entirely of private sector enterprises—from small and medium enterprises (SMEs) to emerging large enterprises in the midstream (wholesale, logistics, and processing) and the downstream (retail and food service).
- 3** Around 80% of food consumption in Africa is from purchases by urban and rural consumers. Only 20% of food production is for self-consumption. Thus, 80% of Africa's food consumption is marketed and handled mostly through private operators. The private sector is thus crucial for food security.
- 4** An estimated 96% of marketed farm output in Africa is supplied through domestic markets, leaving only 4% for export markets. Domestic supply chains are currently crucial to farmers. Over time, export markets are expected to rise in importance.
- 5** There has been rapid growth and proliferation of SMEs in the midstream of the output value chains, constituting a Quiet Revolution in the Hidden Middle. Wholesale, logistics, processing SMEs in the aggregate are the biggest investors (and the lion's share of the private sector's volume) in creating markets for farmers in Africa today. SMEs will continue playing a key role over the next 10–20 years. It is a Hidden Middle because it is typically ignored in prevailing policy debates related to food and agriculture. However, it exists and is dynamic, hence, not missing.

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6 Input value chains, such as for improved seeds and fertilizers, have moved from being largely controlled by the public sector (and with private sector agents mainly involved in the “last mile” of input delivery) to a supply system consisting of a mix of few government and private sector providers. The emerging private sector includes SME agrodealers. Some receive assistance by donor funding and government policies that facilitate their entrance into input markets. SME actors appear to be proliferating and, with continued support, this is likely to expand further. At the same time, however, this trend has also given rise to substantial problems with supplies of sub-standard and fraudulent seeds, fertilizers, and pesticides.

7 There are powerful drivers of the expansion of agri-food processing, wholesale/logistics, and distribution in sub-Saharan Africa. Downstream factors include: (1) rapid urbanization and road building, leading to longer supply chains; (2) dietary change in urban and rural areas, including soaring demand for processed foods, non-food grain products, like meats, fish products, fruits, and vegetables. Shares of purchased food are also increasing rapidly in rural areas. Upstream factors include intensification with more external input use by farms, commercialization, and diversification beyond basic food grains. Policy factors include the liberalization and privatization with progressive withdrawal of governments from direct provision of supply chain services, which have unleashed massive investments by SMEs and large enterprises in the supply chains.

Key Recommendations

1 Agriculture, food and broader development policies should recognize the Quiet Revolution of the proliferation of private sector SMEs in output and input value chains in Africa. There is no “missing middle”, but only a middle that has thus far been hidden from the policy debate and now needs to be brought to the fore.

2 Governments and donors should not be “reinventing the wheel” by trying to provide supply-chain services themselves. Rather, they should support and stimulate private sector investments in the middle of food supply chains.

3 Key support measures include public investment in infrastructure and policies and regulations aiming to reduce transaction costs and increase capacity to manage supply-chain risks.

4 Government and donor efforts should further focus on enabling agri-food SMEs to connect small-scale farmers to markets. Over time and gradually, they may also encourage strengthened links between smallholders and emerging modern, large-scale agri-food businesses.

Introduction: Themes, issues, and organization of AASR 2019

Small-scale farms that sell to urban markets in Africa are about 10 times more likely to use fertilizer, manure, and improved seeds, and to invest in soil conservation and “sustainable intensification” than farmers who do not sell to markets (Reardon, Crawford, Kelly, & Diagana, 1995). Farms that undertake those investments tend to have higher yields. Thus, those farms have more output and higher farm income, which in turn provides multiplier effects, generating broader-based rural and urban income, and employment growth (Haggblade, Hazell, & Dorosh, 2007; Reardon, 1997). Adjognon, Liverpool-Tasie, and Reardon (2017) further show that income from rural non-farm employment is, by far, the most important funding source for input purchases in Africa.

Dynamic and inclusive agricultural transformation depends on whether small-scale farms are “sandwiched” between (small and medium enterprise (SME)-driven output and input value chains

- Mid- and downstream segments of output value chains are dynamizing market demand, providing farmers with market access and pulling along the whole “train” of the food system. This dynamic is fostering farm sector development and creating rural jobs. The midstream in particular (wholesale, logistics, and processing) is by far the main interface that connects smallholders to markets. It conditions the prices and other market terms farmers face.
- Input value chains that operate upstream from farms “fuel” farm-level output growth, intensification, commercialization, and diversification. Input retailers and wholesalers (agrodealers) provide fertilizers,

improved seeds, machines, information and communication technology (ICT) services, and pesticides to farmers. They condition farmers’ access to these inputs, their price, and other market terms such as input value chain finance and private extension information.

While there has been much research and policy debate on the small farm sector per se, our review of the literature and observation of the debate has led us to conclude that there is a huge gap:

- Between the importance of the private sector in output and input value chains in Africa, and its presence in government and donor policy debate and supportive investments.
- In systematic data on the private sector in the off-farm segments of the upstream and midstream/downstream supply chains and their micro, small, and medium enterprises (MSME) and large enterprises actors. Official statistics follow only the edge of the phenomenon, the small part that is formal sector and mainly large scale. Several reports and books focusing mainly on case studies and particular sectors and locations emerged in the early to mid-2010s. But there is need for systematic updating and coverage of the sector and its policy implications.

With the motivation to address those gaps, this Africa Agriculture Status Report (AASR) focuses on the role of the private sector in the output and input value chains in sub-Saharan Africa. We examine its structure, conduct, and performance, particularly in regard to its interface with small farms.

The AASR is structured as follows: The first part focuses on the patterns of development of the private sector in the output value chains.

- Chapter 1 lays out the broad patterns of transformation and the importance of the private sector in both output and input value chains, and the drivers of change.
 - Chapter 2 focuses on the distribution segments of the output value chain, and does a “deep dive” on wholesaling, logistics, and retail, and their links to the small farm sector.
 - Chapter 3 does the same with respect to the processing segment, analyzing the “Quiet Revolution” and its associated “spontaneous clusters” of SMEs of processing and wholesale, as well as the emerging “Modern Revolution” in processing.
 - Chapter 4 focuses on supply chain services firms related to international trade and which vertically integrate processing, logistics, and wholesale activities. The chapter emphasizes the need for domestic and foreign direct investments (FDI) that help these segments to become efficient and competitive.
 - Chapter 5 treats “managed clusters” of processors and farmers in initiatives such as agro-industrial parks. The chapter treats the interest and promise of these initiatives, and the challenges manifest in the mixed record of their implementation.
 - Chapter 6 focuses on cross-border output value chains, both within Africa and between Africa and the rest of the world. It discusses trade opportunities deriving from food system change in Africa, and policy and infrastructure constraints holding Africa back from fully grasping those opportunities.
- The second part focuses on factor markets and input value chains.
- Chapter 7 examines the link between labor markets and the private sector in the value chains. It starts by showing the importance of agri-food value chain employment off-farm for rural households in Africa. It also assesses the empirical evidence regarding the extent to which SMEs and large enterprises in agri-food supply chains in Africa are constrained by the quantity or quality/skills of labor supply to them, and thus whether that hampers their being effective in supplying services in value chains. It ends with a discussion on the need for education and selective training programs.
 - Chapter 8 examines the supply of ICT services to farms and firms in African rural areas. It considers the performance of the ICT firms and how it is affected by policies and infrastructural conditions.
 - Chapter 9 focuses on the fertilizer supply chain and the relative roles of the private and public sectors in it. It starts with an analysis of fertilizer demand and its drivers, and then turns to the structure and performance of fertilizer supply chains. It differentiates the roles of the public sector, non-governmental organizations (NGOs), fertilizer multinational firms, and domestic SMEs and large enterprises engaged in the sector.
 - Chapter 10 parallels the fertilizer chapter in themes but focuses on the improved seeds supply chain in Africa. It features a case study of how the Alliance for a Green Revolution in Africa (AGRA) facilitated the emergence of some SMEs in the domain of multiplication and distribution of seeds.
 - Chapter 11 recaps the key messages of the chapters with respect to findings and policy recommendations and highlights priority actions.

The private sector's importance and dynamism in output value chains

The private sector in output value chains handles 80% of Africa's food consumption

Following the liberalization and privatization of Africa's agricultural distribution parastatals, nearly all Africa's food output value chains, post-farmgate, are operated by the private sector. That private sector is composed of SMEs and large firms undertaking:

- The “midstream” or middle of the value chain: food processing, wholesale, and logistics
- The “downstream” of the value chain: retail and food service

In the “drivers” section, we calculate that approximately 80% of food consumption in Africa is from purchases by urban and rural consumers. Only 20% is self-consumed (grown by the rural consumers on their own farms). Thus, the private sector handles 80% of Africa's food consumption.

An estimated 96% of marketed farm output in Africa is supplied through domestic markets, leaving only 4% for export markets (based on FAO data of tonnage; see Awokuse et al. this volume). This shows the supreme importance of understanding the domestic food value chains.

Our review of research estimates that roughly 40% of the value of the agri-food value chains in Africa is in the midstream segments, and 20% is in the downstream segments. Farm-level output makes up the remaining 40%. The performance of the private sector in the midstream and downstream of Africa's value chains is as important as farm performance in determining the food security of Africans,

and they are crucial in conditioning the terms of access to markets by farmers, because most farm sales are made via traders (wholesalers and brokers) or to processors, not directly to consumers.

We term the thriving wholesale/logistics/processing segments the “Hidden Middle” – but not the “missing middle” as it is commonly but wrongly referred to in the policy debate in Africa. In this volume (Reardon et al. in chapters 2 and 3) show that the midstream is not only present, it is growing rapidly, in:

- A Quiet Revolution with massive aggregate investments by private sector firms, especially by SMEs.
- An emerging Modern Revolution with an increasing role of large enterprises.

These two revolutions fit into the stages of transformation of agri-food value chains in developing regions (Reardon et al., 2019):

- Traditional (short, local, fragmented value chains).
- Transitional (longer value chains driven by supply chains stretching deeper and deeper into rural areas to supply cities during rapid urbanization; but still fragmented supply chains characterized by a proliferation of SMEs, especially in the midstream).
- Modern (long supply chains but substantially consolidated via the rise of supermarkets and large processors).

We roughly estimate that most (80–90%) of the agri-food economy of Africa is now in the “transitional” stage, with a vast proliferation of SMEs in wholesale, logistics, and processing (the Quiet Revolution previously noted). The traditional value chains are mostly confined to hinterland rural areas and the poorest zones. Modern value chain segments such as supermarkets and large processors are beginning to emerge in large cities, forming

some 10–20% of the agri-food economy, depending on the country and the product. It seems probable that over the next two decades sub-Saharan Africa will mainly be in the transitional stage but with the modern segment continuing to emerge rapidly.

Drivers of the dynamism and transformation of the private sector in output value chains

Over the past 25 years, there have been deep and rapid changes in sub-Saharan Africa that have driven the Quiet Revolution and the emerging Modern Revolution. They are as follows:

- Policies of (partial to complete) privatization of public sector processing and distribution firms in the 1990s and 2000s. In most countries, some or all output wholesale and processing parastatals were sold to private firms or disbanded creating a vacuum that the private sector has filled.
- Policies that liberalized FDI, imports and exports, sometimes fully, sometimes partially. This was an impetus to FDI by US, European, Asian, North African, and sub-Saharan African firms in the past one to two decades. It also facilitated imports of inputs and food, fertilizer, pesticides, and equipment. A similar process happened in Asia and Latin America a decade or two earlier (Awokuse & Reardon, 2018).
- Policies (and private investments) that reduced constraints and transaction costs for technology transfer (such as of ICT).
- Public infrastructure investment in wholesale markets (a very important part of our story), roads, some electrification, some port improvement. Even though there are severe problems with current infrastructure, nevertheless there was a large expansion of highways and rural roads that allowed value chains to extend further into rural areas, feeding cities,

and linking production and consumption zones (such as illustrated in Chapter 2 with Ethiopia and Nigeria).

- A corollary to the infrastructure driver has been the rapid development of rural towns, tertiary and secondary cities in proximity to crop and animal production zones. The causality was sometimes bi-directional. These secondary urban areas are important nodes in value chains. These urban areas form some 60% of urban Africa (Christiaensen, De Weerd, & Todo, 2013; Tschirley, Haggblade, & Reardon, 2013).
- Population of sub-Saharan Africa grew from 509 million in 1990 to 1,078 million in 2018 (UN, 2018), a total nearing that of China or India, or the sum of the populations of the US and Europe combined. Incomes also increased over the past 25 years on average. Nearly doubling population, while increasing income means that food demand tripled, driving the development of supply chains to meet rapidly growing demand.
- Rapid urbanization. Sub-Saharan Africa's urban population share was 40.4% in 2018, up from 18.3% in 1970. It is projected to average 47.0% by 2030 and 58.1% by 2050 (UN, 2018).
- Urban areas now consume most of the food supply in sub-Saharan Africa. Based on Living Standards Measurement Study (LSMS) data and urban and rural population shares, we calculated that urban areas consume 50–70% of food consumption nationally in sub-Saharan Africa. Given an export share in output of only 4%, this means cities are the main markets of farmers in Africa.
- Urbanization drove rapid growth in rural-urban value chains and in the length of supply chains stretching into rural areas. Rural-urban supply chains increased in volume by 800% in the past 3 decades. Haggblade (2011) predicts about the same

in the next three decades. To feed cities, supply chains need to stretch further and further into rural areas and across zones (and eventually more and more across African countries). Longer supply chains are one of the drivers of the increase in the share of the midstream, including a rise of traders and logistics.

- Diets “commercialized” in rural areas. Purchases are 45–70% of rural diets depending on the subregion. Twenty-five years ago, farmers grew what they ate and ate what they grew, purchased very little except grains in bad years and some condiments (Reardon et al., 2019). Today’s rural purchases of food drive the development of rural-rural and urban-rural supply chains (e.g., processed foods from large cities in Tanzania penetrating villages and rural towns).
- There has been a rapid rise of processed food consumption. Processed foods constitute 40–65% of urban and rural purchases (Tschirley, Reardon, Dolislager, & Snyder, 2015). Twenty-five years ago, households consumed very little processed foods and not much food was purchased in markets. There is a two-way causality between these shifts in food demand and the rise of food processing firms.
- There has been a rise of non-food grains (meat, fish, milk, fruits, vegetables, lipids, and roots/tubers (roots/tubers mainly in West Africa)). These now form 50–70% of urban and rural diets. Twenty-five years ago, diets mainly consisted of food grains and very little grain was used as feed for livestock. There is a two-way causality between the growing demand for non-food grain products and the rise of packers, cold storages, truckers, non-grain wholesale markets, and collection points. There is an increase of non-food grain supply chains.

The rise of meat, fish, and poultry supply chains created a derived demand for feed (and feed milling). Spectacular surges have come from this such as a rise of feed output 600% in a decade in Nigeria (Liverpool-Tasie et al., 2017).

- Dietary changes are driven by urbanization, increased rural non-farm employment⁶, income growth, and rising opportunity cost of time (as women increasingly work outside the home and have rural non-farm employment, while men commute to their off-farm jobs). Income increases translate into non-food grain consumption by the statistical regularity called Bennett’s Law. These factors drove domestic processed food consumption but have also driven the rise of imports of rice and wheat (Kennedy & Reardon, 1994; Reardon, 1993).
- International demand for sub-Saharan Africa exports was not a major driver of value chain changes. As discussed in detail in the Awokuse et al. (this volume), exports have grown slowly, falling from 17 million tons (8% of agricultural output) in 1970 to 15 million (5%) in 1990, but increasing to 39 million tons (6%) in 2013. The share of exports from South Africa in total sub-Saharan Africa exports increased from 20% to 32% between 1970 and 1990, but dropped to 30% in 2013. South Africa’s export share for crops important in the diversification of agriculture, like horticulture, is much larger, constituting 65% of sub-Saharan Africa exports of horticulture products. At 70%, South Africa’s share of sub-Saharan Africa exports of the main staple crops (rice, wheat, and maize) and oilseeds (palm kernels, soy, rapeseed, cotton seed, and groundnuts) is even higher. Much of remaining agricultural exports originate

⁶ Rural non-farm employment nowadays constitutes an estimated 60% of full-time equivalent rural employment in sub-Saharan Africa (Dolislager et al., 2019).

from “enclave” subsectors, like those for cocoa and coffee, which are linked to world markets but show little development, being outcompeted by growing exports from Asia and Latin America.

Emerging presence of the private sector in input value chains in sub-Saharan Africa

Upstream from farms are supply chains of farm inputs such as feed, pesticides, farm machines, fertilizer, and improved seeds. There are also supply chains of services such as ICT. The private sector has two degrees of involvement in these supply chains.

On one hand, in the emerging supply chains of pesticides and farm machines, the private sector operates nearly the entirety of the chains, from import to assembly or repackaging to wholesale to retail.

This private sector role is complete in pesticides, such as herbicides. The private sector has responded to rapidly growing small-scale farmer demand for herbicides in the context of increasing rural wages for weeding due to increased rural non-farm employment and decreasing prices of herbicides due to a boom in Chinese exports of these chemicals in the past decade. Haggblade, Minten, Pray, Reardon, and Zilberman (2017) provide a rare review of new studies that treat both the demand side of herbicides by African farmers, but also the private sector supply chains of these chemicals. In the cases of Ethiopia and Mali, for instance, they are showing rapid uptake of herbicides by small-scale farmers, including women farmers, in the past decade.

The private sector has also been the main actor in farm machine supply chains. The story is largely parallel story to that of herbicides, with the impetus for more machine demand being:

- Rising rural wages and opportunity cost of time (especially from the rise of rural non-farm employment, as shown in Nigeria (Oseni & Winters 2009).
- The need to clear and prepare more land and harvest more output.
- Falling imported machine prices, as China and India export small-scale farm machines en masse to Africa and other developing regions.
- Rising investment in supply chains of machines by the local private sector⁷.

There are exceptions to private sector dominance in farm machine provision (sale or rental), with the presence of some NGO-supported entities, cooperatives, and some continuing parastatal services subsidizing and renting machines, such as in Nigeria. The trend, however, is for the vestiges of government direct involvement in machine provision to trend downward (Takeshima, Nin-Pratt, & Diao, 2013).

On the other hand, the fertilizer and certified seed supply chains have been characterized by a mix of private sector, government, and cooperative and civil society providers:

- Private sector (importers, manufacturers, and wholesalers and retailers (agrodealers))
- Government (importers, breeders and multipliers, manufacturers, and subsidized distribution)
- Semi-governmental entities and cooperatives (for distribution)
- NGO entities (for distribution)

⁷ For instance, Houssou et al. (2013) note that in the case of Ghana this domestic importers/distributors role is under-researched and given inadequate policy attention. They state that: “Often, little attention is paid to the supply side of agricultural mechanization in the literature, as demand is commonly accepted as the driving force of mechanization” (Houssou et al., 2013, 1238).

In the fertilizer supply chain, Liverpool-Tasie et al. (this volume) shows a strong growth over the past two decades of fertilizer use in Africa (with substantial variation over countries and crops), driven:

- On the demand side by farmer commercialization and demand for cropping intensification.
- On the supply side by increasing recognition of the importance of the African market by world exporters of fertilizers, and a subsequent export surge by global fertilizer producers in North Africa and other regions and the rapidly emerging FDI presence of fertilizer multinationals.

Liverpool-Tasie et al. note that while there has been some revival in the 2000s of subsidization of fertilizer (albeit with limited coverage of the total fertilizer supply in Africa) from the pre-structural adjustment period of the 1980s, there have been parallel trends of:

- Increased targeting of subsidized fertilizers.
- Liberalized and privatized distribution segment of the supply chain, allowing much more private agrodealer proliferation.
- Increased training and other facilitation of agrodealers by NGOs.

However, Liverpool-Tasie et al. emphasize that:

- The subsidized portion of fertilizer supply in Africa is minor; most is not subsidized. They note that the policy debate is disproportionately focused on the subsidized part.
- While there have been government and donor moves to liberalize and facilitate the proliferation of agrodealers in fertilizer, these dealers have for decades been an

important part of many of the fertilizer supply chains in Africa, and are just somewhat increasing that major role in recent times with recent public initiatives.

The improved-seed value chain is also a mix of public sector, NGO-assisted entities, and private sector in Africa, with an emerging trend of the development of the private sector. Devries (this volume) notes that there has been a trend of increasing demand for improved seed in Africa. He illustrates that with data showing the spread of hybrid maize in Uganda. He notes further that traditionally improved seed supply chains were dominated by governments who bred, multiplied, and distributed improved seed, and the private sector was largely “crowded out”. However, in the past 15–20 years there has been a rise of a multiplicity of actors in improved seed supply:

- Upstream in breeding, the national agricultural research systems (NARS), the CGIAR (formerly the Consultative Group for International Agricultural Research), and multinational seed companies have become increasingly active.
- Midstream and downstream in seed multiplication and marketing to farmers, private sector domestic SMEs have emerged. This has been in two steps: (1) a proliferation of grassroots SMEs and cooperatives with limited assets, informal status, and a strategy of differentiating the varieties on offer beyond what was perceived as an overly limited variety portfolio available from the public sector distribution system; and (2) an emergence of NGO training and investment programs to train and formalize some of the emerging SME segment. Devries describes the actions taken in those programs.

Preview of main recommendations

- Governments and donors should recognize that the Quiet Revolution in the private sector has already taken off in sub-Saharan Africa. In fact, its dynamism and path are similar to what research recently observed in Asia. In sub-Saharan Africa, where conditions are favorable, SMEs in agri-food value chains, inputs and outputs, are growing quickly. It is not “missing”, it is just hidden from the policy debate.
- Governments and donors should minimize “reinventing the wheel” in the sense of trying to provide midstream supply-chain services themselves. Rather, they should focus on creating the enabling conditions for agri-food businesses to be established and to thrive. This will make sure government action is focused on the basic conditions for the private sector, small and large, to continue to invest and develop output and input supply chains, which is crucial to agricultural transformation with inclusion of small farmers.
- There are two key actions to improve enabling conditions. Each is needed, as one without the other does not work:
 - Public investment in infrastructure. This should be focused on the big priority needs: wholesale markets, roads, and electrification. This AASR provides many examples of soaring private sector activity where and as soon as the right infrastructure was put in place. The investment in infrastructure has touched two live wires together to make a strong current: urban food demand and supply chain enterprises eager to meet that demand. Infrastructure investments benefit the numerous “spontaneous clusters” of supply chain actors; they also can be targeted and directed in emerging “managed cluster” initiatives.
 - Policies and regulations that reduce transaction costs and investment risks. These are crucial for SME and large enterprise establishment and growth. The AASR is packed with examples of where enterprises mobilized their cash sources (seldom relying on credit) to invest when favorable policies (plus infrastructure) were in place. Such policies include for example cross-border trade liberalization, reduction of double taxation, and regulations to reduce corruption.
- Governments should recognize that research shows that many traders sell substandard or fraudulent seeds, fertilizer and pesticides. This is also a developing issue in output markets with food safety. The key necessary public good is setting regulations and enforcing them. This will “leapfrog” solutions to many problems suffered during the recent development of Asian food systems.
- We suggest that government and donor make as their primary effort enabling the Quiet Revolution in SMEs in value chains of outputs and inputs. Efforts to link small-scale farmers to large agribusiness and industrial food companies are important complements to that primary focus. The efforts to link small-scale farmers to large companies will be increasingly effective as policy frameworks and infrastructure improve.

References

- Adjognon, S.G., Liverpool-Tasie, L.S.O., & Reardon, T. (2017). Agricultural input credit in Sub-Saharan Africa: Telling myth from facts. *Food Policy*, 67, 93–105
- Awokuse, T., & Reardon, T. (2018). Agrifood foreign direct investment and waves of globalization of emerging markets: Lessons for U.S. firms. *Economic Review - Federal Reserve Bank of Kansas City (Special Issue 2018: Agriculture in a Global Economy)*, 75–96. Retrieved from <https://www.kansascityfed.org/~media/files/publicat/econrev/econrevarchive/2018/si18awokusereardon.pdf>
- Christiaensen, L., De Weerd, J., & Todo, Y. (2013). Urbanization and poverty reduction: The role of rural diversification and secondary towns. *Agricultural Economics*, 44, 435–447.
- Dolislager, M., Reardon, T., Arslan, A., Fox, L., Liverpool-Tassie, S., Sauer, C., & Tschirley, D. (2019). *Livelihood Portfolios of Youth and Adults: A Gender-Differentiated and Spatial Approach to Agrifood System Employment in Developing Regions*. Background paper for the Rural Development Report 2019. Rome, Italy: International Fund for Agricultural Development (IFAD).
- Haggblade, S. (2011). Modernizing African agribusiness: reflections for the future. *Journal of Agribusiness in Developing and Emerging Economies*, 1(1), 10–30.
- Haggblade, S., Hazell, P., & Dorosh, P. (2007). Sectoral growth linkages between agriculture and the rural nonfarm economy. In S. Haggblade, P. Hazell, & T. Reardon (Eds.), *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World*. Baltimore, MD: Johns Hopkins University Press.
- Haggblade, S., Minten, B., Pray, C., Reardon, T., & Zilberman, D. (2017). The herbicide revolution in developing countries: Patterns, causes and implications. *European Journal of Development Research*, 29(3), 1–27.
- Houssou, N., Diao, X., Cossar, F., Kolavalli, S., Jimah, K., & Aboagye, P.O. (2013). Agricultural mechanization in Ghana: Is specialized agricultural service provision a viable business model? *American Journal of Agricultural Economics*, 95(5), 1237–1244.
- Kennedy, E., & T. Reardon. (1994). Shift to non-traditional grains in the diets of East and West Africa: Role of women's opportunity cost of time in prepared-food consumption. *Food Policy*, 19(1), 45–56.
- Liverpool-Tasie, L.S.O., Omonona, B., Sanou, A., Ogunleye, W., Padilla, S., & Reardon, T. (2017). Growth and transformation of chicken and eggs value chains in Nigeria. *Nigerian Journal of Agricultural Economics*, 7(1), 1–15.
- Oseni, G., & Winters, P. (2009). Rural nonfarm activities and agricultural crop production in Nigeria. *Agricultural Economics*, 40, 189–201.
- Reardon, T. (1993). Cereals demand in the Sahel and potential impacts of regional cereals protection. *World Development*, 21(1), 17–35.
- Reardon, T. (1997). Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. *World Development*, 25(5), 735–748.

- Reardon, T., Crawford, E., Kelly, V., & Diagana, B. (1995). Promoting Farm Investment for Sustainable Intensification of African Agriculture (MSU International Development Paper No. 18). East Lansing, MI: Department of Agricultural Economics, Michigan State University (MSU).
- Reardon, T., Echeverría, R., Berdegue, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2019). Rapid transformation of Food Systems in Developing Regions: Highlighting the role of agricultural research & innovations. *Agricultural Systems*, 172, 47–59.
- Takeshima, H., Nin-Pratt, A. & Diao, X. (2013). Mechanization and agricultural technology evolution, agricultural intensification in sub-Saharan Africa: Typology of agricultural mechanization in Nigeria. *American Journal of Agricultural Economics*, 95(5), 1230–1236.
- Tschirley, D., Haggblade, S., & Reardon, T. (Eds). (2013). *Africa's Emerging Food System Transformation* (White Paper). Global Center for Food Systems Innovation, Michigan State University, East Lansing, MI.
- Tschirley, D., Reardon, T., Dolislayer, M. & Snyder, J. (2015). The rise of a middle class in urban and rural East and Southern Africa: Implications for food system transformation. *Journal of International Development*, 27(5), 628–646.
- UN. (2018). *World Urbanization Prospects, 2018*. New York: United Nations (UN). Retrieved from <https://population.un.org/wup/Download/>

02 The Quiet Revolution in Agri-food Distribution (Wholesale, Logistics, Retail) in Sub-Saharan Africa

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Key Messages

- 1** Traders, truckers, and retailers are the life blood, the circulatory system, of food value chains in Africa. They constitute about 40% of the total gross value of the value chains in sub-Saharan Africa. This is the same as the share from farms in African food value chains. Trader and logistic firm performance—and enabling conditions—are extremely important to the food security of Africans.
- 2** The myths that there is a “missing middle” in food trade and logistics supply, that traders are not investing and are only exploitative, and that governments and donors need to step in to “fill the gap”, are undermining the policy debate.
- 3** There is a Quiet Revolution in the small and medium enterprise (SME) trader and logistics segments in sub-Saharan Africa. The SMEs are proliferating and making large investments, in the aggregate and individually, in vehicles and equipment. We found third party logistics services in trucking and warehousing to abound.
- 4** Governments and donors need not and should not “reinvent the wheel” and step in directly to provide warehouses, transport, or aggregation facilities. The SME private sector is largely already providing these services, but is constrained in many ways. The need is to relieve the constraints facing them and let the Quiet Revolution proceed further and faster.
- 5** Traders and logistics firms note that they are constrained by the condition of wholesale markets and roads, corruption in the governance of roads, electricity and fuel costs, and vehicle import ease and cost. These should be public policy and investment priorities.

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Introduction

Wholesale and logistics are the “life blood” of the agri-food value chain in sub-Saharan Africa. These are composed of traders based in wholesale markets and “off-market” in rural and urban areas, of integrated brokerage and processing operations, and of truckers and ambient warehousers and cold storage operators. They constitute roughly 20% of the value and cost in the food value chain in sub-Saharan Africa. Retail constitutes roughly another 20% of the value chain in terms of total value added and costs.⁶ Together the distribution segments are some 40% of the total value of the food consumed from value chains by Africans. Recall from Chapter 1 that we calculated that roughly 75% of the food Africans consume gets to them via value chains. Hence, the distribution segments are about one-third of the value of food consumed by Africans. Seen this way, performance of these segments is very important for African food security. They are nearly as important as farmers in forming the cost of food to Africans.

As the AASR is particularly interested in understanding the private sector that conditions directly the transformation of the agriculture sector, we will briefly treat the retail segment, but mainly focus on the wholesale/logistic segment. The wholesale/logistic segment is the immediate interface of the farmers with markets. Most agricultural output sold by farmers is handled by wholesalers and brokers, which together we call traders, and much of that is handled for the traders by third party logistics agents like truckers. Few of the sales except in remote rural areas are directly to consumers or even traditional retailers. Except for a very small modern sector fringe, very little is sold directly by farmers to supermarkets.

Nearly all the wholesale/logistics segment in Africa is composed of small and medium enterprises (SMEs). Large enterprises in this

segment are mainly in the trade sector, such as large fruit trading/packing enterprises like the Belgian Lecofrut operating in Madagascar (Minten, Randrianarison, & Swinnen, 2009), or large commodity trading firms such as Olam and Cargill (see Meyer et al. in this volume). Keep in mind that exports constitute only about 6% of sub-Saharan Africa agricultural output (see Awokuse et al. in this volume), which sets a cap on the quantitative importance to date of the large enterprises in the trader/logistics segment.

It is likely, however, that over time the large enterprise component of this segment will grow. This will be driven by domestic SMEs attaining scale with national and regional operations (as probably a number of informal wholesale market operators such as in Nigeria already do). It will likely also happen from multinational corporations (MNCs) in logistics and wholesale coming into Africa by “follow sourcing” for their retail and processor MNC clients from home markets. (Follow sourcing has become increasingly common in Eastern Europe, Latin America, and Asia; see Reardon, Henson, & Berdegue, 2007.)

The role and importance of the trader/logistics segment can be seen with the image of a huge “hourglass”. Using an example from Nigeria based on research on maize traders (Liverpool-Tasie, Reardon, & Sanou, 2017), one can think of wholesalers/logistics SMEs as the middle part of the hourglass. Some 8 million Nigerian farmers produce maize, which then feeds (directly via flour and indirectly via feed) some 160 million consumers. The maize goes from the farmers via some tens of thousands of “traders” (urban wholesalers and rural brokers), much of it along 500–1,000-km supply chains internal to Nigeria. The performance of that trader “middle of the hourglass” sets the market conditions for farmers and the quality, availability and affordability of maize to consumers.

Our review of the available evidence shows that there has been in several countries a “Quiet

⁶ The definitions of wholesale, retail, and logistics are in an annex to this chapter.

Revolution” in trader and logistics SMEs, and emerging change in the retail sector. The Quiet Revolution involves the proliferation of SMEs in these segments, and substantial private investment at the SME level and in the aggregate among the millions of these SMEs. As noted in Chapter 1, this transformation is mainly part of the transitional stage of agri-food value chains in sub-Saharan Africa. When SMEs rapidly proliferate, the volume of activity vastly increases, and actor behavior transitions from the traditional to new conduct related to the technology, organization, and commercial practices of the firms. Recall from Chapter 1 that the main drivers of this transformation are:

- Urbanization plus rural–urban infrastructure development: this has led to longer and longer supply chains from rural areas to feed the cities and towns; this in turn leads to more traders and truckers and warehouses to move the food.
- Diet change, including diversification beyond food grains, increase in processed food consumption, and increase in the share of the rural diet that is purchased, have spurred supply chain development in processed foods and non-food grains in urban and rural markets, and the need for trader and logistics services to deliver these products.
- Privatization and liberalization have reduced or eliminated governments’ direct roles in marketing and logistics, leaving a gap which private sector SMEs have avidly filled.
- Extremely important is the aggregate massive investment by SMEs. These investments are in a wide range of key equipment for the supply chain, such as trucks, warehouses and trading stalls, mobile phones, and tarps, boxes, and packing sheds. These investments have in their extreme majority been from the own cash sources of these firms, with little to no

bank credit and just short-cycle transaction credit from some clients.

- Feeding the growth in trader and logistics activity is the surge in crop and animal products farm production and processing.

This chapter explores the Quiet Revolution in the distribution segments spurred by those drivers. We examined the growth, structure and conduct of the segments, from wholesale and logistics, to retail. The chapter: (1) discusses the myths about traders and logistics, and the lack of systematic data, that are holding back sufficient useful policy debate; (2) presents findings from important new survey-based studies in several African countries to illustrate the dynamic changes occurring in the wholesale/logistics segment, and aspects of their relations with farmers; and (3) summarizes findings and presents recommendations to the public sector integrated with an enumeration of constraints facing in particular traders and logistics firms.

Policy debate in africa on traders and logistics suppliers is constrained by myths and gaps in systematic data

Prevalent myths

In our review of the literature and experience of the debate in the countries we have observed a set of strong assumptions, priors in the policy debate about the nature and problems of traders in particular and intermediation in general in domestic value chains, as follows.

- Traders are thought to be “exploitative” in that they advance credit (in cash or in inputs) to farmers. They then charge an implicit high interest rate by requiring the farmer to sell to them at a price that has the interest discounted. In the literature and the debate this is considered widespread and of long standing. In economics it is called

“interlinked markets” or “tied output-credit markets.” It is usually hypothesized to be standard among processing companies to make such advances (as part of contract farming). It is also hypothesized to occur generally among traditional wholesalers and field brokers as well as input dealers (Poulton, Dorward, & Kydd, 1998; Zeller & Sharma, 1998).

- Traders are thought in general to be speculative and conservative, not dynamic investors in developing value chains.
- Supply chains are thought to be very fragmented with a sequence of traders from farms to retail adding inefficiency to the system.
- Logistics services are thought to be “missing”—with a generalized lack of access by traders to warehouses and trucking services, and so on. There are continuous calls for governments and non-governmental organizations (NGOs) to build warehouses and fill the (assumed) gap.

We perceived that, before the 1980s/1990s, these conventional wisdoms spurred governments in sub-Saharan Africa (and donors such as the World Bank that actively supported the region to set up parastatals to directly procure and sell grain and other key commodities, in order to get around the domestic traders.

While structural adjustment programs dismantled most of the parastatals, the conventional wisdoms about traders persisted. A lack of surveys and official statistics on the intermediation segment helped to keep the conventional wisdom from being tested with data and new trends clearly observed.

One outcome of retaining the myths that we perceive is that many NGOs and donors set up “market linkage” programs to “fill the gap in intermediation” and make up for the “missing

middle” or provide intermediation that they assert is more advantageous to the farmers. Our contention is that this is essentially a revival of the parastatal, a subsidized marketing mechanism, to stand in for a trader segment that is considered somehow less efficient than the NGOs, or less dynamic.

Lack of information: Policymakers are largely “flying blind”

Especially given the fact that traders/logistics form a large share of the food economy of sub-Saharan Africa, there is an extreme problem of dearth of statistics, either official data or data from field surveys of researchers. This lack extends to both large public assets like domestic wholesale markets, and the numbers and investments and behavior of the millions (in aggregate in Africa) of traders and logistics actors.

Some statistics are available on wholesale market prices in some countries (such as Ethiopia), but little is available of a systematic and geographically broad nature regarding trader and logistics agents’ numbers, sizes, behavior, margins, and so on. The wholesale market policies and regulations are often made at municipal level and information about them is difficult to access. Studies of public investments and policies regarding domestic traders and logistics are largely unavailable, at least per our research.

Because of this lack, governments and donors are often “flying blind” and relying on outdated assumptions. It is important to redress this both with new perceptions and more data. To contribute to that, researchers have recently been undertaking extensive surveys of traders and logistics agents, rather than just relying on key informants. The following section reports on this new research.

Illustrations of the quiet revolution in the trader and logistics segments in sub-Saharan Africa: Busting myths with rare field survey evidence

Recent field survey-based studies in sub-Saharan Africa “bust the myths” about traders and show the dynamism and investment—and transformation—of SME traders. The studies show that there is a vibrant, dynamic domestic wholesale/brokerage, warehousing, and logistics sector already emerged and developing fast in sub-Saharan Africa, extrapolating from trader survey evidence emerging in two countries with a third of sub-Saharan Africa’s population, Nigeria and Ethiopia. We also cite extensive rural household survey evidence from nationally representative surveys in Malawi, Nigeria, Tanzania, and Uganda.

Because such systematic, rigorous studies of traders have been done in only a few countries, and there is very little official data on these actors and even on the performance and structure of public wholesale markets, we cannot state with certainty that the results from these surveys are representative of all countries in sub-Saharan Africa. But we feel that they are generally applicable to many other countries. That is because similar conditions are developing in other countries in Africa, as noted in Chapter 1. The details are important as nearly every finding “busts a myth”.

Maize traders and third party logistics services (3PLS) in Nigeria: Building nationwide supply chains with dynamic private investment

Surveys on maize traders in Nigeria have generally been small studies undertaken in a few localities with small samples. No detailed

survey had been conducted in the past 30 years, until a detailed survey of urban maize traders in 5 states in north and south Nigeria was undertaken by Liverpool-Tasie, Reardon, & Sanou (2017). Yet around 75% of Nigeria’s 160 million people depend on maize traders for their maize consumption, and many depend on them indirectly for their fish and chicken consumption. The fish and chicken are grown on feed composed mainly of maize brought to mills by traders.

Nigerian urban maize traders source from farms and other traders, assemble bulk, and transport or buy transport services. The survey was conducted in north and south Nigeria. This was crucial because the North is the main source of maize and both South and North are major consumers of the crop. The sample covered about 1,500 traders in 5 states and the cities with the main “feed the city” maize markets—Ibadan in the south and Jos, Kaduna, Kano, and Katsina in the North. This involved listing one by one 7,701 traders in around 70 wholesale markets and then selecting the sample of 1,500. The work was painstaking because: (1) there was no official list from which to sample; and (2) surveying traders is far more difficult than farmer surveys because they are more mobile.

Several surprising findings came out of this rare survey, all of which contradict conventional wisdoms previously discussed.

- Trader supply chains are very long, thus providing market integration and market linkages over a vast area. 85% of the maize volume of all the traders in the large sample is sourced by traders from the Northern “maize basket”. 80% of the Southern traders buy maize from the North. The Northern trader makes the sale to the Southern trader in the Northern wholesale markets, and then the Southern trader brings it to 1,000km to the south via third party logistic services (3PLS).

- Traders report they have easy access to abundant logistics services via a very active 3PLS market for trucking and warehouse rental: the logistics “middle is not missing”! Only 4% of the traders own trucks. 96% rely on the 3PLS trucking services market. 50% goes by trailer trucks (see below that that share is 13% in Ethiopia). Traders “comingle” their product in big trucks. Only 24% of the traders store maize; all of them are in the North; the storage is only for a few weeks. Nearly no Southern trader owns a warehouse, but a third rent. In the North, 10% own warehouses, 15% rent, but 40% of the maize that is stored is in rented warehouses.
- Urban traders are “de-fragmenting” supply chains: most buy direct from farmers and cut out the extra step in the chain of field brokers. About 50-60% of the North traders source directly (using 3PLS) from farmers. 60% of South traders buy direct from farmers. (In the North, however, 70% of the volume bought by the urban traders still comes from field brokers selling to them on commission in the wholesale markets.) This kind of disintermediation is typical of the “Quiet Revolution” in Asian food VCs as the old fragmented supply chains are restructured by SMEs operating in city wholesale markets (Reardon et al. 2019). This is important because it depicts the consolidation of long fragmented chains pointing to trends that can make food commerce more efficient.
- The trader segment has become fairly concentrated. It has a 65% Gini coefficient in the North and 85% in the South. Clearly there are investment thresholds, but not for trucks or warehouses as we show below there is an active “3PLS” (third party logistics services) market.
- Traders rarely gave advances to farmers or field brokers: “tied” output-credit markets have become untied! The survey found that nearly 0% of traders gave fertilizer or seed on credit to farmers. Traders also made extremely few transactions where they paid an advance (credit) to the seller (broker or farmer): 6% of the time in the South, 10% of the time in the North.
- There is substantial value chain finance between traders and their buyers (other traders and retailers and mills), but it is mainly short-term transaction cycle credit letting the buyer pay after a week. The study found that only 10% of Northern traders got an advance (credit) from their buyers (such as other traders and retailers). That figure is only 2% in the South. By contrast, traders give credit to their buyers in general, by letting the buyers pay later. Only 10% of Northern traders are paid immediately by their buyers. Thus 90% of their buyers get to pay later and thus have trader-supplied credit. That figure is but 2% for Southern traders. But the “credit” is not substantial; the traders are paid by their clients within a week so it is just a revolving cycle.
- The great majority of the traders are wholesalers (take possession) not brokers (work only on commission). The traders are thus shouldering risk in the value chain.
- Traders make big investments and move important volumes of maize, and each links many farmers to markets. Domestic urban maize traders are substantial medium businesses in the main maize production zone. The survey found that an average urban maize trader in the North handled 700 tons in the high season and 450 in the low season. Each linked on average 600 farmers to the market! Southern traders were 7 times smaller.
- Only 5% of traders’ transactions are on contracts. The other 95% is in spot market relations. Most of the contracted amount is with feed and flour mills.
- Nearly all the maize is shipped bagged and labeled. Thus it is traceable at least partially.

- Traders and their truckers waste little maize! Much less than 1% of the maize is lost/wasted in the 1,000-km post-farmgate supply chain since maize losses at the farm level are definitively higher than 1% of output, as LSMS surveys show .
- Traders complain of poor road conditions, uneven energy access, and congested wholesale markets.

In summary:

- The maize trader segment of the supply chain in Nigeria is no longer traditional, but not yet “modern” with the latter being with extreme concentration and large firms like one sees in the US multinational food companies for this segment.
- The maize supply chain is run by dynamic SME traders supported by a developed 3PLS market for trucking and warehousing. The middle is not missing!
- The story told here is similar to what is happening in Asia, breaking the myth that Africa is “extremely far behind” Asia in these changes.
- Yet traders and 3PLS firms face constraints. Thus, donors and governments have an agenda to help them develop.

Cereal traders and truckers, and infrastructure-building government in Ethiopia: deeply transforming the value chain in one decade

Ethiopia was one of the fastest growing economies in the world between 2004 and 2014. The urban share in the population jumped in that decade. At the same time, private sector SME cereal value chains rapidly developed. Minten, Stifel, and Tamru (2014) undertook a landmark study on transformation of cereal markets in Ethiopia. There are very few studies

of this kind in developing regions in general, and this was the first in Africa. Yet, this kind of study, and that of the Nigerian trader study, should become common in the next 10 years if African policy makers and donors are to be minimally informed in order to make actionable decisions to support market development.

The study had three parts. The first was the use of detailed government-collected price data over 31 wholesale markets from 2000 through 2011 in all major cities and major cereal farming areas. The second was the project’s own collection of cereal flour price data (to calculate margins of millers). The third was 71 focus group interviews with transporters and traders in 31 wholesale markets in 2012. Several key findings of the study “bust myths” as follows.

- There was rapid cereal value chain upgrading over 2000–2012, driven by investments by SME traders and truckers. (1) Price gaps between farms and consumers were reduced, as the market became more efficient; (2) spatial integration over the countries wholesale markets increased; (3) mill and retail margins reduced; and (4) a proliferation of traders occurred, competition increased greatly, and the average size of trader declined some.
- To feed the increase in the urban market, an additional 500,000 tons of cereal, carried by 65,000 additional trucks of 7.5 tons/truck flowed into the rural–urban supply chain in just one decade in Ethiopia! Not one birr of this was generated through government or donor direct investment or operations.
- Transport costs dropped 50% in one decade (despite the elimination of fuel subsidies). Time from farm to market decreased 20%. These were the net results of three factors: (1) government invested in surfaced roads (doubling in length in 15 years); (2) private SME truckers invested enormously in trucks as already noted; the share of small trucks declined; the share of 7.5-ton

trucks went from 15% in 2001 to 33% in 2011, and trailer trucks stayed at 13%; and (3) yet fuel subsidies were dropped so fuel was 60% more expensive.

- Trader SMEs proliferated and competed harder. The number of wholesale traders rose 150%, and field brokers, 250%, showing an increase in domestic supply chains, a decrease in trader scale, and more competition. Sales on main wholesale markets all over the country increased by 70–80% in one decade!
- Mobile phone use soared in wholesale markets. In 2000, only Addis had cellular phone coverage; by 2005, all rural wholesale markets had coverage and, by 2010, all traders had cell phones.
- Farmer sales of grain and use of fertilizer sky-rocketed. The upstream “feedstock” into the growing supply chain was fed by an increase in farm sales of cereals of 117% over that decade! This in turn was fed by an increase in improved seed use in maize, wheat, and teff. Fertilizer use soared from 140,000 tons in the early 1990s to 650,000 tons in 2012, with a doubling of area under fertilizer. Government extension agents were tripled from 15,000 in 2002 to 45,000 in 2010.

In summary:

- There has been a Quiet Revolution in cereal value chains in Ethiopia; it is driven by private investments by truckers, wholesalers, and farmers, and by governments in roads. The middle is not missing!
- The story told here is similar to what is happening in Asia (Reardon et al., 2019), breaking the myth that Africa is “extremely far behind” Asia in these changes.

Traders no longer “trap farmers” with advances of cash or inputs to lock in the farmer’s sales: household survey evidence from Malawi, Nigeria, Tanzania, and Uganda

Adjognon, Liverpool-Tasie, and Reardon (2017) analyzed detailed farm household data from Living Standards Measurement Studies (LSMS) nationwide representative surveys in Malawi, Nigeria, Tanzania, and Uganda. The combined sample was 11,375 farm households. Their findings were a remarkable case of “myth busting”.

- Only 2% of the 11,375 farm households received advances from traders. These in fact tended to be the larger farmers in the sample (whom traders seek to reduce their transaction costs).
- Of farmers that buy inputs (seeds or fertilizer), only 6% used any credit (including from input dealers or output traders or informal sources like moneylenders and friends, or banks). They used their own cash from off-farm employment and cash sales of crops and animals.
- Even most “traditional cash crop farmers” in schemes did not get input advances from processors or traders. Conventional wisdom suggests that farmers growing traditional cash crops (such as cocoa, cotton, tea, and tobacco) would commonly access external inputs on credit, in particular from processors. Yet, the study found only 13% of inputs were purchased on credit (in trader, processor, or dealer advances) among the traditional cash crop farmers (compared with 6% for staple food crops). Nearly all this small share of credit in the findings was among tobacco farmers, only 1% of the total representative sample, and mainly in

Tanzania. This “pocket of farmers” received input credit for tobacco production through contract farming arrangements. Excluding tobacco plots puts the overall credit share of traditional cash crop producers close to that of staple food crop producers.

Food Retail in sub-Saharan Africa: SME retailers as channels of diet change and the emergence of supermarkets

Importance of the retail segment as the pivot between consumers and the rest of the food value chain including farmers

Food retail is about 20% of the total value of the agri-food value chain in sub-Saharan Africa so its performance is important for food security for consumers in urban and rural areas. It is also crucial for farmers as the ultimate interface with downstream demand, both as food to consumers, but also as the transmitter of demand from consumers upstream to farmers.

This point was made dramatically in Chapter 1 of this volume concerning diet changes. Half to two-thirds of the value of consumers’ purchases are for non-food grains. This transmits upstream from retailers to wholesalers to sub-Saharan African farmers. This relay is passing a strong signal to produce more roots and tubers, pulses, fish, meat, milk, vegetables, fruit, edible oil seeds, and feed grains. As little of these non-food grain products are imported, that domestic signal from consumers and retailers upstream to farmers has been responded to in a massive way by farmers in sub-Saharan Africa. Volumes of food in the form of non-food grains from rural to urban areas (and to rural markets) have soared 10-fold over the past several decades. That signal went to farmers, but also to traders and packers and truckers

that moved the enormous increases in volumes of these products up to retailers who sold them to consumers.

A similar point can be made for processed food. Chapter 1 (this volume) noted that consumers are avid for processed food foremost because they need and want to save time in home processing and preparation to free time for working off farm or outside the home, for education, and so on. They demand processed food, and retailers have responded in both small shops and in supermarkets with a wide diversity, including quality and packaging. That signal is in turn transmitted to the processing and wholesale segments.

That is not to say that changes in retail offerings and in consumption are not also supply driven. As noted in Chapter 3 (this volume), SMEs and large firms have made large investments in the aggregate in processing capacity, which has driven down processed food costs over time and increased access enormously, in both urban and rural areas. Retailers stand at the pivot of demand-pull and supply-push and are important to our analysis.

Stages of transformation of retail

The stages of retail transformation in sub-Saharan Africa have been similar to but starting more recently than the experience in Asia and Latin America, which experienced the supermarket revolution in the 1980s to the 2000s, and historically in the first two-thirds of the 1900s in the US and Europe. In general, there is a shift from dominance of: (1) traditional retail (small shops/stalls), to (2) transitional retail, that is, self-service “grocery stores” (larger independent shops) to (3) supermarkets (independent or in chains) and convenience store chains, as well as fast food chains on the food service side. The most recent stage is a shift towards (4) e-commerce.

The stages roll out as “waves” correlated with incomes of zones and countries, usually the

overall size of the country, rural versus urban areas, size of city, and the type of product (with processed foods' retail transformed earliest) (Reardon, Timmer, Barrett, & Berdegue, 2003).

The few survey studies of supermarket penetration of the retail sector in Africa show that the traditional and transitional retail stage is still the dominant one, with only about a 10–20% share of supermarkets in total urban retail. That is, however, up from tiny or non-existent in the 1990s, so there are definite signs of emergence, similar to Latin America in the 1980s. There are no official statistics so this range is estimated from the few studies on supermarket shares in consumption, such as Neven, Reardon, Chege, and Wang (2006) who found a 20% share of supermarkets in consumer expenditures in Nairobi, or Khonje and Qaim (2019) who found 42% of consumer food expenditures in supermarkets. But these are probably higher than for the average city in Africa, so we provide the estimated range of 10–20% of food expenditure in supermarkets and 80% to 90% in traditional retailers. In all cases, the penetration of supermarkets by the late 2000s and 2010s is well beyond what it was in the 1990s, so the trend is increasing, and steeply so in major cities.

The newly emerging supermarkets are thus rising to play an increasing role in the food system. Supermarkets not only provide those products, but because they are a “one-stop shop” they reduce the time needed to go to several specialized traditional shops. As the demand for time saving, especially by women, increases, the demand for shopping in supermarkets rises. Added to that, because of the capacity of supermarket chains to achieve economies of scale and scope, they tend to be able to reduce prices to consumers and add variety and quality and food safety through their leverage in supply chains. These factors are just emerging in Africa along with the emerging role of supermarket chains.

As the share of supermarkets in total consumption gradually grows, the supermarkets quality and safety and consistency demands, from other regions' experience, gradually translate into new investment requirements by farmers relative to what they were used to in traditional markets. These requirements can gradually exclude asset-poor farmers that cannot keep up with the new standards (Reardon, Barrett, Berdegue, & Swinnen, 2009; Reardon, Codron, Busch, Bingen, & Harris, 1999). That situation is still a decade or more in the future in Africa, as supermarket chains still have a small share (perhaps 10–20%) in urban food economies, but as with Asia and Latin America, their share will continue to grow as will their leverage to impose requirements on supply chains in general and farmers in particular. This will further push agricultural transformation.

However, all the transformation is not just from traditional stores to supermarkets. There is a spread of self-service small/medium-sized grocery stores in major cities, with substantial diversity of product offer. We also find shops are shifting from the traditional offer of a handful of packaged goods and loose grains, to packaged/branded processed foods, including of staple grains. Alphonse et al. (2019) studied this for Morogoro and Dodoma, in Tanzania, and the rural towns between these two tertiary/secondary cities. They showed a remarkable penetration and proliferation of processed foods in retail shops in all sizes of cities and towns. Similar results were found for cities in north and south Nigeria (Liverpool-Tasie, Reardon, & Abagyeh-Igbudu, 2017). Much of the processed food was produced in-country.

Moreover, fast-food chains are spreading rapidly, and an even more spectacular proliferation of SMEs of street vendor food is occurring across the cities of Africa. Many of these are operated by women, such as the “*mama ntilie*” in Tanzania serving chicken and chips.

New data on sales of leading chains of supermarkets in sub-Saharan Africa

Tables 1 and 2 show rapid growth in leading chains food sales from 2002 to 2018 for sub-Saharan Africa. We used data on the sales of edible groceries by the top retailers, as compiled by Planet Retail, a leading retail data service that tracks at least 7,000 retail companies in 211 countries. We broke the data into waves as experienced by countries. For instance, the first wave was characterized by the emergence of supermarkets. We also distinguished by the chain's source of capital (local, regional foreign direct investment (FDI), or international (outside sub-Saharan Africa) FDI such as Carrefour). Although Planet Retail has information on most of the main retailers, the firm does not cover the smaller and independent supermarket chains. Thus, the data underestimate total supermarket penetration and local capital-funded supermarket sales. With that in mind, several interesting trends clearly appear.

First, focusing on the 2002–2012 period to make the analysis comparable with other work we have done in Latin America and Asia, we found that the total sales went from about US\$7 billion to US\$29 billion, an increase by about 400%. Interestingly, this is the same increase in sales in Asia in that period (Reardon, Timmer, & Minten, 2012) and Latin America (Popkin & Reardon, 2018). The difference is that Asia and Latin America started from a higher base in the base year as the supermarket revolution had proceeded apace in the 1990s, but it is remarkable that the rates are similar. Also, as in the other regions, the growth is negatively correlated with the wave, so that the later waves are catching up with the earlier waves.

Second, as we found in Asia and Latin America, international supermarkets are more important in the first wave countries. But regional supermarket chains, such as Shoprite of South Africa, play an important role in the second and third wave countries.

Table 2.1. Edible grocery sales of leading modern retail chains by origin of retail company over selected African countries (2002–2016), in nominal millions of USD

Waves	Sales 2002	Sales 2008	Compound Sales Growth 2002–2008 (%)	Sales 2012	Compound Sales Growth 2008–2012 (%)	Sales 2018	Compound Sales Growth 2012–2018
First Wave	6,719	18,329	22	26,371	13	25,576	-1
Local	4,375	11,541	21	13,541	5	13,453	0
Regional	117	377	26	552	14	946	11
International	2,227	6,412	24	12,279	24	11,176	-2
Second Wave	581	1,273	17	2,280	21	3,011	6
Local	160	384	19	1,112	43	1,505	6
Regional	161	287	12	547	24	858	9
International	260	602	18	622	1	648	1
Third Wave	9	172	81	513	44	683	6
Local	-	106	-	260	35	298	3
Regional	-	47	-	183	57	228	5
International	9	19	16	70	56	157	17

Table 2.2: Number of leading retailers followed by wave and country

Waves	Number of leading retailers			
	2002	2008	2012	2018
First Wave				
Botswana	6	5	7	8
Namibia	5	7	7	7
South Africa	7	9	9	8
Second Wave				
Kenya	4	4	8	10
Madagascar	3	2	2	2
Malawi	2	3	4	3
Mozambique	3	3	4	5
Tanzania	2	2	4	4
Zambia	2	2	5	7
Zimbabwe	5	6	5	5
Third Wave				
Angola	2	3	5	4
Ghana	0	2	2	2
Nigeria	0	2	5	5
Senegal	1	1	1	2

Source: Authors' analysis of raw data in www.Planetretail.net. The chains are all of the chains followed by Planet Retail per country, that were specifically food retailers.

Supermarket procurement systems and small-scale farmers

Several points stand out with respect to supermarket chain procurement from small-scale farmers and other suppliers.

- **Supermarkets procurement systems tend to be one factor inducing food processors concentration as they tend to source from medium and large processors.**
- **When supermarkets buy direct from farmers, it tends to only be for fresh fruits and vegetables, and nearly only from medium to large-scale farmers** (Neven, Odera, Reardon, & Wang, 2009 for Kenya). But they tend to use wholesale markets to source produce, so indirectly they buy from small-scale farmers via wholesalers.
- **Supermarkets source extremely little directly from small farmers, except a little in South Africa and in corporate social responsibility (CSR) initiatives.** This is not expected to change for some time.

Conclusions and recommendations to the public sector linked to constraints faced by traders and logistics firms

Findings

Traders/logistics firms and retailers together have the same share of the totality of food value chains as do farmers.

- Myths constrain the policy debate; based on emerging evidence, we identified the following to be myths:
 - 1) Conventional wisdom has it that there is a missing middle of logistics services like warehouses or trucking. *We found these private sector services to abound.*
 - 2) Conventional wisdom has it that traders and truckers are not productive or prone to invest. *We found the opposite: investment patterns are dynamic.*
 - 3) Conventional wisdom has it that traders are exploitative via holding farmers captive with advances and then paying the farmers prices that deduct usurious interest rates. *We found that practice to have nearly disappeared.*
- There has been a Quiet Revolution in the trade and logistics segments in sub-Saharan Africa, and an emerging supermarket revolution. There is a Hidden Middle (hidden from the policy debate) but not a Missing Middle.
- The development of the trade and logistics segments is similar in many ways to dynamic Quiet Revolutions we studied in Asia a decade earlier. Africa has the same capacity to change and is already starting to show it.

Recommendations linked to findings of “constrained dynamism”

Governments and donors need not and should not “reinvent the wheel”. When conditions are ripe, SME traders and logistics firms proliferate quickly and intensely invest, meeting demand. Governments and donors (nor their NGO or other partners) do not need to set up warehouses and trading stations or return to the days where government enterprises undertook marketing. Firms are undertaking transactions with their own working capital. Where they can meet demand, they accumulate savings and invest and grow. Traders and logistic firms are buying and upgrading, and servicing equipment, offering services where the economics make sense, where the constraints are not too great. Governments and donors setting up trading, trucking, or warehouse businesses, even in the hinterlands and even in the villages, will just “crowd out” grassroots entrepreneurs, again, as they did in the 1980s and before.

Governments and donors need to focus on enabling the Quiet Revolution and the Modern Revolutions already launched by the private sector. They need to leverage it, to identify constraints to it and relieve them.

The following are some of the constraints and possible recommendations:

1. **Degraded and congested wholesale markets.** Investing in wholesale market infrastructure should be the number one priority, especially in secondary/tertiary cities and rural towns close to farms. This was the strategy taken by China in the 1990s and was fundamental to their food system success (Huang et al., 2007).
2. **Poor road conditions.** Investing in improving roads –we showed the important effect of Ethiopian government investment

in roads, complementing and probably inducing truckers' investments. Stifel, Minten, and Koro (2012) note the impact of investing in feeder roads in Ethiopia, and Minten and Kyle (1999) show the impacts of investment in road quality on marketing margins in former Zaire (Democratic Republic of Congo).

3. **Corruption** in governance of roads and the transaction costs from that. There is need for control of such corruption.
4. **High cost of energy and uneven access to fuel.** This requires public investment in fuel delivery infrastructure, as well as policies that reduce the cost of fuel and electricity that will benefit the trader and logistics segments.
5. **Lack of knowledge and training of traders and truckers.** This results in food safety problems, such as aflatoxin. Liverpool-Tasie, Reardon, Sanou, et al. (2017). This calls for training of traders at wholesale markets in handling of maize for that purpose, for example.
6. **Difficult importation processes of vehicles, equipment and machineries.** Nearly all the trucks and cooling equipment in Africa are imported. That is not likely to change in the short to medium term. It is thus important to formulate policies and procedures that are simple and efficient.

In conclusion, as the feed market grows (it grew 600% in just over 10 years in Nigeria!), and urban maize milling transforms and develops, markets will look for new varieties of maize, for quality, for traceability and for disease control. In all these things, farmers will play a role, but the traders will be the main conduit of incentives and investments—exploring what incentives and conditions are needed to facilitate this is a new agenda that needs to be prioritized.

Annex 2.1: Definitions

Trader

“Traders” include firms that supply transactional intermediation services between upstream suppliers and other traders or retailers.

A retailer is by definition a firm that sells to a consumer; a trader does not.

Traders can be: (1) wholesalers, who take possession (buy and sell); and (2) brokers, who do not take possession but just take a commission. In practice, traders often do both.

Traders can be vertically integrated: (1) also supplying logistics (instead of buying logistics); (2) also processing the product; (3) also supplying finance to suppliers or buyers; and (4) also retailing. A trader can be based in urban areas, rural areas, or both.

Often one hears a term “semi-wholesaler” for a wholesaler who buys from or sells to another trader. One often hears a spatial adjective applied to a type of trader, such as urban wholesaler or field, rural, or village broker. A trader can, like a processor, be of any scale, from micro to SME to a large enterprise. A trader can deal in the domestic market, international trade, or both.

Finally, a wholesale market (or other terms for varying degrees of persistence in time, formality, or infrastructure, such as a village weekly market) is a cluster of traders; it can be a formal municipal covered building; it can be strung along a highway; it can be a truck stop; it can be permanent or meet at dawn once a week. It can be with registered traders; it can be with informal sector traders. It can be regulated by national or municipal or state law; it can be unregulated.

A trader can be “on market” (based in a wholesale market) or “off-market”. A trader can be capital intensive or labor intensive.

Logistics

“Logistics” includes handling of all products without (strictly speaking) including transactional intermediation services. Of course, in practice, some logistics firms also supply intermediation services such as arrangement of a buyer, and take a commission that combines physical delivery or storage, and dealing with the buyer. Logistics firms can do any or all of these: (1) transport; (2) store such as in a warehouse; (3) cool, freeze or dry (although these can be construed as also undertaking first stage processing); (4) pack; (5) sort

(although that overlaps with intermediation); (6) arrange bills of lading, port and wholesale market fees, and so on; and (7) deliver payment from the buyer.

The firm can own its own equipment or rent or outsource parts of the logistics. Typically the term “third party logistics” is used for these firms (3PLS). As with the other segments, the firm can be one person, an SME, or a large firm (like Penske). A man leading a donkey with a grain sack on it is a logistics firm; so is a multinational shipping company like Maersk, and so is a trucker.

References

- Adjognon, S.G., Liverpool-Tasie, L.S.O., & Reardon, T. (2017). Agricultural input credit in Sub-Saharan Africa: Telling myth from facts. *Food Policy*, 67, 93–105.
- Alphonse, R., Waized, B. Ndyetabula, D., Sauer, C., Caputo, V. Tschirley, D., & Reardon, T. (2019, February). *Penetration of Processed foods in rural and urban areas in Tanzania: Wholesalers, Retailers, Processors, Consumers—Cooking Oil, Maize flour, Wheat Flour & Products*. Presentation at the 5th Annual Agricultural Policy Conference, Dodoma, Tanzania.
- Huang, J., Huang, Z., Zhi, H., Wu, Y., Niu, X., & Rozelle, S. (2007). *Production, Marketing and Impacts of Market Chain Changes on Farmers in China: Case Study of Cucumber and Tomato in Shandong Province*. Micro Study Report of Component 1 of the Regoverning Markets Program. Beijing: Chinese Academy of Science.
- Khonje, M.G., & Qaim, M. (2019). Modernization of African food retailing and (un)healthy food consumption. *Sustainability*, 11, 4306, 1–18.
- Liverpool-Tasie, S., Reardon, T., Sanou, A., Ogunleye, W., Ogunbayo, I., & Omonona, B.T. (2017, December). *The transformation of value chains in Africa: Evidence from the first large survey of maize traders in Nigeria*. Nigeria Agricultural Policy Project Research Paper 91.. Feed the Future Innovation Lab for Food Security Policy. East Lansing, MI: Michigan State University.
- Liverpool-Tasie, S., Reardon, T., & Abagyeh-Igbudu, J. (2017, July). *Rapid agri-food system transformation in Sub-Saharan Africa: Preliminary evidence from processed food inventories in Nigeria*. Presentation at the American Association of Applied Economics (AAEA) Annual Meetings, Chicago, Illinois.
- Minten, B., & Kyle, S. (1999). The effect of distance and road quality on food collection, marketing margins, and traders’ wages: evidence from the former Zaire. *Journal of Development Economics*, 60(2), 467–495.
- Minten, B., Randrianarison, L., & Swinnen, J.F.M. (2009). Global retail chains and poor farmers: evidence from Madagascar. *World Development*, 37(11), 1728–1741.

- Minten, B., Stifel, D., & Tamru, S. (2014). Structural transformation of cereal markets in Ethiopia. *The Journal of Development Studies*, 50(5), 611–629.
- Neven, D., Odera, M., Reardon, T., & Wang, H. (2009). Kenyan supermarkets and emerging middle-class horticultural farmers, and employment impacts on rural poor. *World Development*, 37(11), 1802–1811.
- Neven, D., Reardon, T., Chege, J., & Wang, H. (2006). Supermarkets and consumers in Africa: The case of Nairobi, Kenya. *Journal of International Food & Agribusiness Marketing*, 18(1/2), 103–123.
- Popkin, B.M., & Reardon, T. (2018). Obesity and the food system transformation in Latin America. *Obesity Reviews*, 19(8), 1028–1064.
- Poulton, C., Dorward, A., & Kydd, J. (1998). The revival of smallholder cash crops in Africa: public and private roles in the provision of finance. *Journal of International Development*, 10(1), 85–103.
- Reardon, T., Barrett, C.B., Berdegúe, J.A., & Swinnen, J. (2009). Agrifood industry transformation and farmers in developing countries. *World Development*, 37(11): 1717–1727.
- Reardon, T., Codron, J.-M., Busch, L., Bingen, J., & Harris, C. (1999). Global change in agrifood grades and standards: agribusiness strategic responses in developing countries. *International Food and Agribusiness Management Review*, 2(3/4), 421–435.
- Reardon, T., Echeverría, R., Berdegúe, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2019). Rapid transformation of food systems in developing regions: Highlighting the role of agricultural research & innovations. *Agricultural Systems*, 172, 47–59.
- Reardon, T., Henson, S., & Berdegúe, J. (2007). “Proactive fast-tracking” diffusion of supermarkets in developing countries: implications for market institutions and trade. *Journal of Economic Geography*, 7(4), 1–33.
- Reardon, T., Timmer, C.P., Barrett, C.B., & Berdegúe, J. (2003). The rise of supermarkets in Africa, Asia, and Latin America. *American Journal of Agricultural Economics*, 85(5), 1140–1146.
- Reardon, T., Timmer, C.P., & Minten, B. (2012). The supermarket revolution in Asia and emerging development strategies to include small farmers. *PNAS: Proceedings of the National Academy of Science of the USA*, 109(31), 12332–12337.
- Stifel, D., Minten, B., & Koro, B. (2012). *Economic benefits and returns to rural feeder roads: evidence from a quasi-experimental setting in Ethiopia* (ESSP Working Papers 40). Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Zeller, M., & Sharma, M. (1998). *Rural Finance and Poverty Alleviation*. Food Policy Reports 8. Washington, D.C.: International Food Policy Research Institute (IFPRI).

03 The Quiet Revolution and Emerging Modern Revolution in Agri-food Processing in Sub-Saharan Africa

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Key Messages

- 1** The private sector in agri-food processing has been highly responsive and made a huge aggregate investment to meet the soaring demand for processed food by African urban and rural consumers. There has been a “Quiet Revolution” with the rapid proliferation of small and medium enterprises (SMEs), and an emerging “Modern Revolution” with domestic and foreign direct investment (FDI) large processors.
- 2** Processors are part of what we call the “Hidden Middle”. It is massive and dynamic, but tends to be largely “hidden” from policy debates except to wrongly think it is a “missing middle”.
- 3** Governments have made several good moves that helped the revolutions in processing. Processing has “taken off” because demand is soaring, local farm production is increasing; small and large private processing investment is responding; and governments have liberalized and privatized markets, and built an initial base of the most critical factors, wholesale markets, roads, and some electrification.
- 4** But there is still much to be done: the take-off could fly faster and higher and be more efficient and inclusive; it is constrained by inadequate infrastructure, policies, prevalent risk, uncertainty, and corruption.
- 5** Governments and donors need not and should not “reinvent the wheel”. When conditions are ripe, small and large-scale processors proliferate quickly and intensely invest, meeting demand. Governments and donors (nor their non-governmental organizations (NGOs) or other partners) do not need to set up “value added” initiatives or return to the days where government enterprises undertook processing, which crowd out the private sector.
- 6** Instead, governments and donors need to focus on enabling the Quiet Revolution and the Modern Revolutions already launched by the private sector. They need to leverage it, to identify constraints to it and relieve them.

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7 As the processing sector grows, it will create value added and markets, but it will need and seek more raw material supply. The farm sector must be enabled to this need with the requisite quality, varieties, volumes, consistency, and timing, so that African farmers, rather than imports from outside Africa, supply the raw materials and gain from the markets developed.

8 A total of 95% of small-scale farmers supply to the processing sector directly to SME processors or via SME wholesalers. Enabling conditions for spontaneous clusters of SMEs and traders in wholesale markets is by far the main action needed to leverage value chain investment and support inclusive agricultural transformation. The remaining 5% of small-scale farmers are in “contract farming” with large processors. That is as yet a tiny but emerging opportunity to link small-scale farmers to the soaring processor market.

Introduction

The introductory chapter of this volume notes that African consumers in urban and rural areas are rapidly expanding their purchase of both first-stage processed food (like maize flour) and second-stage processed food (like bread and noodles). This expansion is driven mainly by the increase in opportunity cost of time of rural and urban women who increasingly work outside the home and have less time to do the traditional tasks of hand pounding yam and maize, millet, and extensive meal preparation. Commuting men and women are buying much more food away from home as well, at restaurants and street vendors. Those enterprises also are hard pressed in terms of labor time to do extensive own-processing and preparation. Thus, from the demand side there is strong and rapidly growing demand for buying processed food.

The introductory chapter also notes that African enterprises can far more easily import equipment and raw materials now than they could 25 years ago. Trade liberalized and Asia industrialized, and those two facts make it cheap and easy now compared with before to import processing equipment and motors. Foreign direct investment (FDI) liberalized so that foreign firms have come to Africa with

processing technology and funds to invest in local processing capacity. Domestic capital has also been invested massively (far greater in volume than FDI) via investments of both large domestic firms, but even more important the many thousands of small and medium enterprises (SMEs) in processing that have proliferated and invested in machines for processing and packaging.

Processors have eagerly produced, stockists and truckers have avidly moved, retailers have enthusiastically stocked, and consumers have voraciously bought processed packaged foods in rural and urban areas. It is immensely larger in volume and in its place in the African food system than even 10 but certainly 20 years ago.

This chapter analyzes the rapid rise of the processing sector of agri-food value chains in sub-Saharan Africa. A central message is that this sector has “taken off” and is rising rapidly, even while fettered by problems of infrastructure and policies. We describe a “Quiet Revolution” of SME processors that has spread rapidly through most countries in sub-Saharan Africa, and a “Modern Revolution” of both domestic and foreign large firms that is emerging.

We conclude by urging policy makers and donors to understand that these revolutions

are in a “Hidden Middle”, that is, a midstream often hidden from the policy debate or erroneously said to be a “missing middle”. It is not missing, it is flourishing, it has taken off, but it could fly much higher and be more efficient and inclusive with more public investment and better policy. Policy makers and donors should not “reinvent the wheel”, creating their own “value added” programs and projects, but enable the hundreds of thousands of private entrepreneurs, large and small, laboring to meet the demand of African consumers for more affordable, convenient, and safe food.

The path of transformation of the processing segment in sub-Saharan Africa

Rapid growth of the processing sector

The processing segment grows in volume as the food system develops. This is because households traditionally buy or grow raw ingredients and then process them in the home—grinding and pounding the grain with mortar and pestle, as one would hear in villages all over Africa in the 1980s; home cooking porridge, mashes and breads from the flour into *toh*, *lakh* and *pap*, *ugali* and *enjera* from the flour. The same would occur with vegetables, tubers, meat, buying or home-producing the raw product and then home-processing and preparing. Over the decades the processing sector rapidly developed, as the opportunity cost of women's time increased as they entered the workforce outside the home, and as processed and packaged foods became cheaper and abundant, and long supply chains and urbanization led to the need for transportable and storable goods that could be accessed year-round.

Two patterns of concentration over time

The processing segment has undergone dynamic transformation in sub-Saharan Africa. It has grown from small simple traditional enterprises that populated the segment in the 1970s along with a few parastatals, to a mix of small and large firms. Two typical patterns of change in scale and segment concentration have occurred in sub-Saharan Africa (as well as other regions; Reardon, 2015), as follows.

Upward-sloping curve of concentration.

This is a progression (perhaps with a small slope changing to a steeper slope later) over time from small to medium to large-scale firms, starting from micro enterprises, to SMEs, to large enterprises. It parallels the path from traditional to transitional to modern agri-food systems. This occurs in subsectors that did not have parastatal processing firms (like grain and sugar mills). The increase in scale comes from:

- Economies of scale and scope in processing.
- Usually a phase of increasing labor/output ratios to an increase in capital/labor ratios, and from self-employment to wage employment.

The economies of scale confer cost advantages on each stage of enlarged firms that allow them to out-compete (controlling for transaction costs of accessing their markets) the smaller firms. Economies of scope also allow larger firms to have multiple production lines and products which allow them to adapt to differentiation of demand and eventually provide a “one-stop shop” to retailers, decreasing the transaction costs of the retailers.

J curve of concentration over time. The “J curve” has proceeded as follows in Africa, as it did somewhat earlier in Asia and Latin America (Reardon, 2015).

The first stage (left most part of the J curve) was a situation of partial concentration of processing via the creation of large parastatals each with several plants. This was done by governments and donors in the 1960s and the 1970s to obviate what were considered exploitative traders and inefficient fragmented markets (Reardon & Timmer, 2007). But even in the era of parastatals, the parastatals usually controlled only a portion of the market. There was also usually a “parallel market”, especially in the rural sector, dominated by informal SMEs.

The second stage (the middle of the J curve) was a de-concentration, starting in the 1980s but mainly in the 1990s and 2000s. Structural adjustment gave rise to the disbanding or privatizing of most of the parastatals. Either the parastatal was bought by a large private firm, or it was disbanded and the void filled by SMEs. But even where a large private firm emerged, there tended also to be a proliferation of SMEs due to the rapid growth of demand for processed foods, longer supply chains to urban areas, demand in the rural areas, and so on. This is what we call the “Quiet Revolution”.

The third stage (the rightmost part of the J) is a re-concentration. This happens as: (1) the acquired/privatized large firms gain market share; (2) further FDI or domestic large-scale investment occurs; and (3) the SME segment itself concentrates with competition.

The J curve pattern appears especially common in the subsectors and countries where the parastatal equivalent of a modern large-scale firm is created in the midst of a traditional stage of a supply chain, such as was widespread in grains and edible oils in Africa in the 1970s and 1980s. The rapid growth of city markets and the other inducements to demand processed grains and oils (such as the increase of the opportunity cost of women's time (Kennedy & Reardon, 1994)) led to a proliferation of grain processing SMEs (e.g., in Zimbabwe, Rubey,

1995). The proliferation of SMEs continued into the 2000s and 2010s, with marked growth and proliferation of oilseed and maize milling SMEs, branding and packaging (e.g., in Tanzania; Snyder, Ijumba, Tschirley, & Reardon, 2015).

The stages of transformation, and thus large and small-scale processors, coexist, at least for a time.

If transaction costs are low, a large modern firm with economies of scale and of scope can produce the full range of products in a given category with lower costs than traditional small firms. And yet large processing firms take over markets at varying paces depending on the conditions. That is why in every country where there are large processing firms in a given subsector, one continues to find, but in numbers diminishing over time, the coexistence of the large firms with SMEs. The smaller firms tend to compete and persist where:

- High transaction costs “protect” SMEs; an example is *mandaazi* bun bakers in rural and urban Tanzania.
- Large firms have limitations on procurement of intermediate inputs (crop supplies or through-put) and thus difficulties of consistently maintaining capacity utilization; an example is the dominance of Bakhresa in Tanzania in imported wheat products but not in maize products where many SMEs survive.
- There is a period in which inefficient large traditional (such as family run) firms do not market or adopt technology sufficient to easily compete with SMEs outside of their most accessible markets. These are often targets for large efficient firms such as Bakhresa that acquired such firms in eight countries in Eastern and Southern Africa.
- The product is a highly local and traditional niche that large firms do not find profitable to penetrate; an example is the gummy yeast (*rabile*) found at the bottom of red sorghum

beer brewing cauldrons in Burkina Faso. *Rabile* is used as a traditional ingredient in sauces.

- Some SMEs (especially in a more advanced stage, usually when in the formal sector) produce differentiated products that compete with the large firm's product, at least until the large firm acquires the SME with the new product, or adds a line in a factory to make that product.
- SMEs innovate and invest continuously (especially in the later stages) to stay ahead of the competition from the large firm. This can be in cost innovation, product differentiation, or addition of complementary services such as delivery (staying ahead of the large firm itself adding those services).
- Urban and rural workers seek prepared and processed foods from street vendors that are highly accessible and inexpensive for a quick meal. The importance of these street vendors—of prepared rice, millet, yams, beans, and so on—has been emphasized in urban surveys in coastal West African cities (Bricas & Muchnik, 1985), Burkina Faso (Reardon, Thiombiano, & Delgado, 1989), Ghana and Nigeria (Hollinger & Staatz, 2015), inter alia.

The Hidden Middle—but Not Missing Middle: Quiet Revolution in SMEs in processing in sub-Saharan Africa

The drivers of the rapid proliferation of SME processors

The Quiet Revolution in SMEs in processing and wholesale and logistics is one of the main messages of this chapter. This is happening in Africa during the prolonged transitional stage of the value chain, in the mid-section of the concentration curves previously discussed.

The proliferation of many tens of thousands of processing SMEs per country has not been gradual but rather in many cases extremely rapid.

This surge is driven by a confluence of factors at the national level, as discussed in Chapter 1 under “drivers”:

- Urbanization
- Diet change
- Infrastructure increase
- Privatization of parastatals
- A surge in raw material supply from farms
- And extremely important, the investments, usually from own cash sources (as credit has played a very small role) into SMEs

The spread of “spontaneous clusters” of SMEs: perhaps the most quantitatively important phenomenon in the African private sector today

Emerging empirical evidence from field surveys (discussed in the illustrations of the Quiet Revolution in the following section) show the spread of “spontaneous clusters” of SMEs in processing (as well as logistics and wholesale). It is our contention that these spontaneous clusters are perhaps the most quantitatively important phenomenon occurring in the African private sector today. These occur especially in peri-urban and intermediate rural areas, small and secondary towns, and near wholesale markets and transport nodes (including roads into cities), and in the cities. They are clusters of SMEs.

We contend that far more attention should be paid to identifying and improving the business conditions for development of these clusters. Currently, the main government and donor attention within the domain of clusters is on a subset of cluster types, that is, “managed

clusters”, such as African Development Bank’s initiative on staple crop processing zones for Feed Africa, or special economic zones (SEZs), agro-parks (a term started in India), and growth corridors. Ulimwengu & Jenane (Chapter 5) review the experiences and emerging initiatives of managed clusters in India and Africa. They note that for well-identified markets, such as an export market, the government should consider bringing together a critical mass of infrastructure investments to make it worthwhile for SMEs and anchor large enterprises to cluster. They note, however, that in the case of India’s agro-parks, and several earlier initiatives in Africa, there were substantial problems of implementation, delayed or aborted development, and often performance below expectations. Their conclusion is broadly that the concept is worthwhile but the implementation is challenging and these should be evaluated further.

However, we believe (but have no systematic continent-wide data to confirm) that spontaneous clusters are and will be over time at least as important, or more important, than managed clusters. The spontaneous clusters tend to arise where the confluence of drivers is present in a rural or urban area or sometimes in linked segments (such as in the case of the chicken/feed/maize complex in Nigeria). The literature has both spatial definitions, in terms of a local cluster (such as a cluster of maize mills in a city, as in our Tanzania example given in the following section) and a national cluster. Both are crucial for our theme.

The spontaneous clusters of enterprises are often linked to one product value chain such as in our example of teff in Ethiopia. But the development of one segment such as logistics then serves “laterally” in other value chains such as that for maize or wheat or vegetables in Ethiopia. The same goes for warehouse capacity that might be initially developed by

private sector SMEs as a response to the needs of maize traders as we show in our example for Nigeria, but then in turn serves “laterally” as warehouse third part logistics services (3PLS) for rice and other products.

The drivers of the spontaneous clusters often emerge unplanned and one by one until there is a critical mass or confluence of drivers which give rise to a take-off of SME proliferation. Often a public investment such as in electrification or the improvement of a road is a key part of the sequence of drivers. Our perception is that often the public investments that are important causes of spontaneous clusters are not made with the eventual development of the spontaneous cluster in mind. The cluster becomes an unintentional beneficial consequence—but one often unperceived by governments. We present illustrations in the following section.

SMEs support small-scale farmers

The clusters of SME processors (as well as traders and logistics agents clustering near them), surprisingly (as it is little discussed in the debate) can have important roles in supporting small-scale farmers. This is analogous to “resource provision” in resource provision contracts one finds with contract farming with large-scale processors, and other benefits for small-scale farmers usually only referred to in discussions of large-scale processors. These include:

- SME spontaneous clusters reduce transaction costs (compared with searching for isolated SMEs) directly for smallholder farmers in rural areas and indirectly for farmers via reduction of transaction costs for wholesalers (as wholesalers are the main suppliers of raw input to processors). As logistics clusters/hubs (such as truck stops) tend to cluster near both wholesale markets and SME processors, this further reduces the cost of market linkages—and it does

so spontaneously, for economic reasons, not managed or guided by governments. Examples are the clusters of maize milling SMEs in Dar es Salaam and Arusha that tend to locate near grain wholesale markets (Snyder, 2018), and first stage processors and milk collection centers in rural Zambia (some of which are SMEs and some are large enterprises) (Neven, Reardon, Hernandez, & Tembo, 2017).

- In the case especially of feed mills, even SMEs, they provide “value chain finance” by selling feed to farmers and wholesalers on credit. For the traders, this is typically a short-term revolving credit which the trader pays back in a week or two. For fish and chicken farmers, this is usually paid back after a month or two in the season. This happens in the chicken/feed mills linkages in Nigeria (Liverpool-Tasie, Omonona, et al., 2017).
- SME competition is a market motor of differentiation and value added. This

happens via the point traditionally made about clusters that firms share, consciously or not, information about technologies and innovations such as branding and packaging. The agglomeration intensifies competition and differentiation. An example is the emergence of many firms undertaking second-stage processing of millet in prepared packaged (and bulk) sales in Dakar (Chase-Walsh, 2019) and *lishe* (mixed grains and pulses baby food) in Tanzania (Snyder, 2018). The proliferation of competing SMEs in new products affects the “food environment” of consumers in African cities.

- While discussion in donor circles often mentions “SME incubators” and “SME accelerators”, we posit that the spontaneous SME clusters in the Quiet Revolution may be among the most effective of incubators. In fact, donor incubators have a long but mixed-results history (Haggblade, Hazell, & Reardon, 2007).

Illustrations of the Quiet Revolution in the Hidden Middle, with processing in the mix

A deep dive into several cases makes the general points discussed in the previous section come alive.

Teff supply chain, Ethiopia

Teff is the leading cereal in Ethiopia. The marketed surplus of teff to domestic markets in 2013/14 was US\$750 million, higher than that of coffee (US\$560 million)! This is an amazing fact as coffee is usually highlighted as the leading commodity and is the most important Ethiopian export product. An explosion of growth in the teff value chain to Addis Ababa has occurred in the past decade. That observation is based on field surveys of farmers, rural and urban wholesalers, and truckers midstream, and of cereal retail shops, mills, and cooperative retailers downstream (Minten et al., 2016).

Addis Ababa has experienced a proliferation of SME mills-cum-retailers and rapid transformation all along the supply chain. The recent development of the teff value chain is driven by (Minten, Stifel, & Tamru, 2014; Minten, Tamru, Engida, & Kuma, 2016):

- Significant growth in Addis itself.
- An increase in incomes (with a doubling of income and a doubling of teff expenditure in the past 10 years).
- The increased opportunity cost of women's time (saving time cleaning and milling teff and making *enjera* (teff pancake)).
- The diffusion of cell phones.
- Improvements in roads and reduction of transport costs.
- Provision of government extension services for teff.

The development of the teff value chain was in turn correlated with:

- An increasing adoption of modern inputs (chemical fertilizers, improved varieties of seed, and herbicides), especially by farmers living close to urban centers.
- A rising quality demand and important shifts from the cheap red varieties to the more expensive white teff varieties, with concomitant increases in productivity due to the uptake of improved varieties.
- An increasing consumer willingness to pay for convenience in urban areas, with the rapid emergence of one-stop retail shops that provide sales, cleaning, milling, and transport services, as well as a sizable food service industry.
- A declining share of the margins of rural–urban marketing, urban distribution, and milling in the final retail prices of teff, indicating improved marketing efficiency over time.

Traditionally, and still in rural areas and small cities and towns outside Addis Ababa, consumers buy teff as a grain, clean it at home, have it custom milled, and then prepare *enjera* at home. These practices have changed in Addis Ababa over the past decade, with a decline in custom milling and in cleaning grain at home. Instead, consumers are buying teff flour or *enjera*, driving a sharp increase (nearly 50%) in teff mills, *enjera*-making enterprises, and retail outlets in the neighborhoods.

Moreover, the wholesale marketing of teff has surged; this can be considered as in the overall “spontaneous cluster” with the processors and retailers of teff. The wholesale segment is seldom studied, as attention is usually paid only to the farm segment. Minten et al. (2014) show that the cereal wholesale market activity—including teff and other cereals, such as maize and sorghum—has been developing quickly recently. Focus group participants in a wholesale market survey in Ethiopia were asked about levels and trends concerning the numbers of traders and brokers in the markets, and cereal trucks arriving in these markets. The reported numbers confirm that the marketed surplus of teff has increased rapidly over the last decade. For example, significantly more trade is reported on average in these markets over time. The reported number of trucks increased over the 10 years by almost 70% and 80% in the peak and lean periods respectively. These growth rates are faster than the urban population growth rates in Ethiopia, possibly indicating higher consumption levels in the cities over time, more trade between rural areas that might pass through these urban wholesale markets, and shifts from other means of transportation to trucks.

Minten et al. (2016) also show a rapid shift from transport of teff by foot (head loads) to animal transport (donkey/horses, carts), to motorized transport, and then from small trucks of 4–5 tons to truck-trailers of 20 tons—a thousand years of transport change in a decade.

The maize-feed-chicken system in Nigeria

As Nigeria experiences rapid growth and urbanization, animal proteins alone already account for about 15% and 20% of the food budget in rural and urban areas respectively (Liverpool-Tasie, Omonona, et al., 2017). The maize-feed-chicken system is thus an important complex. A crucial segment of intermediaries in this system, and in maize consumption generally (by far the lead food grain in Nigeria) are the maize wholesalers.

The importance of traders can be seen using the image of an hourglass. At the top (upstream) of the hourglass are roughly 8 million small-medium maize farmers and at the bottom (downstream) are some 140 million purchases of maize out of the population of 170 million in Nigeria. Intermediating between these two massive groups are tens of thousands of maize traders, feed and flour mills, and the 3PLS transporters, and warehouse owners that they work with. These intermediaries condition the profitability of maize farm commercialization, the profitability of private and public investments in control of aflatoxin in the supply chain, and the price of maize to consumers.

Two segments of the hidden middle emerged as particularly dynamic in the survey conducted by Liverpool-Tasie, Omonona, et al. (2017), and are de facto a national level, inter-zone, spontaneous cluster.

- **Feed mills** (both SMEs and large-scale plants) have emerged as a critical midstream segment between the maize farmers and chicken (and fish) farmers. As consumption of fish and chicken have risen quickly in the past 15 years, demand has shifted from fish capture and free range chicken production to feed-based aquaculture and chicken farming. This is occurring both at a large scale such as Chi Farms and Zartech in Southwest Nigeria and at a rapidly growing number of SMEs dispersed in chicken production areas with the most rapid growth occurring in the southwest. There is also a rapid proliferation of small-scale fed-chicken farmers in the north and south of the country. The feed sector has responded to this demand. In 10 years the volume of feed output increased by 600% from 300 thousand to 1.8 million tons. Most of the maize that is the main input for the feed industry in both north and south is produced in the north. This has induced the rapid development of a long supply chain of maize traders from the north to the feed mills of the south (as well as to the flour mills and wholesaler markets in the south).
- As a result of the long north-south maize supply chains, the growth of maize demand in cities, and feed and flour mills in the north and south, there has been rapid development in the maize wholesale sector with attendant growth in the 3PLS (in particular transport, warehousing, and handling). A survey of 2000 urban and regionally based wholesalers in north and south Nigeria found surprising conduct changes in the sector relative to conventional wisdom (Liverpool-Tasie, Reardon, Sanou, et al., 2017), as follows: (1) traders have partially “dis-intermediated” the supply chain by reducing reliance on rural brokers and buying directly from farmers for 60% of their maize for northern urban traders and 40% for southern traders; (2) the southern traders buying 80% of their maize from the north, and feed and chickens also flow along the long supply chains from south to north and north to south and east; and (3) only 5–10% of the urban traders own trucks or warehouses; they hire transport and storage, and rely overwhelmingly on SMEs in an active market in 3PLS services for 85% of their maize pickup or deliveries and storage. The wholesale segment is treated in more detail in Chapter 2 of this volume.

Maize, wheat, and other food processing and wholesale in urban and rural Tanzania

Three recent studies in urban and rural Tanzania have revealed the transformation of the processing, wholesale, and retail of milled maize. This shift is striking in its rapidity (over just the past 10 years) and its being both rural and urban.

- **Proliferation of processed food variety in Dar es Salaam mainly from domestic firms.** Snyder et al. (2015) undertook an inventory of processed foods on sale in shops. They found a proliferation of processed food—487 different items in the inventoried categories of processed maize and other flours, packaged rice, dairy products (excluding cheeses, butter, and whipped cream), juices, and poultry. Contrary to a common view they observed, they found that 62% of these items came from Tanzanian firms. Imports from other East African countries (specifically Kenya and Uganda) accounted for 10% of the items. South Africa accounted for another 8%. Items from outside Africa accounted for 20%.
- **Rapid proliferation and change in maize flour milling SMEs in Arusha and Dar es Salaam.** Snyder (2018) reports on their survey of hundreds of maize flour SMEs in Arusha and Dar es Salaam. The maize flour market is now only SMEs (as the large company Bakhresa exited from this market) and domestic (none is imported). The survey found that 85% of the SMEs started over the past 10 years. Only a third of the mills are “traditional” in that they do not own a brand but provide custom milling to consumers. The other two-thirds of the mills are “non-traditional:” a third of the maize flour SMEs have a brand and also own a mill, and a third of the SMEs have a brand but do not own a mill (they buy the custom milling service from other SMEs). This shows the maize flour sector has moved well into branding and packaging, well beyond the old mode of just custom milling for consumers, and well into business-to-business service provision. Moreover, while all are SMEs, there is significant heterogeneity of scale in this group.
- **Tanzanian maize flour SMEs in small cities and rural towns are transforming in ways similar to those found in Dar es Salaam.** Alphonce et al. (2019) report on their primary surveys of 360 retailers, 95 wholesalers, and 315 consumers of processed maize and wheat. The sample included two secondary cities (Morogoro and Dodoma) and 20 small towns along, and 25 km north and south of, the main East-West road from Dar es Salaam to Morogoro to Dodoma. The striking finding is that the rural towns and secondary cities’ hidden middle in maize flour shows, similar to what was found in large cities (Snyder, 2018), a proliferation of SMEs selling packaged/branded maize flour. The survey found 70 brands of maize flour. This traditional product had changed much like the other product they studied, wheat products (mainly cookies). Wheat products have blossomed into 500 stock keeping units (SKUs; a mix of brand and unit size). A total of 70% of the consumers in rural towns and villages reported that they bought maize flour “loose”, and 30% packaged and branded. In the secondary cities, 48% bought loose and 52% bought packaged-branded maize flour.

This is a fundamental shift away from the traditional practice of buying maize flour loose (in scoops into plastic bags) from the market. The maize flour brands are all regional/local (not national and not imported). In wheat products there is a balance of imported, national, regional, and surprisingly, even local rural brands. Even in rural towns the market system is changing, with some decline of the traditional stockist (dry foods wholesaler) and emergence of retailers buying direct from processors with the help of 3PLS, and the emergence of payment using “mobile money”.

Second-stage prepared/processed millet products in Senegal and Nigeria

There has been a proliferation of processed packaged foods in Nigerian cities such as Ibadan and Kaduna (Liverpool-Tasie, Reardon, & Abagyeh-Igbudu, 2017). While many of the products are “Asian” such as ramen noodles and “Western” such as bread, there has been a wave recently of processed packaged forms of traditional African products, such as “poundo yam” and prepared-packaged millet-based dishes.

While there has been a long history of street vendors selling prepared local dishes in West African cities (such as the bean and yam “local informal fast food” studied in Bricas and Muchnik (1985) in Benin and maize *toh* and cowpea fritters studied by Reardon et al. (1989), the mass retail of packaged-prepared traditional dishes has recently emerged, in particular in the past 10–20 years in West African cities. We focus on the packaged-prepared traditional dishes.

Mainly in the past 10–15 years there has been a rapid emergence of commoditized prepared/processed millet products in Senegal (Badiane 2015) and northern Nigeria, making and marketing to the urban food supply chains products. These dishes are commercialized (and sometimes packaged) versions of traditional dishes formerly produced only in homes. The pioneers were women-headed micro and small enterprises that began selling prepared millet and millet-plus-dairy dishes—such as *thiakry* and *fura da nono* (millet with fermented milk)—in stalls in markets, in neighborhoods, and as street vendor restaurants in urban markets in Dakar and northern Nigeria. Small enterprises and enterprise groups began to manufacture these dishes, and package and brand them for local shops, including as dry products and as cooked products with fermented milk as a compartment of the package. This emerging micro and small enterprise sector employs many women who often collectively own mills to process the raw grain. They then prepare, package, and sell the products to local clients, wholesalers, and retailers.

In both Senegal and Nigeria there has been rising competition from medium-sized, formal enterprises (often male headed) as the market increased in size and profitability. In northern Nigeria these medium firms include fast food chains of millet and yoghurt (*fura da yoghurt*, as a differentiated product from the traditional version). These outlets have spread in the towns. The medium firms in Dakar and the chains in northern Nigeria have a competitive edge by promoting their milk products as more hygienic than the traditional fermented milk. There is a national chain/franchise called Habib Foods (they are even in Port Harcourt in the south where the dish is not traditional) and many other informal street vendors. There are also processors who sell their *fura da yoghurt* through eateries and supermarkets; this is more common in the north.

A similar trend is occurring in Senegal. Alongside the already-mentioned micro enterprise sector, there is fast emerging a medium-scale packaged millet/milk product sector. An early entry in millet products for the formal market was La Vivriere, founded in Dakar in 1992. In the early 2000s, dairy enterprises in Dakar, including Mamelles Jaboot, Dolima, and Ardo began adding millet-based products to their yogurt products. At present these firms are operating mainly in a segment parallel to the informal enterprises, supplying dry packaged and refrigerated grain/milk products to small shops (sometimes with refrigerators from soda companies), gasoline stations, convenience stores, and emerging supermarket chains (Chase-Walsh, 2019).

Rapidly emerging large-scale processors (and integrated processor-wholesalers)

Large-scale processors have in some subsectors, like oilseed processing and grain milling, large shares of the overall formal market (such as wheat and maize milling in Zimbabwe). In some countries and products, large-scale processors still have relatively low shares (such as maize milling in Tanzania). The determinants of their share in a given subsector are a logical mirror of the factors discussed above that allow SMEs to persist. Thus the determinants and paths of the emergence of large processors in sub-Saharan Africa were in several (sometimes overlapping) categories, as follows.

Path 1. Privatization of parastatals and “state proxy” private companies with scarce rights to imports

Government (first colonial then post-independence) investments suddenly (in historical terms) introduced large processing firms and economies of scale by setting up parastatals from the 1960s to the 1980s. These were usually linked to government grain and traditional cash crop procurement systems, and to export marketing. Many of the export firms were extensions of colonial marketing boards.

These state investments were a key factor in the eventual formation of large private processors today. While most parastatals have been privatized, their initial large scale relative to the SMEs of the parallel market at the time of their introduction, and their real estate acquisitions to set up the mills and packing houses, constituted a sudden jump (today often called a leapfrog) to a country portfolio of large firms.

When privatization came, where conditions were ripe for a continuation of large-scale operations, the private firms that acquired the parastatals instantly had good real estate sites, road and/or rail and port infrastructure, and water and electricity connections that smaller competitors sometimes lacked. (This story is not unique to sub-Saharan Africa; it was repeated in Latin America and Asia from the 1980s to the 2000s.)

Moreover, domestic investment and FDI by processors has been incentivized beyond privatization of parastatals and liberalization of FDI. Governments in sub-Saharan Africa, as in Asia, have provided incentives that have been given to investors and companies in general, e.g., land discounts, import tax exemption, and so on.

- **The case of Bakhresa.** This is a grain miller that started in Tanzania and is now a multinational corporation (MNC) in seven other countries in Eastern and Southern Africa. While now Bakhresa is the largest miller in East Africa, it started as a donut shop in Dar es Salaam in the 1970s. Mr. Bakhresa went on to purchase parastatal wheat, rice, and maize mills or sites from the government starting in 1983 (<https://bakhresa.com/services/agro-processing-grain-milling/said-salim-bakhresa-co-ltd>). Ismail and Josephat (2012) note that usually the company started with a moderate capacity parastatal and then expanded its capacity 5–10 times over a decade or 2, and undertook other upgrades.

We return to acquisitions and upgrades in the next section as part of the discussion of FDI, such as Bakhresa did in eight other countries, each time undertaking similar steps to what it did with respect to acquisitions in Tanzania. Also Bakhresa, while especially large by sub-Saharan Africa processor standards, is in the norm of what MNCs in processing do when acquiring firms in FDI in sub-Saharan Africa, and in Asia and Latin America.

Path 2: MNC FDI forming and/or expanding/upgrading large-scale processors

The FDI of processing MNCs followed three stages into sub-Saharan Africa (as into Asia and Latin America) (Awokuse & Reardon 2018). In most cases the FDI set up or acquired large processing (and logistics and wholesale) firms.

First stage: Vertical FDI. This was mainly by European then US MNCs setting up export platforms, with processing and logistics, from the 1500s mainly through the 1950s/1960s, although with several sub-Saharan Africa bases operating today. The FDI was to produce and trade tropical products suitable for long transport such as jute, coffee, cocoa, rubber, canned pineapples, green bananas, etc. As the Awokuse et al. chapter 6 in this volume shows, since the 1970s the importance of the traditional commodity operations in relative terms diminished, and the growth in them was in general much less than in other products.

However, from the 1990s there began emerging such packing, processing, and export platforms for horticultural products and fish. An example is the Belgian FDI firm Lecofrut in Madagascar exporting fresh produce to Europe (Minten, Randrianarison, & Swinnen, 2009).

While such examples evoke a lot of interest, it is important to put them in context. Note that (in weight terms) exports of any agri-food product are 4% of sub-Saharan Africa agri-food output in 2013 (as discussed in the Awokuse et al. chapter 6 in this volume). Only 16% of exports are of horticultural products, hence 1% of sub-Saharan Africa agri-food output. South Africa's horticulture exports, mainly from large farms, form 75% of that 1%. So all the rest of sub-Saharan Africa has horticulture exports totaling 0.25% of all output. And an important share of those non-South African horticultural exports comes from medium/large farms and plantations.

Second stage: Horizontal FDI. This was mainly by European and US companies. This FDI emerged in the 1980s, 1990s, and 2000s in developing regions in general, and more toward the recent end of that period in sub-Saharan Africa, and still at a very limited scale. Horizontal FDI is investment aimed at supplying the domestic (or we can say regional) market of the host country.

- **The case of Nestlé in Central and West Africa.** Nestlé-Central & West Africa is based in Ghana. It started in 1957 with sales in Ghana and gradually spread its sales and some processing operations to other countries in the subregion. The company opened an office for the subregion in 2005. It makes and sells to the domestic markets maggi cubes, powdered milk, and nescafe (both widely distributed in West Africa in the 1980s), and more recently hot breakfast cereals, bottled water, and chocolate drinks. Nestlé established nine factories in the subregion: three in Nigeria, two in Côte d'Ivoire, one in Senegal, one in Cameroon, one in Ghana, and one in Angola. Most of these were established after 2000. Moreover, Ghana and Côte d'Ivoire are important in Nestlé's global sourcing of cocoa for its global chocolate sales (<https://www.nestle-cwa.com/en/aboutus/history-of-nestle-cw>).
- **The case of Cargill-Zambia.** This is further discussed in the Meyer et al. chapter 4 in this volume. Cargill bought a Zambian soybean crushing plant in 2015 for US\$25 million. The company mainly sold into the Southern Africa subregional market. Due to losses, it exited Zambia in 2018; Meyer cites the reasons for this as unfavorable exchange rate policies and policy uncertainty.

Third stage: Horizontal and vertical FDI by “global south” firms. This is especially by sub-Saharan Africa firms into other countries in sub-Saharan Africa, and Asian firms into sub-Saharan Africa.

Sub-Saharan Africa and Asian MNCs are running a path similar to what the current “global MNCs” did starting in their home US and European markets in the second half of the 1800s and first half of the 1900s. Recall that global MNCs like Nestlé and Cargill started as SMEs serving local markets in Europe and the US in the 1860s. They expanded rapidly in and from their local markets as the agri-food system transformed in the same ways as we described for changes in the sub-Saharan Africa food system underway—rise of processed foods, and diversification of the diet beyond food grains into meat and milk, etc. These US and European processing firms “rode the wave” of food system transformation and went from tiny to huge, undertaking FDI globally. The same can be said of Walmart that started as a tiny shop in the 1950s in a poor area of the south of the US and then expanded to become the largest company in the world.

Those stories of the path from local and small to large and multinational are exactly parallel to what we see starting in Africa and Asia today; we cite examples of sub-Saharan Africa and Asian FDI to Africa. Bakhresa started as a donut shop in Dar es Salaam in the 1970s and became a processing MNC in 40 years. It would not be surprising if in 2030 we cite it as a global MNC. Bimbo of Mexico started as a small bakery in 1945 and now is the largest baking company in the world with FDI across all regions. It formed/rode the wave of packaged bread and sweets consumption in developing regions. Indofoods started as an instant noodle company (formed by a flour milling company) in Indonesia in 1968 and then became a snack firm in 1990. The

company went on to have FDI in Africa, Asia, and Latin America by the 2010s. It formed/rode the wave of packaged noodle consumption in developing regions.

Sub-Saharan Africa processing firms becoming regional MNCs by FDI in the region’s countries. This can be by “greenfield” investments. But far more commonly, the FDI into sub-Saharan Africa has often been by mergers and acquisitions (as it had been a decade or two before into Latin America and Asia) (Reardon & Timmer, 2012).

- **Again the case of Bakhresa.** In the 2000s/2010s Bakhresa essentially repeated what it did in Tanzania by buying existing flour mill firms (sometimes parastatals being privatized or struggling local medium/large processors) in Eastern and Southern Africa (Burundi, Kenya, Malawi, Mozambique, Rwanda, Uganda, and Seychelles; www.bakhresa.com). In 2015 the company acquired Blue Ribbon Foods (BRF), the second largest wheat/maize flour and feed miller in Zimbabwe. BRF was itself an FDI firm of Blue Ribbon South Africa. BRF was competing in a very concentrated flour milling market in Zimbabwe with 3–4 lead firms with 95% of the market, and 5% share of SMEs BRF had been struggling, shutting down more than half its bakeries; it suffered from low capacity utilization (35%, while it needed at least 60% to survive); lack of working capital, old equipment and silos, and a bout of poor economic conditions (Neshe, 2016). Bakhresa purchased it in 2015 and invested US\$20 million in new equipment and silos, expanding its capacity and capacity utilization substantially. The FDI was accorded to Bakhresa by the Government of Zimbabwe conditional on 80% of the flour supply from the plants being sold in the Zimbabwe market (Neshe, 2016).

The steps typically taken by large firms undertaking FDI as acquisitions.

We illustrated this with the steps Bakhresa undertook for domestic acquisitions of parastatals (and other private companies). They are typical of what most FDI firms have done in processing in sub-Saharan Africa. The steps taken after acquisition or merger are in fact typical of MNCs say from the US or Europe investing in food processing (and retail) in Asia and Latin America (Reardon & Timmer, 2012). The parent company generally (like Bakhresa):

- 1) Acquired the target-acquisition company's mills.
- 2) Upgraded the acquired company's technology via updating their (usually old vintage) equipment.
- 3) Expanded the plants' capacity thus adding economies of scale.
- 4) Added new lines to processing to differentiate products and add economies of scope.
- 5) Incorporated the company into the regional or global wholesale and retail distribution networks of the parent company.

Asian processing firms FDI into sub-Saharan Africa.

Asian processing MNCs are increasingly undertaking FDI in sub-Saharan Africa. Two cases illustrate this.

- **Indofoods** started an instant wheat noodles business (brand "Indomie") in Indonesia in 1972. It grew quickly in Indonesia and then undertook FDI around Asia and then into Africa (Nigeria) in 1996. It formed/rode the wave of packaged noodles in Nigeria (which product has subsequently become popular around Africa), and set up two factories in the country and company subsidiaries in Nigeria and Ghana. Over the past decade it has become a joint venture

(JV) of Indofoods, the Tolaram Africa Foods (Singapore capital), and Kelloggs (US). It has also vertically integrated into wheat flour mills (www.dufil.com). (Note the similarity but in reverse with Bakhresa which started as flour mills and vertically integrated forward into second-stage processed food. The similarity is the importance of controlling one's intermediate input of wheat flour which is mainly imported and thus competed for by large firms.)

- **Ugandan, Kenyan, and French partner investment into Uganda dairy processing.**

There has been rapid and substantial FDI into Uganda dairy processing by one Kenyan firm (Brookside, a large Kenyan dairy firm, said to be the largest in East Africa, in a 40% JV with Danone) and two Indian-capital firms (Pearl (<http://pearldairyfc.com>), and Amos (<https://amosdairiesug.com>). These three firms control 80% of dairy processing in Uganda. The three firms source milk from farmers and have 500 milk collection centers. The capacity of the centers went from 500 thousand liters/day to 2.5 million over 2007 to 2018. An important goal of the FDI was for exports, as the share of pasteurized milk in urban areas of Uganda is still small (10%). Exports of milk became the third-ranked export of Uganda. The firms exported to Kenya, the Gulf, and India, and the product "casein" to the US. The firms began FDI in 2013; FDI liberalization had occurred in the early 2000s (Minten, van Campenhout, Ahmed, Tamru, & Habte, 2018).

- **South African, Italian, French, and New Zealand FDI into Zambian dairy processing.** Parallels exist with the Ugandan situation with FDI into Zambian dairy processing by South African, Italian, French, and New Zealand firms. Neven

et al. (2017) report that 4 firms control 80% of the formal dairy processing sector: Parmalat, Finta, Zammilk, and Diamondale. Neven et al. (2017) roughly estimate that the “pie” of dairy processing in Zambia to be about 100,000–150,000 tons in informal channels, 100,000 in formal channels (of which 42,000 tons were sourced from imports (liquid equivalent of milk powder imports), and 58 million from domestic channels). This means that the formal sector has roughly half of the total dairy output. That half is very concentrated, while the other half is fragmented among SMEs.

Over 20 years, the lead firms have acquired privatized parastatals, who themselves have been acquired by foreign firms, and in the rush to compete among the leaders have intensely invested in capacity, product diversification, and quality control. Two examples are Parmalat and Bonnita. Parmalat (Italy) acquired Bonnita (South Africa) in 1998. Bonnita had bought the country’s privatized dairy parastatal in 1996. Bonnita had undertaken the “upgrade and expand” steps common to FDI previously discussed for Bakhresa. Parmalat then did the same to Bonnita both in Zambia and in its home base South Africa. Parmalat tripled its output from 9,000 tons/year to 30,000 tons per year from 1998 to 2012. In the competitive rush, Finta Farms (Zambian) began a JV with Clover Farms, the leading dairy processor in South Africa, that itself had a JV with Danone (France) and Fonterra (New Zealand). This led to a large capacity expansion in Finta.

In summary:

- Where the intermediate input is at least partly produced in the countries, the resulting processing sector tends to be

bimodal, with most of the market being under SMEs, and the minority (but growing) part of the market under a small number of large firms. The large firms include large domestic firms, regional sub-Saharan Africa MNCs, Asian MNCs, and US/European MNCs, that often started by buying privatized parastatals in the 1990s, and then rapidly investing for expansion and upgrading their acquired firms in the 2000s and 2010s.

- Where the intermediate inputs are mainly imported, like processed wheat products, the formal share of the market is large and the concentration is high. Moreover, there is a marked pattern of JVs between leading domestic or regional MNCs and Asian or US/European MNCs, as competitors “arm” (with capitalization, market links, and technology) for domestic and regional commercial competition.

Organizational strategies under constraints: Large processors’ procurement and marketing

As large processing firms address local constraints as well as compete with each other and with SMEs, they undertake several strategies. We briefly discuss the well-known constraints, and then discuss examples of their strategies in marketing and procurement. The cases are from sub-Saharan Africa, but one finds similar strategies (and to varying degrees, similar constraints) in Asia and Latin America.

Procurement supply chain constraints faced by large processors in sub-Saharan Africa

To be viable, and eventually profitable, a processor needs sufficient “through-put” (intermediate inputs such as grain) from any

source. If this falls below 50–60% of capacity utilization, the processor is in serious trouble. Various problems getting enough ingredient supply are commonly cited:

- Local supply chains have high transaction costs, either from the port or from domestic farm areas, due to poor roads and corruption.
- Local supply chains are risky (roads and bridges wash out, drought and disease affect local farms, and so on; regulations for internal commerce are missing or changeable).
- Import supply chains have high transaction costs due to poor port and border facilities.
- Import supply chains are risky due to poor or changeable trade regulations, sudden import or export blocks, non-tariff trade barriers, taxes, “informal fees”, and so on.
- Quality, especially from domestic sources, is variable or inadequate or of the wrong type (e.g., to make French fries, firms like McCain or Pepsico need adequate supply of Atlantic variety potatoes, not regular table varieties; maize processors need dent not flint maize while flint is the main one produced locally, and so on).
- Production costs, from the cost of the intermediate input (is itself high because of transaction costs and high farm input costs), to equipment costs (because of import tariffs, exchange rates, and cost of spare parts), to high energy costs (a large share of factor costs for processors).
- Various registration and local certification costs; stories abound of numerous costly certificates required to set up a plant.

Procurement strategies large processing firms undertake in sub-Saharan Africa to address the constraints

We start with the important caveat to this discussion that there are no systematic data over sectors and countries to estimate what share of large processor/packer operations rely, in terms of share of volume, on own-farming versus sourcing from aggregators and contract farming for their domestic supply. There are few systematic empirical studies of sourcing by large processors, and representative surveys of farmers supplying a product only a part of which goes to large processors (compared with small processors and the spot market).

We are thus working from cases and observations. We think it is important to undertake more systematic study of the shares of different sources in procurement systems of processors.

Large processing firms rarely contract with small farmers. The exceptions tend to be for export markets: a small share of the small horticulture export market outside South Africa (e.g., Jaffee & Masakure, 2005; Masakure & Henson, 2005; Minten et al. 2009), and part of the small-scale tea export sector and most of the cotton export sector and part of the sugar sector outside of plantations (Minot, 2011). These tend to be high value exports where often there is a competing or parallel plantation sector. As noted earlier in this chapter and in the Awokuse et al. chapter 6 in this volume, the export sector in general is a tiny share of total output (around 6%) in sub-Saharan Africa, and of that, a small share is of small-scale farmers, and only part of that is under contract.

The modern food sector in general, and the export sector in particular, is highly visible to policy makers, donors, and researchers. It is usually localized and relatively easy to observe without broad surveys. Yet as we show in all three segments discussed in Chapters 2 and 3 of this volume, wholesale, processing, and retail, the formal, modern sector is only about 10–20% of the food economy. That puts an upper limit on the possible share of food coming from small-scale farmer contract schemes. The other 80–90% of the food processing (and distribution) economy is of SMEs that do not contract small-scale farmers, although they are the main buyers from these farmers.

Only a minor share of formal sector processors, that is, of medium and large firms (themselves a small share of all processors) source by contract directly from small-scale farmers. Our rough calculation from studies showing farmers in contract schemes as part of larger samples—such as the multi-country study of Adjognon et al. (2017) and reviews of contract farming by sector (Minot 2011—is that not more than 5% of smallholder farmers in Africa are in contract farming schemes.

The few of those in place are typically for export products that require high levels of supervision and input provision to meet world market standards. An example is Lecofrut in Madagascar (Minten et al., 2009). These relatively rare contract schemes such as Hortico in Zimbabwe have been studied by academics and international institutions and so are disproportionately visible.

Corporate social responsibility (CSR) initiatives of global MNCs have received much public attention but are quantitatively very minor and are likely to remain so. However, there is emerging evidence (Meemken, 2019) of companies investing more into their supply chains procuring from small-scale farmers

as part of their business models. These have included supply chain and certification initiatives of large cocoa and coffee companies that have featured support for formation of farmer organizations/cooperatives to enable improved linkages. Yet the evidence is mixed as to the effectiveness of these schemes and even whether they benefit small-scale farmers (Meemken, 2019). There is some symbiosis between large firms sourcing directly from small-scale farmers and non-governmental organizations (NGOs) providing upgrading and support services to small-scale farmers, such as to help them certify. NGOs and large firms emphasize these initiatives to donors and governments so that they are visible.

Large-scale processors often have lists of preferred suppliers or regular suppliers that include wholesalers and other aggregators, and sometimes, but rarely, cooperatives (Minot, 2011). These are often incorrectly interpreted as direct contracts of large firms with small-scale farmers. But companies usually observe that foregoing aggregators and sourcing directly means high search and transaction costs.

Large processors sometimes vertically integrate into own-farming. An example in dairy is Zammilk, a subsidiary of Zambeef (www.zambeefplc.com; (a large integrated company with animal and crop farming, feed production, wholesale), and retail (shops, butcheries in supermarkets, and fast food chain) operations. An example in meat is Meat World (www.meatworld.com.za) in South Africa, which combines second-stage processing and wholesale to small and large retailers, and Cargill (www.cargill.com) in Zambia, which crushes soy and then wholesale-exports (Meyer et al., chapter 4 this volume). An example in poultry is Zartech (www.zartechltd.com) in Nigeria, which has finished poultry and day-old chicks farms, abattoirs, and its own wholesale and retail chains.

Large processors often have to rely on the import of intermediate inputs because of constraints in local supply chains and farming, as already noted. We do not have systematic estimates of this share. Instead, we can identify specific subsectors where imports of ingredients are important. The most obvious is the dairy processing sector. Previously we noted that for Zambia, roughly 40% of the formal sector processing output uses reconstituted imported powder. This is of course a lost opportunity for African farmers.

Marketing strategies of large processors

Large processors pioneered in sub-Saharan Africa the transfer of the practice common in the US and Europe (and now in Latin America and Asia) of packaging and branding. SMEs are rapidly emulating that strategy.

Large processors mainly use general wholesalers (“stockists”) as well as networks of dedicated wholesalers (“agents”) for distribution. Dedicated agents have historically provided an advantage to large processors over small processors over time in placing their product among small retailers consistently and sometimes on credit to the retailer (Reardon & Timmer, 2012, for Indian and Latin American examples.) For example, both strategies are used in rural and small town Tanzania for the packaged foods of the leading processors (Bakhresa and Metl Group (www.metl.net), “Mo’s” brands of edible oils and flour and sugar).

Some large processors use direct retailing (and wholesaling) to consumer (vertical integration forward). Various cases of firms already mentioned qualify for this point.

- Blue Ribbon Foods in Zimbabwe has its own bakery chain with hundreds of outlets.
- Zambeef in Zambia has its own retail chain of 78 shops, 19 macro stores, 2 wholesale

stores, 3 fast food outlets, 17 Novatek outlets, and 12 Zamshu outlets.

- Zambeef also has a concession/JV with Shoprite supermarkets (a chain from South Africa) with 31 butcheries in these supermarkets in Zambia, 22 in Nigeria, and 6 in Ghana (www.zambeefplc.com). Meat World in South Africa also has its own wholesale stores.
- Zartech (poultry processing and farming) in Nigeria has its own wholesale and retail chains (as well as selling via other retailers).

The cases of forward integration of processing into retail are of interest for several reasons.

- The processors involved all have perishable products that require cold chain and good handling for quality and safety. Own retail and arrangements with supermarkets maximize quality assurance and control over their products that they might lack in spot markets.
- These processors use forward integration as a competitive strategy for brand promotion as well as creating profit centers of modern retail and wholesale in contexts where that is only emerging.
- By their close relations with supermarket chains they can “piggyback” on the retail chains’ multinationalization in Africa. This is an example of “follow sourcing” where a supplier from one country “follows” its client to other countries where the client undertakes FDI (Reardon, Henson, & Berdegue, 2007).
- These strategies are similar to what processors do in Asia and Latin America, for similar reasons. An example is CP Foods based in Thailand but with food operations in Asia and feed operations in Asia and Africa (<https://www.cpfworldwide.com/en/business/food/shop>).

Conclusions and recommendations to the public sector

Agri-food value chains in Africa are expanding rapidly, spurred by private businesses. Policies and public infrastructure provisioning should focus on leveraging this emerging private sector dynamism, especially of SMEs. They are the best vehicle to link small-scale farmers to markets and forge an inclusive agricultural transformation.

Findings

There are strong and continuing drivers of transformation of private sector agri-food value chains in sub-Saharan Africa. These include demand side forces, such as the rise of incomes, the integration of women in employment outside the home, and the change in diets. It also includes forces set in motion by governments in the past several decades, including road building and improvement, construction of municipal wholesale markets, partial electrification, privatization of parastatals, and liberalization of FDI.

There has been a massive response of the processing sector to soaring demand for processed food. The private sector has been dynamic and in aggregate has made extremely large investments in the food value chains.

There has been a Quiet Revolution of SMEs in agri-food processing. We call this the “hidden, not missing, middle”. The debate tends to neglect it, hence it is hidden. But it is extremely far from missing, as we have shown. We call this a Quiet Revolution in SME development. The cases we have described show a process similar in speed and nature to what was observed in Asia just slightly earlier (Reardon, Chen, Minten, & Adriano, 2012).

There is an emergent Modern Revolution in large processors, both from FDI and from domestic

private investment. The patterns are those observed in Latin America and Asia 10–20 years earlier.

Contract farming by large processors is extremely limited, touching at most 5% of small farms in sub-Saharan Africa. For the next 10–20 years such direct relations with small-scale farmers will probably continue to be limited and not a major scalable factor in the small farm sector transformation. However, where it occurs it is generally beneficial to small-scale farmers.

The dynamism in small and large-scale processors in sub-Saharan Africa mirror what we observed in Asia and Latin America one to two decades earlier; sub-Saharan Africa also faces the same challenges that Latin America faced, and South Asia and some of Southeast Asia still face. Roads are not long or good enough; electrification is not yet widespread; policies are uncertain; regulation is often excessive; corruption is common; farm transformation is still partial as a feeder of agroprocessing in particular, and supply chains and cities in general. These constraints make it so that the real take-off we observe is not yet flying nearly as high as it should be and could be.

Both SMEs and large processors actively pursue new technologies where they make economic sense. Where there are economies of scale, they invest in equipment upgrades. Where they need better information, they invest in mobile phones. FDI from large processors often helps local firms make those upgrades. But we found that SMEs actively invest in equipment and capacity upgrades, typically using their own retained earnings.

The transformation of the food value chains appears in the main to be facilitating market access by small-scale farmers, extending it further into rural areas, and opening up higher value opportunities.

Public policy implications

Governments and donors need not and should not “reinvent the wheel.” When conditions are ripe, small and large-scale processors proliferate quickly and intensely invest, meeting demand. Governments and donors (nor their NGO or other partners) do not need to set up “value added” initiatives or return to the days where government enterprises undertook processing. Firms are undertaking transactions with their own working capital. Where they can meet demand they accumulate savings, invest and grow. Processors are buying and upgrading and servicing equipment, bagging and labeling product, and innovating and differentiating. Donors and governments do not need to step in and intermediate, store, fund business directly, and set up processing facilities. Governments and donors setting up businesses, even in the hinterlands and in the villages, will just “crowd out” grassroots entrepreneurs, again, as they did in the 1980s and before.

Governments and donors need to focus on enabling the Quiet Revolution and the Modern Revolutions already launched by the private sector. They need to leverage it, to identify constraints to it, and relieve them.

The biggest costs of processors, usually in this order, are:

- 1) The intermediate input, such as maize for flour and feed mills
- 2) Equipment purchase and maintenance
- 3) Energy to run the equipment
- 4) Transport costs which in turn are dependent on truck and fuel costs
- 5) Labor costs

Public investments and policy can help processors (and thus indirectly help farmers) by reducing those costs. The implications for investments and policy in turn are the need for:

- Public investments in infrastructure that reduce costs of transport and energy. These then support private logistics (including cold chain) and distribution services. These are crucial for processing firms to get consistent through-put to achieve capacity utilization and thus survival. These investments include road building, port improvement, electrification, and wholesale market upgrading. These reduce costs of processors sourcing from farm areas and ports.
- The great mass of processors, meaning the SMEs, mainly source from traders, and do that via wholesale markets. Investments in and policies developing wholesale markets in Africa are the most important policy implication of the chapter in terms of linkages to small-scale farmers.
- In contrast, there is no special need for governments or donors to foment hub and spoke linkage initiatives between large processors and small-scale farmers. Where these make sense economically and the risks are not too high, companies tend to spontaneously set them up. This has, however, only been the case with a very small number of products and situations. As noted in this chapter, contract farming touches at most 5% of African farmers. For that share to inch up over the next decade the investments and other policies noted here must be pursued. This does not contradict the potential (but unproven empirically) value of initiatives like risk guarantees and managed clusters and other mechanisms that support processors investments in building hub-and-spoke programs. We just emphasize that initiatives focused on large processors’ sourcing direct from small-scale farmers will probably (as it can only be a hypothesis not a conclusion) not have

a major impact on these farmers for at least the next decade.

- However, over time, as the share in the overall processing sector of large firms increases, there will be increasing challenges to small-scale farmers due to the use of private standards by large processors, that in turn require various “threshold investments” in food safety, quality, volume, and consistency by small-scale farmers (Reardon, Codron, Busch, Bingen, & Harris, 1999). Governments should look ahead and help the upper tier of small-scale farmers who face first such requirements to be ready to meet them.
- Policies that reduce the average cost and the variability of costs of energy. Low tariffs and consistent access to oil is important for processors. Eventually solar power and other energy sources may reduce this need, but not in the short to medium run.
- For the next 10–20 years Africa will mainly get processing equipment from imports mainly from Asia and for specialized equipment, mainly Europe. Low tariffs and easy access to equipment imports will be needed for continued rapid development of the processing sector. Eventually such equipment may be manufactured in several countries in Africa.
- **Ease the overall regulatory cost of doing business.** Processors in particular need a reduction of red tape and cumbersome regulations and corruption.
- **Food safety regulation.** Food safety concerns will grow as Africans continue to buy more first and second stage processed milk, meat, fish, vegetables, edible oil, and peanut butter, as well as second-staged

processed food and prepared food in restaurants. As in Asia now (and Europe and the US before it), a series of food safety crises will occur. Well known examples are the milk and processed meat crises in the US in the early 1900s, and the milk crisis in China 10 years ago. At that stage in those other regions, there were important public health crises, loss of confidence in local processors, and sharp lurching toward heavy regulation that drove most SMEs out of business as they could not make the adjustment. We hope that in Africa there will be a dual approach of gradually imposing such regulations, while helping (such as with training and tax breaks for updating equipment) processing enterprises to make the adjustments.

- **Agricultural policy.** Farms are most of the source of intermediate inputs for processors, and domestic processors are an important market for farmers. They depend on each other. While farm policies are beyond the scope of this volume, they are clearly important for the development of processing. Processors can, however, source from neighboring countries, or from further afield. The domestic farm sector thus has an interest in adjusting to the needs of domestic processors, such as needed varieties of maize for milling.
- **Public sector investment in systematic data gathering and survey programs.** Policy makers are largely “flying blind” with respect to the domestic processing sector, especially SMEs. This is a big gap and a huge need in order to design good public policies and investments to help the domestic processors develop faster and further and inclusive of both small farmers and SMEs.

Annex 3.1: Definitions

“Processors” include: (1) first-stage processors, such as mills, that take a raw ingredient and produce a semi-processed ingredient such as a flour mill; and (2) second-stage processors that take, for example, flour and combine with other ingredients and further process (e.g., into bread or noodles). Of course some firms do both, and are thus vertically integrated. A processor can also farm, or also wholesale and retail, to be vertically integrated. A processor can be a microenterprise of one person in a

rural household, or an SME with one to two persons to some dozens. A large enterprise is typically hundreds of employees and usually with a higher capital/labor ratio but not necessarily. Processors can have labor-intensive or capital-intensive technologies. The same goes for degree of formality: an SME can be formal (registered) or informal, but is usually, in sub-Saharan Africa, informal, just as a large enterprise is usually formal. Finally, while feed is an input to animal production, we include it in this chapter to emphasize its processing aspect.

References

- Alphonse, R., Waized, B., Ndyetabula, D., Sauer, C., Caputo, C., Tschirley, D. & Reardon, T. (2019, February). *Penetration of processed foods in rural and urban areas in tanzania: wholesalers, retailers, processors, consumers—cooking oil, maize flour, wheat flour & products*. Paper presented at the 5th Annual Agricultural Policy Conference, Dodoma, Tanzania.
- Awokuse, T., & Reardon, T. (2018). Agrifood Foreign Direct Investment and Waves of Globalization of Emerging Markets: Lessons for U.S. Firms. *Economic Review - Federal Reserve Bank of Kansas City (Special Issue 2018: Agriculture in a Global Economy)*, 75–96. Retrieved from <https://www.kansascityfed.org/~media/files/publicat/econrev/econrevarchive/2018/si18awokusereardon.pdf>
- Badiane, O. (2015, March). *Processed/Prepared Millet Products in the Dakar Market: Rapid and Recent Development*. PowerPoint of talk to Food Security Policy Innovation Lab Workshop on Value Chain Methods and Planning, Dakar, Senegal.
- Bricas, N., & Muchnik, J. (1985). Technologies aiutochtones et artisanat alimentaire urbain. In N. Bricas G. Courade, J. Coussy, P. Hugon, & J. Muchnik (Eds.), *Nourrir les villes en Afrique subsaharienne*. Paris, France: Editions L'Harmattan.
- Chase-Walsh, S.V. (2019). Willingness to pay for processed grains in Dakar Senegal: An analysis using discrete choice experiments (Master's thesis). Agricultural, Food, and Resource Economics, Michigan State University, East Lansing.
- Haggblade, S., Hazell, P., & Reardon, T. (Eds.). (2007). *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World*. Baltimore, MD: Johns Hopkins University Press.
- Hollinger, F., & Staatz, J. (2015). *Agricultural Growth in West Africa: Market and Policy Drivers*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO).

- Ismail, A. & Josephat, P. (2012). Statistical measurement of service quality in Tanzania industries: A case of Said Salim Bakhresa & Co Ltd. *International Journal of Human Resource Studies*, 2(4), 152–165.
- Jaffee, S., & Masakure, O. (2005). Strategic use of private standards to enhance international competitiveness: Vegetable exports from Kenya and elsewhere. *Food Policy*, 30(3), 316–333.
- Kennedy, E., & Reardon, T. (1994). Shift to non-traditional grains in the diets of East and West Africa: Role of women's opportunity cost of time in prepared-food consumption. *Food Policy*, 19(1), 45–56.
- Liverpool-Tasie, L.S.O., Omonona, B., Sanou, A., Ogunleye, W., Padilla, S., & Reardon, T. (2017). Growth and transformation of chicken and eggs value chains in Nigeria. *Nigerian Journal of Agricultural Economics*, 7(1), 1–15.
- Liverpool-Tasie, S., Reardon, T., & Abagyeh-Igbudu, J. (2017, July). Rapid agri-food system transformation in Sub-Saharan Africa: Preliminary evidence from processed food inventories in Nigeria. Presentation at the American Association of Applied Economics (AAEA) Annual Meetings, Chicago, IL.
- Liverpool-Tasie, S., Reardon, T., Sanou, A., Ogunleye, W., Ogunbayo, I., Omonona, B.T. (2017). The transformation of value chains in Africa: Evidence from the first large survey of maize traders in Nigeria. Research Paper 91. Nigeria Agricultural Policy Project. East Lansing, Michigan: Feed the Future Innovation Lab for Food Security Policy, Michigan State University.
- Masakure, O., & Henson, S. (2005). Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe. *World Development*, 33(10), 1721–1733.
- Meemken, E. (2019, July). *Do smallholder farmers benefit from sustainability standards? A systematic review and meta-analysis*. Presentation at Invited Paper Session, American Association of Applied Economics (AAEA), Annual Meetings, Atlanta, Georgia.
- Minot, N. (2011, April). *Contract Farming in sub-Saharan Africa: Opportunities and Challenges*. Presentation at the Policy Seminar organized by the ACTESA-MSU-IFPRI African Agricultural Markets Program (AAMP): Smallholder-led Agricultural Commercialization and Poverty Reduction: How to Achieve It? Kigali, Rwanda.
- Minten, B., Randrianarison, L., and Swinnen, J.F.M. (2009). Global retail chains and poor farmers: Evidence from Madagascar. *World Development*, 37(11), 1728–1741.
- Minten, B., Stifel, D., & Tamru, S. (2014). Structural transformation of cereal markets in Ethiopia. *The Journal of Development Studies*, 50(5), 611–629.
- Minten, B., Tamru, S., Engida, E., & Kuma, T. (2016). Transforming staple food value chains in Africa: The case of teff in Ethiopia. *The Journal of Development Studies*, 52(5), 627–645.
- Minten, B., van Campenhout, B., Ahmed, G., Tamru, S., & Habte, Y. (2018, June). Transforming dairy value chains in East Africa: (Early) Evidence from Ethiopia and Uganda. Presentation at the Food Industry Policy Program Conference, IFPRI, Washington, D.C.

- Neven, D., Reardon, T., Hernandez, R., & Tembo, G. (2017). *Smallholder farmer participation in modernization of a food system: The dairy value chain in Zambia*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). Retrieved from <http://www.fao.org/3/a-i7094e.pdf>
- Nsehe, M. (2016, 29 June). *Tanzanian tycoon Said Salim Bakhresa to invest \$30 million in Zimbabwean flour mill*. *Forbes*. Retrieved from <https://www.forbes.com/sites/mfonobongnsehe/2016/06/29/tanzanian-tycoon-said-bakhresa-to-invest-30-million-in-zimbabwean-flour-mill/#4ef7160237c5>
- Reardon, T. (2015). The hidden middle: The quiet revolution in the midstream of agrifood value chains in developing countries. *Oxford Review of Economic Policy*, 31(1), 45–63.
- Reardon, T., Chen, K.Z., Minten, B., & Adriano, L. (2012). *The Quiet Revolution in Staple Food Value Chains in Asia: Enter the Dragon, the Elephant, and the Tiger*. Mandaluyong City, Philippines: Asian Development Bank and the International Food Policy Research Institute (IFPRI).
- Reardon, T., Codron, J.-M., Busch, L., Bingen, J., & Harris, C. (1999). Global change in agrifood grades and standards: Agribusiness strategic responses in developing countries. *International Food and Agribusiness Management Review*, 2(3/4), 421–435.
- Reardon, T., Henson, S., & Berdegue, J. (2007). “Proactive Fast-Tracking” diffusion of supermarkets in developing countries: Implications for market institutions and trade. *Journal of Economic Geography*, 7(4), 1–33.
- Reardon, T., Thiombiano, T., & Delgado, C. (1989). L'importance des céréales non-traditionnelles dans la consommation des riches et des pauvres à Ouagadougou. *Economie Rurale*, 190, 9–14.
- Reardon, T., & Timmer, C.P. (2007). Transformation of markets for agricultural output in developing countries since 1950: How has thinking changed? In R.E. Evenson & P. Pingali (Eds), *Handbook of Agricultural Economics, 3: Agricultural Development: Farmers, Farm Production and Farm Markets*. Amsterdam, The Netherlands: Elsevier Press.
- Reardon, T., & Timmer, C.P. (2012). The economics of the food system revolution. *Annual Review of Resource Economics*, 4, 225–264.
- Rubey, L. (1995). The impact of policy reform on small-scale agribusiness: A case study of maize processing in Zimbabwe. *African Rural and Urban Studies*, 2(2–3), 93–119.
- Snyder, J.E. (2018). *Milling service markets, value chain coordination, and food attribute values: three essays on the post-farm food system in Tanzania* (Doctoral dissertation). Agricultural, Food, and Resource Economics, Michigan State University, East Lansing.
- Snyder, J.E., Ijumba, C., Tschirley, D., & Reardon, T. (2015, May). *Local Response to the Rapid Rise in Demand for Processed and Perishable Foods: Results of Inventory of Processed Food Products in Dar es Salaam*. Feed the Future Innovation Lab for Food Security Policy Research Brief 6. East Lansing, MI: Michigan State University,

04 Avoid Hitting the Wall by Leveraging Investments of Midstream Heroes in African Food Value Chains

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Key Messages

- 1** Since 2007 Africa has seen rapid increases in net exports of several basic commodities. In some markets the rapid increase in production has resulted in local gluts driving down local prices far below import parity levels and consequently eroding farm profits. Growth has already stagnated, hitting a wall of local surpluses with low margins and high transaction costs that at best allow for temporary forays into exports to neighbors who themselves are working up to local gluts.
- 2** Zambia illustrates “hitting the wall” of local surpluses combined with high transaction costs constraining the country’s ability to export these surpluses beyond the region. Since 2000 the area under main field crops (maize, grown by small and medium-scale farmers, and wheat and soybeans, grown by large-scale farmers) has expanded rapidly and average yields have increased consistently. This has moved Zambia from a net importing to a net exporting country for these three crops. Despite more consistent surpluses, Zambia is only exporting into the region and surplus exports have not found their way into international (deep sea) markets. The ability to export these surpluses and grow output further is constrained by Zambia’s competitiveness in global markets.
- 3** To increase export competitiveness, countries can be helped by supply chain services firms. These firms undertake wholesale, and logistics and processing, the midstream of the supply chain. They range from the small and medium enterprises (SMEs) and large domestic firms mainly focused on domestic markets, to African and Asian-based multinational firms, to global firms. The condition for these firms to invest in building supply chain capacity is consistent trade and investment policies, and sufficient public infrastructure.
- 4** Again, Zambia illustrates where such firms made major investments, such as in feed mills, crushing plants, feedlots, and intensive chicken operations, and has met local demand for meat and is also exporting soybean meal into the subregion. But the country also illustrates reversals, as policy conditions and transaction costs were felt to be constraints by a major enterprise which then shut down its operations.

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Introduction

Over the past two decades agricultural markets, trade, foreign direct investments, and food systems in Southern Africa have experienced dramatic transformation (Reardon et al., 2019; Tschirley, Dolislager, Reardon, & Snyder, 2015). Many of the region's economies were characterized by periods of relatively fast economic growth (around 3% to 6%), increasing population and strong patterns of urbanization that have triggered a diversification in diets. Despite these strong trends, the current debates are to large extent still dominated by three key underlying themes, namely (1) yield worries; (2) import worries; and (3) export dreams. These underlying themes are also evident in most of the policy debates that have a strong producer-led bias. The careful assessment of key policy and investment requirements and the potential impacts of rapid growth in agricultural productivity on markets and supply chains, is generally less covered than farm level productivity. Even in the most recent national agricultural investment plans (NAIPS) developed by many African states, market and supply chain considerations are addressed under the general theme of public-private partnerships, without detailed analyses of recent trends in commodity markets and investment patterns by actors in the middle segments (wholesale, logistics, and processing) of the supply chains. Reardon (2015) calls these middle segments the “hidden middle”—they are not missing, rather, they are “hidden” from the debate—although their value is estimated at approximately 40% of the supply chain.

Despite the overwhelming focus on farm level productivity, there has been a rapid evolution in supply chains in several markets, yields have increased and import worries have turned into rapid increases of net exports. In fact, in some markets the rapid increase in

production has resulted in local gluts driving down local prices far below import parity levels and consequently eroding farm profits. Growth has already stagnated, hitting a wall of local surpluses with low margins and high transaction costs that at best allow for temporary forays into exports to neighbors who themselves are working up to local gluts.

The main objective of this chapter is to follow a market-led approach that offers an alternative assessment of the most recent trends in agricultural markets and the behavior of midstream actors in these fast-changing food systems. The first section provides an overview of the evolution of Africa's agricultural trade; the second highlights the key elements of hitting the wall in some of the African markets and the importance of venting surpluses; and the last section provides a taxonomy of wholesale/logistics-cum-supply chain services firms in Africa that fill the midstream. In many cases these actors can be classified as “midstream heroes” that have brought real capital and long-term investments to the table, and have been a major driving force for growth and off-farm employment in several African economies. Increases in productions arising from capital investments that have provided markets for primary farm output have also seen some of this production being exported, and thus, the venting off surpluses to reduce local glut.

Bending the curve on imports

In many debates, it is still the conventional wisdom that African imports continue to rise faster than exports. However, recent trade data suggest that this is no longer the case. Figure 4.1 presents the net exports of all agricultural products in an aggregation of countries in sub-Saharan Africa from 2000 to 2017, and reflects two key phases:

- The first phase (2000–2006) was distinctly negative and downward trending, with a progressively worsening trade balance.
- The second phase (2006–2017) has been showing a largely negative but upward trend, with a progressively improving trade balance.

However, from 2007 onwards this declining trend is reversed. Rising demand for agricultural commodities from the emerging biofuel sector, as well as rapid economic growth in China, shifted global agricultural commodity prices to new norms post-2007. Higher prices supported profitability, real net farm income increased rapidly, and consequently substantial investment occurred in the agriculture sectors of many countries. In sub-Saharan Africa, the investment drive coincided with a shift in land policies and the general approach of governments to farmland in several countries. In countries such as Zambia, Ghana, and Tanzania, this shift in land policies provided access to bigger portions of land for cultivation and the share of production from medium and large-scale farmers increased. Consequently, production expanded

and the declining trend in sub-Saharan Africa's net exports of agricultural products from the early 2000's reversed in the post-2007 period (Figure 4.1).

Focusing on this post-2007 period, several important trends are clear:

- Sub-Saharan Africa is, in most years, a net exporter of unprocessed products and a net importer of low and high processed products.
- Highly processed goods (perishable and non-perishable) account for just over 50% of total import value.
- Imports of highly processed, non-perishable goods have increased by an annual average of 1.8% over the period from 2007 to 2016, whereas imports of unprocessed, non-perishable goods have declined by an annual average of 1.9%. This may be indicative of increased demand for processed goods, increased local production of raw agricultural commodities, and lower global prices in recent years for grain and many other bulk commodities.

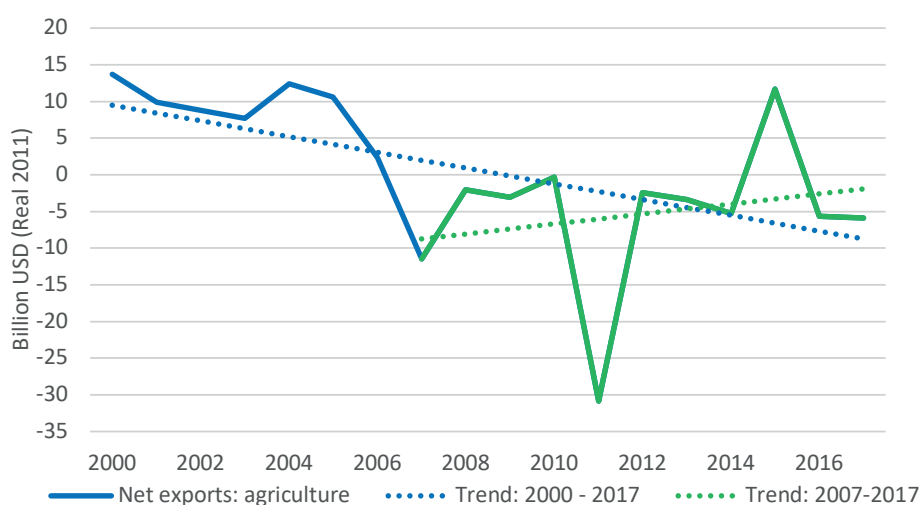


Figure 4.1: Net exports of total agricultural products out of sub-Saharan Africa (aggregate)

Source: Compiled from UN Comtrade (2018)

- While it constitutes a small share of total imports, the real import value of unprocessed, perishable goods has increased by an average of 5.5% per annum. If produced in more informal value chains, the perishable nature of these goods demands significantly higher capital investment from the farmer all the way to the consumer.

Globally, agricultural commodity markets have moved back into a lower price cycle and profitability is under significantly more pressure than during the 2007 to 2014 period, when prices peaked. In many countries in sub-Saharan Africa, this has already slowed the trend of area expansion substantially. With a few exceptions in terms of countries and commodities, the bulk of the production growth that turned the historic trend of increased imports around over the past decade was derived from area expansion. In the latest agricultural outlook of the Organisation for Economic Co-operation and Development (OECD)/Food and Agriculture of the United Nations (FAO) (OECD-FAO, 2018), global commodity prices are expected to remain under pressure in the coming decade and this area

expansion is projected to slow significantly. Combined with rising incomes and a rapidly expanding population base, both of which support growing demand for food products, it points to a situation where production growth is again unable to keep pace with consumption gains, and with the exception of maize, self-sufficiency ratios are projected to deteriorate over the next decade. This implies that imports into the region will increase once more, as was the case in the early 2000s.

Hitting the wall

The biggest assumption underpinning the OECD-FAO agricultural outlook is that yield gains are unable to accelerate sufficiently for production gains similar to the past decade to be achieved in the absence of continued area expansion. This is, however, a very broad statement for the region, and plausible alternative future scenarios can be considered taking a commodity specific country-by-country approach. For example, since 2000 the area under main field crops (maize, wheat, and soybeans) in Zambia has expanded rapidly (Figure 4.2) and at the same time average yields have increased consistently. This has moved

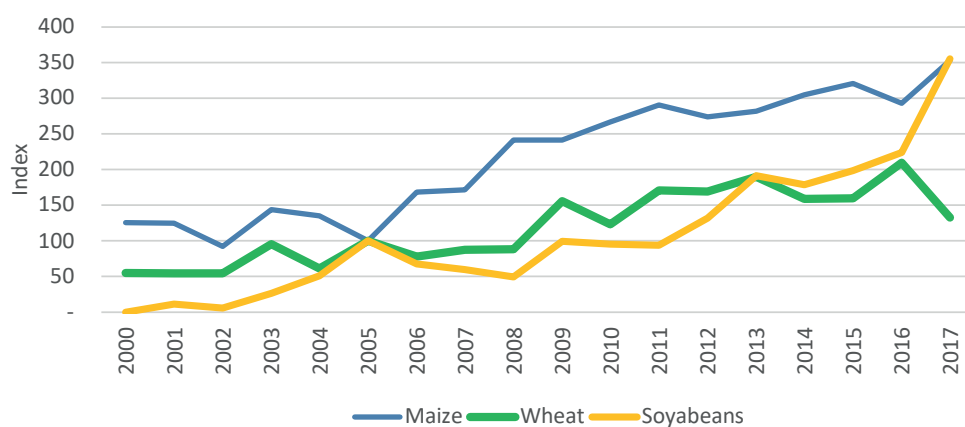


Figure 4.2: Trends in area planted of main field crops in Zambia presented as an index, 2005=100.

Source: Compiled from Central Statistical Office Zambia (2018)

Zambia from a net importing to a net exporting country for these three crops. Despite more consistent surpluses, Zambia is only exporting into the region and surplus exports have not found their way into international (deep sea) markets. Furthermore, the rate of expansion in maize and wheat area has slowed in recent years. Whereas, most maize is produced by small and medium-scale producers, the rapid expansion in wheat and soybean production was mainly driven by the investment in large-scale commercial farming operations. The area under maize production more than doubled, increasing from an annual average of around 600,000 hectares pre-2005 to 1.4 million hectares by 2014. However, for the past five years the maize area has fluctuated around these levels and no major expansions have taken place. From a market perspective, the supply and demand situation is fairly balanced with local production comfortably meeting the local demand plus maize for exports into neighboring countries, which are averaging around 500,000 tons per annum. Even though Zambia has the natural resource potential to further increase maize production from these levels, the rate of growth will be determined by the growth in local consumption of maize and the level of competitiveness in export markets.

Based on the current infrastructure, logistics, and policies (e.g., ad hoc maize export bans), it is unlikely that Zambia will expand its maize production beyond what the local market and the neighboring countries (e.g., Zimbabwe and DRC) can absorb. Even if the country could produce maize profitably at prices prevailing in global markets, transportation and marketing costs will make it difficult to compete successfully with other major exporters. There might be periods where policy interventions (e.g., guaranteed prices, subsidized fertilizer, and seed) might boost production beyond local commercial demand, yet this surplus production will have to be absorbed by a

government's food reserve agency, which will either have to release it in the local market at reduced prices or export the surpluses into the region at a potential loss.

The evolution of soybeans and wheat has followed a similar path with production levels increasing rapidly until the local market is saturated and surpluses have to be exported beyond the country borders. This can be referred to as an inflection point where prices fall from import parity to export parity levels, which in African markets typically implies a drop of around 30–40% relative to parity prices (Figure 4.3). However, the shift from import to export parity prices sometimes results in commodity prices that are too low for farmers to be profitable (since most of the inputs are priced at import parity levels, and on average, comparatively 20–30% more expensive than other importing producers), and too high to be internationally competitive (due to high inland transport costs). This is typically the case for politically sensitive and bulky food security commodities such as maize, where governments typically intervene in markets to keep prices artificially low.

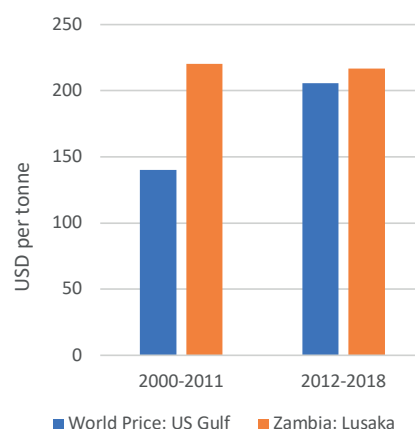


Figure 4.3: Maize prices in Zambia relative to the global average.

Source: Compiled from Commodity Insight Africa (2019).

In Zambia soybeans and wheat are regarded as “less political”. Fewer direct policy interventions, more consistent surpluses, and consequently lower prices sparked the interests of investments by local and multinational companies in downstream value chains. Major investments in feed mills, crushing plants, feedlots, and intensive chicken operations have occurred in recent years and Zambia is now producing sufficient beef and chicken to meet local demand. Furthermore, there is an increasing trend in soybean meal exports into neighboring countries (Figure 4.4). Although most of the soybean meal is currently exported to South Africa, Zambian exports will face increasing competition from South African producers who are also ramping up production and other regional feed markets (Namibia and Botswana) are much smaller. Therefore, similar to maize and wheat, the growth in Zambian production of soybeans beyond what the local and regional markets can absorb, can only be maintained under significant market reforms that drive down transaction costs and increase investments in infrastructure and logistics.

The Taxonomy of midstream supply chain services actors in sub-Saharan Africa

The previous section highlighted the main feature of markets that are “hitting the wall” and the necessity for a vent for surplus. The vent for surplus is a theory that was formulated by Adam Smith (1978) and later revised by Hla Myint (1958) on his thesis of South-East Asia. The theory states that when a country produces more than it can consume it produces a surplus. This underutilization causes an inward movement on the production possibilities frontier. Trade with another country is then used to vent off this surplus and to bring the production possibilities frontier back to full capacity. In most African countries where there was rapid growth in exports (i.e., vent off surplus) of grains and oilseeds over the past decade, one finds significant investments by midstream firms.

There are typically two types of firms, namely: (i) the short-term speculators that are making

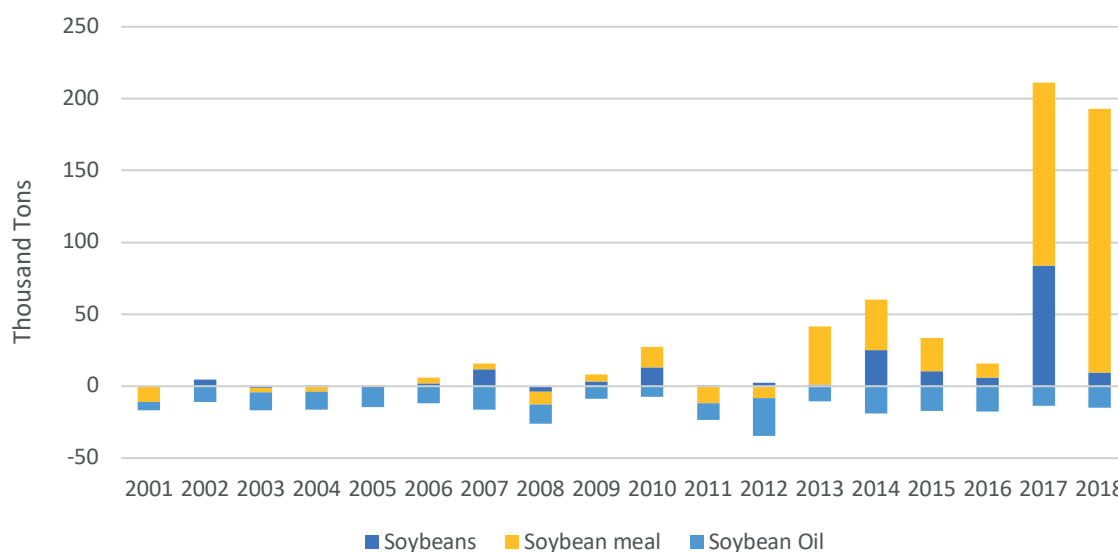


Figure 4.4: Zambian net trade of soybeans and soybean products

Source: Compiled from UN Comtrade (2018)

little deals and constantly moving in and out of markets as opportunity arises; and (ii) long-term investors that are bringing real capital and investing in upstream and downstream supply chain services. An example of this is the investment in soybean crushing plants in Zambia and Malawi and the consequent exports of soybean cake. For these long-term investments to continue, it is critical for African governments to understand the workings of these firms in finer detail. There are major benefits but also in some cases major risks of attracting investments of these firms into a country. For instance, the benefits of these significant investments could come in the form of more urban jobs and (rural farm) incomes, but the risks could also come through lack of competition, higher consumer prices, and lower farm prices. To provide a foundational understanding of the structure and conduct of these midstream actors, this section provides a taxonomy of the most common supply chain service firms that have invested in the region over the past decade.

Broadly, the term “supply chain service firms” applies to a set of midstream firms under two broad categories—the input and output value chains—all of which are found plugged within the mid-segments of supply chains. The two categories can be described as:

1. Midstream input supply chain firms which produce midstream goods and services, which comprise three sub-categories:
 - Input retail and wholesale (fertilizer, seeds, and equipment).
 - Mechanization services and other mobile outsource services like fruit tree spraying firms.
 - Complementary upstream services like private extension services often linked to input retail and wholesale, providing financial services to farms and other

actors in the domestic and trade supply chains.

2. Midstream output supply chain firms which provide goods and services, and found within four sub-categories:
 - Wholesale/brokerage in both domestic and international trade.
 - Logistics (transport and warehousing, and cold chain).
 - Processing.
 - Complementary downstream services such as finance, digital services for all of the above.

The supply chain services outlined above include both large firms and micro, small, and medium enterprises (MSMEs), domestic, or foreign (multinational) capital. Reardon (2015) refers to the above as the “hidden middle” (and not the “missing middle”)—comprising all companies that are involved in both output and input markets, dealing in goods and services, as well as research and extension. The reason they are called the hidden middle rather than the missing middle is because midstream actors have always been there—they only have not received as much scholarly and policy attention as the farm sector.

The exhaustive set above of seven midstream services seeks to capture a broader scope of the key features of the agri-food system. Such features include a collective of diversified product portfolios, providers of clusters of services—all of which capture previously under-explored supply chains which are geared towards providing a specialized set of tailored solutions to small-scale farmers (as well as large-scale farmers). The seven service segments are undertaken by the five types of firms in sub-Saharan Africa already described, and these can be listed in terms of their geo-locational footprint:

- (1) “Global North” multinational corporations (MNCs)
- (2) “Global South–South” MNCs
- (3) African-based regional MNCs
- (4) Africa-based sub-region MNCs
- (5) Country-specific local-based firms.

While (1) through (4) are usually large scale, (5) includes large and semi-large scale as well as MSMEs.

The taxonomy illustrated in Tables 4.1 and 4.2 is a characterization of changes of the structure of the sub-Saharan African agri-food supply chains markets, after decades of evolution. There are four key features that are revealed by the taxonomy.

First, the taxonomy shows MNCs range over (Global) North and South, and then within South, mainly between Asia and Africa. The key point is that global MNCs that are based in the US and Western Europe grew from small domestic firms to large domestic firms in their national markets. Over time, the firms shifted to the “readiest” markets that were most like their home markets, hence from US into Europe in the mid-1900s, and then from US to beyond Europe into Latin America and Asia in the last third of the 1900s, and finally into Africa in the first fifth of the 2000s. Examples of US firms are Cargill, AgCo and John Deere, with European firms such as Bunge and Louis Dreyfus doing the same. Moreover, Asian firms underwent a parallel but later development. They grew as domestic firms, then branched around Asia or also started in Africa. Sometimes they bought or merged with Asian-migrant capital already in Africa, such as Olam and the Export Trading Group (ETG). The point is that firms that started in the US or Europe and those that started in Asia and/or Africa ended up recently as important MNCs in supply chain services related mainly to trade but also to regional and domestic markets in Africa.

Second, African firms have begun to develop along a similar path to that of the US and European firms, and then the Asian firms. That is, some started in their home country and then became large either from the home market or exporting to the world market or both. Such firms invested in other countries in their sub-region such as AFGRI and NWK from South Africa into Zambia, or ETG from Kenya to Tanzania. Then they sometimes moved beyond their sub-region into other regions of Africa, as in the case of AFGRI from Southern Africa into East Africa (Uganda) and West Africa (Ghana).

Third, as each set of the five types of firms outlined in Tables 4.1 and 4.2 came from three key regions (US or Europe, Asia, and Africa) and moved in the world market as well as in Africa, they needed to make two basic adjustments in each new market.

These firms needed to vertically integrate to make up for missing services locally or had to bring in a partner (local, regional, or global) to do that. For instance, entry into a new market might involve a joint venture (JV) partnership with big local firms or even small local firms which have competitive advantage through trader networks in the respective country markets to help them procure and/or set up links with farmers. An example is when Bunge partnered with Senwes, and when NWK partnered with Louis Dreyfus Commodities, both forming JVs to access regional markets such as South Africa, Zambia and Malawi, among others. An alternative strategy has been to enter the market by acquiring existing infrastructure and upgrading it to suit the scale and strategy of the firm, without necessarily entering into a partnership. For example, instead of just trading, buying from existing crushing facilities, Cargill acquired a soybean crushing facility in Zambia.

Table 4.1: Taxonomy of supply chain service firms: An example of Zambia

Supply chain segments	Types of firms	Example of firms
Input retail/wholesale	Global North MNCs	Monsanto/Bayer, Syngenta/MRI
	Global South–South MNCs	Olam
	African-based regional MNCs	Seed Co, Pannar/Pioneer
	Africa-based sub-region MNCs	NWK Agri-services, QualiBasic Seed, CropServe
	Country-specific local firms	Zambia Fertilizers, Amari
Mechanization services	Global North MNCs	AGCO, John Deere
	Global South–South MNCs	
	African-based regional MNCs	AFGRI
	Africa-based sub-region MNCs	
	Country-specific local firms	CropChem
Wholesale/brokerage local/ international trade	Global North MNCs	Cargill, Louis Dreyfus
	Global South–South MNCs	ETG
	African-based regional MNCs	AFGRI
	Africa-based sub-region MNCs	NWK/Dunavant
	Country-specific Local firms	Zambeef
Logistics	Global North MNCs	Cargill, Louis Dreyfus
	Global South–South MNCs	ETG
	African-based regional MNCs	AFGRI
	Africa-based sub-region MNCs	NWK/Dunavant
	Country-specific local firms	Zambeef, Copperbullet Express
Processing	Global North MNCs	
	Global South–South MNCs	
	African-based regional MNCs	
	Africa-based sub-region MNCs	
	Country-specific Local firms	Zambeef, CHC Commodities, Mpongwe Milling, Zdenakie
Complementary services	“Global North” MNCs	Norfund, CDC
	Global South–South MNCs	
	African-based regional MNCs	AgDevCo
	Africa-based sub-region MNCs	AgriVie, Zeder, Chayton Africa
	Country-specific local firms	

Table 4.2: Taxonomy of supply chain service firms: An example of Ghana

Supply chain segments	Types of firms	Example of firms
Input retail/wholesale	Global North MNCs	Monsanto/Bayer
	Global South–South MNCs	Olam-Ghana
	African-based Regional MNCs	
	Africa-based sub-Region MNCs	
	Country-specific Local firms	
Mechanization services	Global North MNCs	AGCO, John Deere
	Global South–South MNCs	
	African-based Regional MNCs	
	Africa-based sub-Region MNCs	Wienco
	Country-specific Local firms	West Africa AgroTech
Wholesale/brokerage local/ international trade	Global North MNCs	Cargill-Ghana, Bunge Loders Croklaan Office-Ghana, ADM Cocoa (Ghana) Limited
	Global South–South MNCs	ETG
	African-based regional MNCs	AFGRI-Ghana
	Africa-based sub-region MNCs	
	Country-specific local firms	Takoradi Flour Mills Limited
Logistics	Global North MNCs	Cargill-Ghana, ADM Cocoa (Ghana) Limited
	“Global South–South” MNCs	ETG Ghana Limited, Olam Ghana
	African-based regional MNCs	AFGRI
	Africa-based sub-region MNCs	
	Country-specific local firms	
Processing	Global North MNCs	Cargill-Ghana, ADM Cocoa (Ghana) Limited, Cadbury–Kraft Foods Ghana Limited
	Global South–South MNCs	ETG, Olam, Unilever Ghana Limited
	African-based regional MNCs	Takoradi Flour Mills Limited
	Africa-based sub-region MNCs	Parlays Ghana Limited, MV Brands (Pioneer Food Cannery Limited),
	Country-specific Local firms	SAMBA Foods Limited, Premium Foods Limited, CPC Limited
Complementary services	Global North MNCs	
	Global South–South MNCs	
	African-based regional MNCs	AFGRI-Ghana
	Africa-based sub-Region MNCs	Barak Fund/ETG
	Country-specific local firms	Fon Packaging

However, all five sets of firms leveraged their market development in one region to start and grow it in another. So the US and European firms that came to Africa supplied products to second stage processors from their home region—which formed the core of their competitive advantage. They also, as previously noted, reached an inflection point and tried to supply from one country to the sub-region they invested in. But an ultimate goal is usually to also supply to or from their home region.

Fourth, interestingly and often forgotten, are a fourth set of firms that parallel the above “big firms”. These are the MSME domestic firms. They are typically local based and operate within the country, and also spread from zone to zone within their national markets. Sometimes they become international when they identify cross-border export opportunities, particularly if they have grown to a level where they can supply consistent volumes over time. The growth of MSMEs runs parallels to

how the likes of Cargill developed in the US a century ago.

The taxonomy of supply chain service firms in Africa present an important empirical question—how have these supply chain firms developed over the past decade, and how are they likely to evolve and re-shape markets in the continent over the next 10 years? Understanding the development and evolution of midstream supply chain firms is critical to a broader understanding of how the agri-food system is going to look like in the future. The policy environment impacting investment behavior of supply chain and intermediation services, to farmers on one end, and second-stage processors and retailers on the other will also be critical in this regard. In the next section, a more in-depth review of supply chain service providers is undertaken to provide some key examples and insights that can provide a clearer picture of the trajectory of the agri-food system.

Case Study One: Global North MNCs

First, the world export market for major grains (i.e., rice, wheat, and maize) and oil seeds (i.e., palm kernels, peanuts, soy, rapeseed, cotton seeds, and canola) is very concentrated—four firms have 80% share of exports. The four are the “ABCD” firms—Archer Daniels Midland (ADM), Bunge, Cargill, and Louis Dreyfus Company—account for between 75% and 90% of the world export market for these grain and oil seed commodities. The collective market share of the ABCD firms means that they have a significant influence over the global export market for major grains and oilseeds and the global, regional, and even national supply chains into those export markets.

Second, ABCD firms are usually vertically integrated firms spanning all the midstream segments of the supply chain (but not so much in farming⁵ or the retail). They have intensively

⁵ For example, Louis Dreyfus Commodities owns 60,000 ha of farmland in Brazil, while Calyx Agro—a Louis Dreyfus Commodities subsidiary established in 2007—was quoted by de Lapérouse (2012) as having 103,000 ha of land in Latin America (Brazil, Argentina, Paraguay, and Uruguay). Cargill owns farmland through its Black River Asset Management’s investment in Ceres, the third largest farmland fund operating in Bulgaria, controlling 22,000 ha of land (de Lapérouse, 2012). However, despite sub-Saharan Africa’s significant farmland, there are no reports of high profile farmland acquisitions by ABCD firms in sub-Saharan Africa. The likes of Cargill have in fact, scaled down significantly their farm origination businesses across the African continent, opting rather, to provide supply chain services and vertically integrate to manage risks.

acquired assets such as transportation and port logistics infrastructure, agro-processing as well as farmland to the extent that they own entire supply chains in between the farm to retail. The reason for vertical integration was to capture margins by servicing missing markets for logistics (building own infra facilities where usually lacking or expensive to rent) and processing (such as building crushing plants), and desire to control timing and pricing, to have profit centers in each of the segments of wholesale, logistics, processing). Ownership and control of whole parts of the supply chain suggest that the ABCD firms probably have internal transfer pricing to reduce exposure price uncertainty, and their strategic locations in tax havens mean that they aim to reduce tax liability to maximize profitability and flexibility in moving capital across world markets.

Third, ABCD multinational corporations are spread over the world and undertake arbitrage⁶ to get the best procurement and sales prices and manage price risk. For example, ADM has 450 procurement stations and 330 processing plants (such as soybean crushing plants) in 200 countries (www.adm.com). Africa is a small part of their global operation.

Fourth, the expansion of ABCD firms (just like South MNCs in Africa) was encouraged by liberalization policies of trade and foreign direct investment (FDI) in the 1990s in Africa. While trade liberalization alone is enough for only trading, to be a vertically integrated firm with crushing facilities and a complement of supply chain services, the policy environment would require FDI liberalization as well. The gradual opening up of (non-staple) markets was a signal to MNCs to invest and locate operations in Africa. This trend was an extension to the same phenomenon in parts of Latin America and Asia a decade earlier, for the same reasons.

However, this trend has neither been seamless nor lacking in challenges. For example, in Zambia, the poor enforcement of trade policy to halt the influx of illegal vegetable oil imports led to significant losses in soybean oil-crushing investments. Cargill had made a US\$25 million acquisition of a 100,000-ton soybean crushing facility in Zambia in June 2015 but exited the market entirely after incurring cumulative losses in excess of US\$40 million. Cargill has also significantly scaled back its investments in other parts of Africa—selling off its cotton ginning investments in Zambia, Zimbabwe, and Malawi, and disposing of its tea processing and silo assets in Kenya, as well as its milling interests in Egypt—all in an effort to optimize profits. A combination of unfavorable exchange rate policies, policy uncertainty, droughts, and consequently, high default rates in their input credit business compounded to form a particularly challenging operational environment that led to dis-investment.

⁶ Arbitrage is the practice of purchasing commodities or securities in one market for immediate resale in another market to profit from a price discrepancy.

Case Study Two: Global South MNCs

First, Global South MNCs are also somewhat concentrated in the export market in Africa, just as the Global North MNCs are in the rest of the world export market. Between 2017 and 2018, global trade in grains, oilseeds and pulses averaged US\$206 billion, and it is estimated that ABCD firms accounted for about 80% of this value. Meanwhile, sub-Saharan Africa imported US\$11.6 billion worth of grains, oilseeds, and pulses, while exporting US\$3.1 billion over the same period. Therefore, sub-Saharan Africa accounted for 5.5% of global imports in grains, oilseeds, and pulses, and 1.5% of global exports. With sub-Saharan Africa making up a relatively small share of global trade, a fairly large part of this small share is being traded by the Global South MNCs, such as ETG and Olam International.

Second, south-based MNCs consider being acquired by north-based MNCs and also acquiring other south based MNCs and north MNCs. This is a reason for consolidation in the trading segment. For example, COFCO bought the Netherlands-based Nidera Trade Company in 2016) and in 2014 bought the agricultural commodity trading arm of the Singapore-based Noble Group.⁷ Another example is that in 2010, Olam International discussed a possible merger with the Geneva-based Louis Dreyfus Company, the world's largest cotton and rice trading company. However, the merger talks broke down as the two firms failed to agree on terms.

Third, Global South MNCs were usually born as national trading firms which then went international, trajectories akin to those of the ABCD firms which expanded from their home markets to international markets. For example, Olam went from being a Nigeria exporter to an Asia–Africa MNC. It was set up in 1989 by Indian Nigerians to export cashews to India for further processing (value added). The company then moved to London and started expanding to West and East Africa from the London base, exporting cotton, cocoa, and Shea. It then moved its base to Singapore. With the shifts to West and East Africa and then to Singapore Olam went from being an export operation in Nigeria to an Asia–Africa firm. Olam spread its geographic footprint into other parts of West Africa (including Benin, Togo, Ghana, Côte d'Ivoire, Burkina Faso, Senegal, Guinea Bissau, Cameroon and Gabon) and East Africa (Tanzania, Kenya, Uganda, Mozambique and Madagascar)—exporting cotton, cocoa and Shea nuts.

Another example of starting as national and becoming regional and then Asia based is ETG. Established in Kenya in 1967 by Indian Kenyans, ETG, then known as the Export Finance Company Limited, was initially focused on distributing and marketing products manufactured by MNCs such as Colgate-Palmolive and Del Monte in neighboring Eastern and Central African countries (Patel, 2014). In 1981, Mahesh Patel, the company's chief executive officer, bought 100% of the shares in the Export Finance Company to establish the Export Trading Company (ETC), which became known for agricultural commodities. Between 1990 and 1995, the company's corporate head office was moved from Kenya to Tanzania, while establishing storage and logistical capacity throughout Eastern and Central Africa to support its trading activities. In the 2000s, ETG became more diversified by focusing more on integrating its supply chains. In 2002, the firm set up its agricultural manufacturing, milling and processing, dal mills, corn-soya blend factories, and cleaning and packaging plants. Between 2005

⁷ <https://www.wsj.com/articles/chinese-grain-trading-firm-cofco-buys-out-nidera-1471952752>

and 2008, ETG expanded into primary agriculture through the acquisition of farms. Its parent holding company (Export Trading Group PTE was established in Singapore in 2011) with the Export Trading Company (ETC) Holdings based in Mauritius. ETC manages the procurement or warehousing, processing, and specialization divisions.

Fourth, the expansion of Olam and ETG from their home countries to trading around Africa was encouraged by FDI and trade liberalization post-2000. The opening up of new markets in Europe through the Africa Caribbean and Pacific (ACP)-European Union (EU) Economic Partnership Agreement (EPA) in 2000 and Olam's listing on the Singapore exchange in 2005, positioned the firm for substantial acquisitions across West Africa and Southern Africa, and export trade into the European markets. For instance, Olam entered the cotton market in Zambia in 2007, and entered into a JV Continental Ginnery in 2009. Olam expanded its product portfolio in Zambia by entering the grain market, trading wheat, soybeans, and maize at the same time. Other investments include a greenfield cocoa processing plant in Abidjan (Côte d'Ivoire), and acquisition of Crown Flour Mills in 2010, one of the top three wheat millers in Nigeria, for US\$107.6 million. In the same year, Olam entered into an 80/20 JV with Lababidi Group (LG) to set up a port-based sugar refinery in Nigeria in which Olam's equity contribution for its share of investment would be approximately US\$80 million and LG US\$20 million.

Fifth, just as the US and European-based MNCs, the south-based MNCs are vertically integrating over segments (processing, wholesale, and logistics such as warehousing and transport) in the midstream of supply chains. They do it for reasons similar to those of the ABCD firms. For example, Olam's expansion started between 1994 and 2000 when Olam International Limited went through a period of organic growth, establishing supply chains for various commodities across the continent. The regional expansion of the firms trading business between 1994 and 1999 coincided with widespread deregulation of food markets, opening processing plants and trading offices in eight countries in East and West Africa. These included Tanzania (diversifying to cotton, sesame, cocoa, and green coffee in 1994), Ghana (cocoa, tomato paste, and wheat flour in 1994), Côte d'Ivoire (cashew processing plant in 1994), Togo (coffee, cocoa, and rice for exports in 1996), Gabon (palm oil and fertilizer manufacture in 1999), and Cameroon (cocoa, coffee, rice, and dairy in 1999). Olam also expanded its warehousing, first and second stage processing, inland logistics and shipping in Côte d'Ivoire, Ghana, Tanzania, Togo, Uganda, Gabon, Cameroon, Mozambique, and South Africa.

The expansion of the Global South MNCs is largely predicated on their ability to operate in opaque spaces which are characterized by unclear trade policies and grey operational environments. For example, Global South MNCs are generally regarded to be comfortable in integrating their value chains in countries where they do not have to pay a premium on, for example, stringent and higher worker safety regulations, and as such, these firms do not have a significant operational cost base. This allows the Global South MNCs the flexibility to adapt to challenging environments, and remain competitive.

Case Study Three: Africa-based Regional MNCs

This class of firms include African MNCs that are based in one African country but operate in other countries in sub-Saharan Africa—either in their own subregion (such as Southern Africa) only or across subregions. They may export to more countries than they invest in as FDI operations (such as having a procurement warehouse and/or crushing mill, or flour mill) investing in other parts of Africa. In many ways these subregional or cross-subregional companies are smaller mirrors of the Global North and South MNCs previously discussed. In drawing parallels between the African-based subregional MNCs and the ABCD firms, three observations are worth noting:

- They too are a relatively concentrated segment with a limited number of large firms.
- They too start locally and build to their national level and then spread over countries.
- They too tend to have vertical integration such as setting up procurement warehouses as well as at least first stage processing facilities, or also logistics operations (that they sometimes sell services from to other companies).

One illustration of this class of MNCs is AFGRI Group Holdings (AGH). The company evolved from being a farmer-owned cooperative (Oos Transvaal Kooperasie (OTK)), during the “single marketing channel” era over the period 1923 to 1995. However, between 1996 and 2014, AGH—then OTK—was renamed and rebranded as AFGRI Operations Limited, transformed from a farmer-owned cooperative into a modern corporate agribusiness company. Market deregulation in 1996 allowed for the firm’s public listing on the Johannesburg Securities Exchange (JSE), which saw a diverse AFGRI shareholding structure that consisted of professional asset managers holding public shares on behalf of institutional and individual investors (AFGRI, 2013; Ducastel & Anseeuw, 2014).

As with Global South MNCs, the ownership of AFGRI evolved as a function of its acquisition. Between 2014 and the present, AGH delisted from JSE to become a private company after its takeover by AgriGroupe—a South African registered holding company controlled by a consortium based in Mauritius called Joseph Investments (Wessels, Mazwai, & Valodia, 2014). The consortium is led by a pool of North American investors that hold 60% of AgriGroupe. The main investor in this pool is Fairfax Financial Holdings, a financial holding company listed on the Toronto Stock Exchange (Canada). Under its private ownership in 2018, AGH bought the National Bank of Greece Group’s (NBG) 99.81% stake in the South African Bank of Athens (SABA).

Just as North and South global MNCs do, AFGRI expanded by FDI and JVs, and like MNCs, made investments in vertical integration thus developing local supply chains. Firstly, AGH (then AFGRI) expanded its sub-Saharan African footprint through a partnership with John Deere, which resulted in equipment dealership branches opening in Zimbabwe, Zambia, and Ghana. Over time, AGH expanded its input equipment retail business in Nigeria, where the company also diversified into poultry through a partnership with BNOT Harel, where AFGRI held a 51% majority shareholding. In its expansion into Zambia, AGH (with financial help from the United States Agency for International Development)) constructed grain storage infrastructure with a capacity of 20,000 tons, servicing 3,000 smallholder farmers (Hayat, Chikura, Kapoor, & Gajarsa, 2016). However, due to ad hoc government interventions in the Zambian grain market, AFGRI (now AGH’s trading division) significantly scaled down and exited its grain and storage operations, maintaining only its equipment retail business.

Case Study Four: Africa sub-region MNCs

As with the three case studies previously discussed, MNCs that confine themselves (for now) to a subregion are mirror images of the above. An example of this is the Bakhresa Group based in Tanzania. Unlike the agri-food focused firms already noted, Bakhresa is an industrial conglomerate with food forming a part of its wider business interest. There are several key points worth noting regarding this key feature of their business.

First, the Group spread its operations from Tanzania base to have operations across Eastern and Southern Africa, with procurement and sales points and plants (usually through acquisitions) in Kenya, Uganda, Malawi, Mozambique, Zambia, Rwanda, Burundi, Zimbabwe, and South Africa.

Second, the Group has supply chain activities that span segments of the midstream, similar to the other MNCs, in processing of food and beverage sector (maize flour, maize bran, biscuits and bakery products, carbonated soft drinks and malt flavored products, natural fruit juices, ice cream, and bottled water), and has big import and processing operations in grains, especially wheat, as well as a big brand line. Bakhresa has significant non-agri-food interests and is heavily invested in activities like packaging (polypropylene bags including laminated bags for cement industries, and plastic packaging materials, including printing and paper bags), and logistics (inland container depot and road and marine transport services), petroleum and petroleum products, as well as entertainment.

Third, Bakhresa has been making strategic investments in countries that would otherwise be shunned by some regional and international investors. For example, in 2015 and 2016, Bakhresa took over and invested US\$40 million and US\$30 million respectively in Zimbabwe's second largest food milling company—Blue Ribbon Industries Limited (BRI). Such investments came at a time when larger global firms such as Cargill were disinvesting and exiting agri-food markets in Zimbabwe, whose operational environment was deemed not conducive. Thus, firms such as Bakhresa have a higher risk appetite and are taking a more long-term view, expanding their footprint and taking up space in markets that are operationally challenging.

Case Study Five: Country-specific local-based firms

Domestic private sector in sub-Saharan Africa consists of a rich heterogeneous set of firms—from MSMEs servicing local communities to large-scale corporations that have significant national presence. For taxonomic purposes, local firms can be seen to fall within two broad sub-categories, namely: (i) wholesalers; and (ii) logistics firms. Wholesale firms consist of traders and aggregators who could either be small or large firms. However, logistics firms, particularly those involved in shipping and trucking, port infrastructure, and cold storage equipment are usually large firms due to the resource intensity of the nature of investments, the level of technological sophistication, and the requisite economies of scale required to attain reasonable levels of profitability.

(i) Small and large-scale local wholesalers

This class of firms consists of a largely “invisible” part of the value chain, which has mix of agro-processors (such as Unilever, who mainly source specialty food and intermediate raw materials like starches, herbs and spices, etc.); specialized packers (such as Wesjan, who co-pack foodstuffs for supermarkets); and specialized trading houses or distribution centers for mass retail markets (such as ZEMCOR, who deal with a product range which consists of at least 108 different commodities).

Apart from these firms, there are the more popularly known trading companies which deal in staple foods—commodity grain and oilseeds traders such as NWK, Senwes, AGH (South Africa); National Foods, Oregon, Surface Investments (Zimbabwe), (Rab Processors, Mount Meru (Malawi); etc. An interesting dynamic in the grains and oilseed trading business is the trend of consolidation where large firms either acquire rivals or “high potential MSMEs” or partner their competition through strategic alliances of JVs.

This phenomenon has also manifested itself in South Africa, at a relatively larger scale. An example is the 50–50 JV of Dreyfus and NWK Limited in Epko Limited, a sunflower crushing subsidiary based in South Africa. The partnership between NWK Limited and Dreyfus has subsequently gone beyond South Africa which, through Opti-feeds, invested in a poultry enterprise through Mont-Trade (Pty) Ltd in Botswana in 2012. In the same year, NWK and Dreyfus entered into a 60–40 JV to acquire the Zambian-based Dunavant Cotton Company, which was later incorporated as a diversified grain trading firm called NWK Agri-Services (Zambia).

In another example, Bunge Limited entered into an equal JV with Senwes in April 2011 through Bunge EMEA (Bunge Europe, Middle East and Africa), to form Bunge Senwes Africa (Pty) Ltd. The purpose of the JV was to develop grain and oilseed operations in South Africa, with a view to supplying maize, wheat, and soybean to both South Africa and the rest of sub-Saharan Africa (ACB, 2013). The Bunge-Senwes partnership expanded the regional footprint of Bunge Senwes Africa (Pty) Ltd to Zambia, Kenya, Mozambique, and Malawi between 2012 and 2015.

More recently, JVs between Global North MNCs and African-based Regional MNCs—with Bunge-Senwes and NWK and LDC being key examples—have not generated enough impetus and traction to spur growth and expansion of equivalent partnerships, as was earlier predicted by keen observers. Both the Senwes-Bunge and NWK-LDC partnerships ended acrimoniously, Senwes-Bunge in 2016 and NWK-LDC in 2018, as difficult trading conditions in Africa failed to generate desirable shareholder value. The trend of foreign/global agribusiness MNCs entered into strategic alliances through acquisitions or JVs with South African-based agribusiness MNCs may well be coming to an end.

(ii) (Large) Logistics firms

These firms form the core part of the “hidden” middle and consist of a heterogeneous set of medium to large and specialized or dedicated wholesale firms. An example of cold chain managers are “Fresh to go” and Freshmark, who source for fast food chains and supermarkets such as Woolworths, Shoprite, Checkers, and Pick ‘n Pay (PnP), among retail chains. Cold storage supply chain managers normally source directly from large-scale commercial farmers, or from aggregators (dairy milk collection points which can be farmer owned, or municipal-owned and run), or from Fresh Produce Markets (FPMs). Other parts of Africa, outside of South Africa, do not have significant cold chain infrastructure, and fresh produce markets are neither structured nor formalized. However, due to the expansion of South African supermarkets across the African continent, cold chain supply chain models have been expanded to countries where these supermarkets have a footprint.

Local sourcing initiatives have been adopted by large supermarkets in several countries, at the insistence of national governments seeking win-win outcomes. However, supplier development programs have been largely experimental, and in certain instances donor supported. While the potential is there for ramping up local production, it will take some time for local producers to reach the scale that would ensure the necessary volumes and quality which match the demands of the retailers. Due to a lack of local capacity to supply these supermarkets, there remains a significant reliance on fresh produce supply from South Africa. The large firms largely adopt centralized global sourcing to ensure consistency in supply of product flow, stricter quality control, and tighter coordination of supply chains.

Conclusion

This chapter outlined the trends in agricultural markets and a taxonomy of the midstream supply chain actors who have been investing heavily into supply chain services in Africa over the past decade. The Zambia and Ghana examples outlined in Tables 4.1 and 4.2, as well as the specific case examples provided in this chapter give typical illustrations of the opportunities and the challenges facing sub-Saharan Africa with respect to continued growth and investments beyond the point where a local glut is established. For many agricultural products, local prices are significantly higher than in global markets because of inadequate local supplies and high transaction costs. Increasing investment and local production is very feasible and can provide multiple benefits, including higher levels of farm income, reduced import costs,

and incentives for the creation of new value chains. However, once the local market is satisfied, further increases in production must find a home, either in regional markets or outside the region. While a given country can be successful by expanding sales to regional markets, such a strategy may not be as successful if pursued by many countries simultaneously. To go beyond regional markets, countries must be able to compete globally which, in many cases, may require far greater improvements in production and marketing efficiency. Only by fixing logistics and input prices can countries be competitive and export the surpluses and thus sustain the drive to yield and/or area expansion and midstream investments. The taxonomy of midstream supply chain service firms provides an important background to the functioning of these services and what policies will attract the investment in these services.

References

- ACB. (2013). *Corporate concentration and control in the grains and oilseed value chain in South Africa: A case study of the Bunge/Senwes joint venture*. Agriculture, Energy and Livelihood Series. Johannesburg, South Africa: African Centre for Biosafety.
- AFGRI (2013). BNOT Harel Nig: Agricultural Integration Solutions. Retrieved from <http://www.bnotharel.com/about-us/bnot-harel-nig-company-profile/>
- Central Statistical Office Zambia. (2018). *Statistics*. Retrieved from <https://www.zamstats.gov.zm>.
- Commodity Insight Africa. (2019, May). *Soft Commodities Weekly Report*. Retrieved from <http://www.ciafrica.co.za>
- de Lap rouse, P. (2012). *Case studies on private investment in farmland and agricultural infrastructure*. Danvers, MA: High Quest Partners.
- Ducastel, A., & Anseeuw, W. (2014, September). The financialisation of South African grain cooperatives. What room for the agrarian capital? CIRAD, UMR Art-Dev and University of Pretoria, Post-graduate School of Agriculture and Rural Development. IIPPE conference paper, , Naples, Italy.
- Hayat, A., Chikura, C., Kapoor, R., & Gajarsa, J. (2016). *Southern Africa Trade Hub: Final Performance Evaluation*. USAID E3 Analytics and Evaluation Project. Pretoria, South Africa: United States Agency for International Development (USAID).

- Myint, H. 1958. The “Classical Theory” of international trade and the under-developed countries.” *Economic Journal*, 68(270): 317–337.
- OECD-FAO. (2018). *OECD-FAO Agricultural Outlook 2018-2027*. Organisation for Economic Cooperation and Development (OECD) and Food and Agriculture Organization of the United Nations (FAO). Paris, France: OECD Publishing.
- Patel, D.M. (2014). The Export Trading Group: Unlocking Africa's agricultural potential. *International Food and Agribusiness Management Association Review*, 17(B), 187–192.
- Reardon, T. (2015). *The hidden middle: the quiet revolution in the midstream of agrifood value chains in developing countries*. Oxford Review of Economic Policy, Volume 31, Issue 1, 1 March 2015, Pages 45–63.
- Reardon, T., Echeverría, R., Berdegue, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2019). Rapid transformation of food systems in developing regions: Highlighting the role of agricultural research and innovations. *Agricultural Systems*, 172, 47–59. <https://doi.org/10.1016/j.agsy.2018.01.022>
- Smith, A. (1978). *The Wealth of Nation*. Oxford: Oxford University Press.
- Tschirley, D., Dolislager, M., Reardon, R., & Snyder, J. (2015). The Rise of the African Middle Class: Projections and Implications in East and Southern Africa to 2040. *Journal of International Development*, 27(5) 628–646. <https://doi.org/10.1002/jid.3107>
- United Nations Comtrade (2018). Trade database. [Online]
- Wessels A., Mazwai, M., & Valodia, I. 2014. Agrigroupe Holdings (Pty) Ltd and AFGRI Ltd: Reasons for Decision. Case No. 017939. Competition Tribunal of South Africa. Pretoria.

05 Private sector and clusters development for agricultural transformation in Africa

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Key Messages

- 1** Clusters are valuable organizational frameworks to support farmers and agri-enterprises development with the potential to link them to domestic and global agricultural value chains in a more efficient and sustainable manner.
- 2** No universal formula exists for how clusters should be formed. However, in the context of Africa, with many smallholder farmers, limited networking, and minimal specialization, there is great need for government intervention.
- 3** The nature of agriculture clusters varies from country to country depending on the government's role, national economic development policies, raw material and land availability, comparative and resource advantage, among others.
- 4** African clusters face major challenges, including: (a) challenges of the knowledge revolution and increasing global competition; (b) lack of a critical mass of skills and talent; (c) weak links between businesses and knowledge institutions; (d) weak governmental and institutional support; and (e) resource depletion and failure to meet international standards.
- 5** The location of a given cluster is often crucial and should be based on grounded policy objectives with limited political interference and/or non-market driven initiatives. It is essential to consider locations near existing population centers, national/international transportation networks, provide easy access to labor, raw materials, suppliers, and distribution markets.

Introduction

The new era of increased globalization, growing population, expanding urbanization changing dietary patterns, and high-value production, provides enormous opportunities

for agricultural development in Africa. However, to seize these opportunities, countries in Africa must meet the challenge of increasing overall competitiveness of their agriculture sector and modernizing their food system. This “new agriculture” calls for holistic approaches to ramp up efficiency and productivity. Clustering, among other tools, offers the potential for improved coordination between value chains actors and agglomeration

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economies that can lead to enhanced performance of agricultural value chains (reduced transaction costs, access to markets, and increased profits). Such coordination fosters linkages among farmers and enterprises and collaborative relations with local institutions (i.e., extension and research institutes), supporting knowledge spillovers and spurring innovation and development in agribusiness. In addition, clustering agri-enterprises makes it more convenient for them to attract suppliers, service providers, skills, 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 engage in higher productivity and more market-oriented value chains 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.

Nogales (2010) reports that governments prefer to organize their support to the agriculture sector around clusters which they find more focused and effective than other strategies. They also acknowledge that clusters are valuable organizational frameworks for supporting farmers and agri-enterprises development in their regions, and can help farmers link to domestic and global agricultural value chains in a more efficient and sustainable manner. In a review by Zeng (2012), clusters are also viewed as a way of enabling industry players to compete and cooperate, supported by government policies, to drive the country towards local, regional and international competitiveness.

The question of “how and why do clusters?” has been analyzed by several authors (e.g., Nogales, 2010; Sharma & Gautam, 2014). Many studies have credited “clusters” for

the economic growth in several countries (Delgado, Porter, & Stern, 2014; Garanti, Zvirbule-Berzina, & Yesilada, 2014; Yang and Cai, 2015). A recent publication by the United Nations Food and Agriculture Organization of the United Nations (FAO) on territorial tools for agro-industry development (Nogales & Webber, 2017) provides a clear context of why cluster development would be relevant for agricultural and rural transformation by tackling both Africa’s food security challenges and its employment conundrum and, in particular, why a territorial approach to agri-food value chain development is essential. These authors stated that such an approach is critical to attract and concentrate agro-industrial investments as a way to enhance value addition, create jobs, increase exports, and provide markets for new and existing producers. In addition, because of the worldwide trend towards economic integration and globalization of supply chains, geography and territorial development are key factors to be considered for development policies in Africa. In the decades to come, these factors associated with spatial inclusion will be at the center of the challenges facing Africa. The limited spatial inclusion and current regional disparities hinder inclusive growth and are a major obstacle to structural transformation. The African Development Bank (AfDB) 2015 Feeding Africa Conference (AfDB, 2015) conceded that addressing the barriers to agricultural transformation in Africa will require working with a wide range of partners across different enabling areas. Among the priorities identified for investment during the conference were the need to promote regional integration and networking opportunities for African agri-cluster and agro-processing zones.

According to Wolman and Hincapie (2015), there is no universal formula for how clusters should be formed. In the context of Africa, however, with many smallholder farmers, limited networking, and minimal

specialization, there is a greater need for government intervention than in developed countries (Nogales, 2010). The literature review propounds that the public sector should act as a key enabler to kick-start the process, and create enabling key assets and conditions that unleash private-sector led transformation. It also highlights that policy support should be directed towards removing obstacles to growth and upgrading existing and emerging clusters as a priority.

This chapter looks at how agri-based clusters can be nurtured for further growth in the context of Africa and how they can drive private sector investment and innovation for agricultural transformation. It briefly describes the different types of agri-clusters, analyzes experience from developing these models around the world and lessons learned (successes and failures) from these. The chapter also proposes key factors to be considered by policy makers for clusters development to help Africa unleash the full potential of its agriculture sector.

What are the various types of agriculture clusters?

An agriculture cluster is simply a concentration of producers, agribusinesses and institutions that are engaged in the same agricultural or agro-industrial subsector, and interconnect and build value networks when addressing common challenges and pursuing common opportunities (Nogales, 2010). These entities are, in general, located in relatively close geographical proximity and may compete in similar markets. They cooperate to enhance technical skills and market access, and support growth and development of individual businesses. They may share common facilities and inputs such as storage and specialized technical skills. They can recruit support industries based on local concentration of agri-

firms and work together to respond to new market demands (i.e., norms and standards).

While there is no set formula for how clusters should be formed (Wolman & Hincapie, 2015), they can develop either organically, through managed processes, or in response to a lead buyer or a set of key buyers (hybrid cluster). Organic clusters comprise units or businesses located in a geographical zone by themselves without any prior planning from a management authority. Managed clusters, however, are developed in a zone by a public or private promoter who provides the basic infrastructure (i.e., power, water, internal road connectivity, etc.) and common facilities (i.e., water treatment plant, storage facilities, etc.) and attracts agri-firms accordingly. Hybrid and organic clusters can be non-managed and later develop their common needs and facilities amongst themselves as per their requirements or those of the lead buyer. There is no entry and exit norm and no boundary for these clusters. Zeng (2012) states that successful clusters grow organically from the bottom-up and therefore have their community's buy-in. Kamath, Agrawal and Kris (2012) argue that the key enablers for successful cluster development include a business friendly and stable socio-political environment, plus the availability of infrastructure.

The nature of agriculture clusters varies from country to country depending on the government's role, national economic development policies, availability of raw material and land, comparative and resource advantages, among others. These can be broadly grouped into three categories: (a) the first type, special agricultural economic zone, is a geographically demarcated area in which the rules of business are different from those that prevail in the national territory, and which offer advantages to investors in terms of infrastructure, special regulatory regimes and a range of fiscal incentives; (b) the second

type, agri-industrial park, offers a concentrated agro-industrial estate or zone/cluster mainly focused on value addition/agroprocessing services of food products. It also supports agribusiness development (especially small and medium enterprises (SMEs)) through knowledge institutions and horizontal and vertical coordination of agri-firms along the value chain; and (c) the third category, agri-clusters, is typically a concentration of agri-firms involved in a particular activity or supply chain. They often share related production inputs, distribution and communication channels, specialized labor pools and network associations, across a larger geographical area (sometimes within a single country, sometimes contiguous regions of two or more countries). They foster linkages and interdependence between actors in the overall network of producing products and services, contributing to the creation of innovative and more efficient utilization of scarce resources.

All these types of clusters (which can be managed or non-managed) are prevalent in Africa and operate under different policies and incentive frameworks. The most successful examples of agri-based clusters tend to focus on high-value and export-oriented production. They are mostly dominated by small and medium agri-enterprises, whereas in developed countries larger firms predominate. Several of these clusters face challenges to achieve the critical mass of firms needed to create sizeable learning externalities to trigger further development of the cluster (Nogales, 2010). In a review of the performance of three clusters—in Uganda (fish), Kenya (cut flower) and South Africa (wine)—Zeng (2008) concludes that, in general, African clusters face major challenges, including: (a) challenges of the knowledge revolution and increasing global competition; (b) lack of a critical mass of skills and talent; (c) weak links between businesses and knowledge institutions; (d) weak governmental and institutional

support; and (e) resource depletion and failure to meet international standards. Their sustainability depends on how successfully they can address these challenges. In this endeavor, the public sector needs to promote measures to establish a favorable regulatory and incentive environment, facilitating knowledge and technology learning and innovation. To improve the competitiveness of clusters, collaboration with foreign firms should be encouraged to tap into modern technologies and apply them in the local context. Policy incentives should also be put in place to encourage technology institutes and universities (both public and private) to respond to cluster needs in terms of skills development (technical and managerial), research and development (R&D), technology and process innovations. In addition, although governments have been supporting the provision of basic infrastructure (roads, water, power supply, and so on) to clusters, these are still limited and require additional investments in high-quality public goods, to accelerate the growth of the clusters. Section 3 provides a summary of lessons learned from experience developing different types of managed clusters around the world.

Learning from past experiences: Failures and successes

Several countries have adopted cluster-based approaches to support their development objectives around enhanced food production, farmers' access to markets, private sector development, jobs creation, and economic growth. These countries have adopted different models of cluster development. Lessons from these initiatives suggest that in most cases clustering in agriculture generate positive socio-economic benefits, including promoting an enabling environment for agri-firm cooperation, introducing new technologies, opening new markets, acting as a means to efficiently channel

public support to increase competitiveness in the agri-food sector and the rural space (on farm and off farm), and providing increased opportunities for spillover effects into other economic sectors. These benefits kick-start new industries. In general, successful development of agri-based clusters (especially agri-industrial parks) around the world share the following main features: (a) 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 suitable soil foundation capable of being secured with minimal environmental constraints (e.g., flooding, rivers) and minimal environmental impact (e.g., water quality, biodiversity, air quality); proximity of the proposed zone to existing public infrastructure facilities to minimize public offsite infrastructure-development expenditures; and selection of a site that has physical expansion potential, with no encroachment vis-à-vis urban centers or tribal communities; (b) construction of the park near existing population centers, national/international transportation networks, and enterprise clusters to provide easy access to labor, raw-material, supplier, and distribution markets; (c) 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, commercial, and residential areas; (d) public/private construction of infrastructure facilities (e.g., sewerage/wastewater treatment plants), including social infrastructure (especially education and health care) to attract skilled workers; implementation of environmental protection technologies (e.g., storage/incineration areas); and provision of waste disposal/refuse-collection capacities; (e) 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 (f) the

existence of privately managed zones to increase administrative, operational, and management efficiencies and to lower costs vis-à-vis public-sector counterparts.

Country cases have shown that deliberate and strategic interventions on the part of governments have often played important roles in the development of agri-food clusters (Farole & Akinci, 2011; Nogales & Webber, 2017) although their role varies from country-to-country (largely linked to national development policies, geography, business culture, and the overall economic environment), and even among individual sub-sectors as they are exposed to differing levels of competition in domestic and international markets. Wolman and Hincapie (2015) recommend government support for clusters involved in growth industries or industries offering a growth potential. They warn against the creation of clusters where they have not previously existed. The main reason for this is the poor community buy-in and the perception of “choosing and supporting winners”.

Experience with Special Economic Zones (SEZs)

This type of cluster development tool has been widely promoted in Asia and Latin America and has contributed to their export-led growth and structural transformation. For example, China used SEZs as platforms to support the development of export-oriented manufacturing. Alder, Shao and Zilibotti (2013) estimate that SEZs established in various cities in China generated a 12% increase in gross domestic product (GDP) for each respective city. In Latin America countries such as the Dominican Republic, El Salvador, and Honduras used other forms of SEZs, namely export processing zones (EPZs), to take advantage of preferential access to the US market. These zones generated large-scale manufacturing sectors in economies

previously dependent on agricultural commodities. In other parts of the world SEZs played an important role in promoting diversification, among others in the Arab Republic of Egypt, Morocco, and the United Arab Emirate. Furthermore, SEZs played a key role within the political economy of reform. In several countries, they have supported partial exposure to global markets while maintaining protective barriers in a “stepwise” approach to reform. SEZs have aided 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 & Moberg, 2017).

This positive experience in Asia, Latin America, the Middle East and North Africa has prompted governments in sub-Saharan Africa to initiate their own SEZ programs. Currently most countries in sub-Saharan Africa have active SEZ projects which may take the form of EPZs, free trade zones, and free ports. Experience with these zones over the past two decades, by and large, shows they have failed to achieve the expected benefits. According to Farole (2011), except for Mauritius and the partial initial successes of Kenya, Madagascar, and Lesotho, most sub-Saharan African zones have failed to attract significant investment, promote exports, and create sustainable employment. Investments in zone infrastructure have in many cases resulted in “white elephants”. In some instances, SEZs became zones where investors take advantage of tax breaks without delivering substantial employment or export earnings. Other zones, such as in Madagascar, have been 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, & Roubaud, 2005), however, the zone’s success has proven to be highly vulnerable to changes

in trade preferences and political stability (Cling, Razafindrakoto, & Roubaud, 2007; Farole 2011) and did not manage to sustain its competitiveness in the face of eroding trade preferences or rising wages (Staritz & Morris 2013). Other SEZ experiences supported by China in five African countries resulted in poor linkages to the domestic economy which will likely limit their ability to promote wider structural transformation, however, the infrastructure developed for the zones will likely benefit other sectors (Brautigam & Tang, 2014).

While sub-Saharan Africa 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 (i.e., civil unrest, policy instability, regulatory uncertainty, etc.). Other key factors that contributed to failure of the zones included sites which 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. In a recent study, Farole and Moberg (2017) argue that these constraints are mostly technical and that the main reason for SEZ failures in sub-Saharan Africa is largely due to flaws in the political economy of SEZ schemes, which prevent replication of “best practice” in SEZ development and management. They further suggested that acknowledging the political economy challenges with 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 accounted for when embarking on large, costly, and long-term projects like SEZs.

Experience with agri-industrial parks

As part of their policy support to developing the agriculture sector and fostering food industry growth, a few countries promoted the concept of agri-industrial parks. This concept is based on a concentrated agro-industrial zone, mainly focused on value addition/agroprocessing services of food products, including crops, livestock/dairy products and allied services. It is also based on a public–private partnership (PPP) scheme aimed at facilitating private sector investment in agribusiness by providing: (a) access to basic industrial infrastructure; (b) shared

common services and facilities and creation of economies of scale in terms of warehouses, cold storage facilities, logistic services, waste management, etc.; (c) specialized agro-industrial services such as laboratory testing, certification and new product development services; (d) improved access to technical support, and information and management services; and (e) facilitation of partnerships through effective networking between primary producers, agroprocessors, traders, retailers and end markets. Similar concepts were promoted in late 2000s in India under the Mega Food Parks program. The program is based on a cluster approach and envisages the creation of modern support infrastructure in a well-defined agri-/horticultural zone for establishing food processing units in the industrial plots provided in the park. The aim is to provide a mechanism to link agricultural

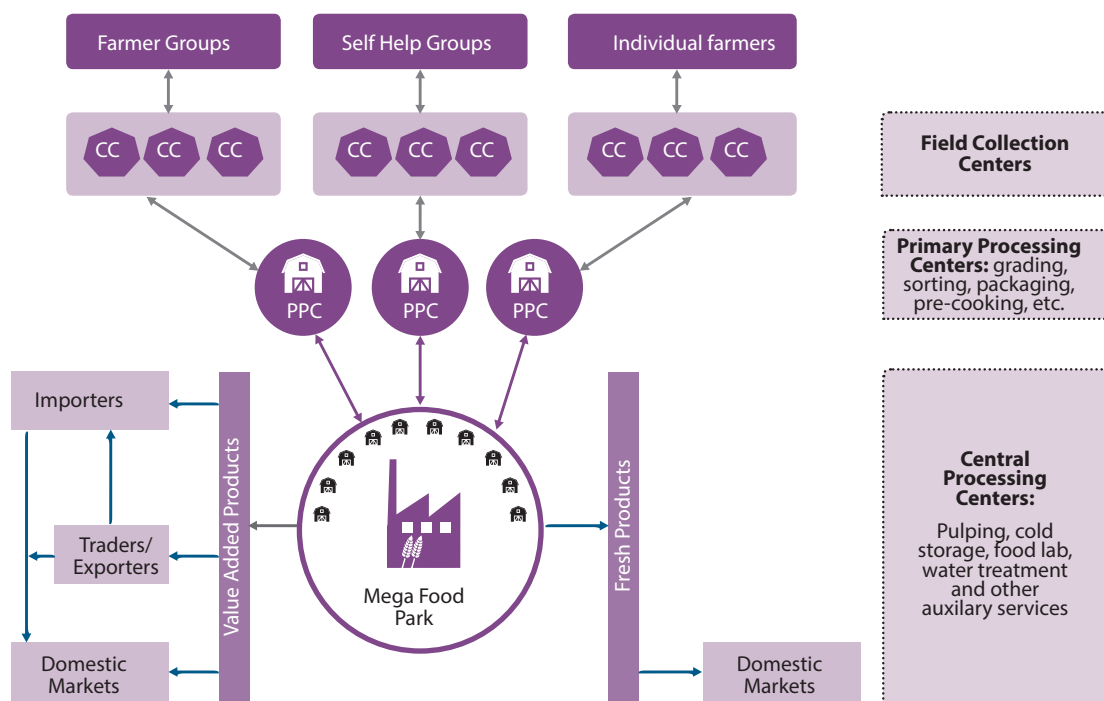


Figure 5.1. Illustration of the India Mega Food Park scheme.

Source: Adapted from the Ministry of Food Processing Industries, Government of India

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 sector. The mega food parks typically consist of supply chain infrastructure, including collection centers, primary processing centers, central processing centers, cold chain, and 25–30 fully developed plots for entrepreneurs to set up their food processing plants (Figure 12.1). The government provides a grant up to US\$7 million to build a mega food park with a minimum land area of 20 hectares and a contribution of at least \$US7 million investments from the park developer. These projects are implemented by a Special Purpose Vehicle.

As of July 2019, of the 42 parks envisaged in the India Mega Food Park program, 16 are operational. The main issues faced by the program include delays in approval and implementation; and 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 (MoFPI) 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 is difficult and offers low returns in the beginning. They also pointed out that there is hardly any buy-in from state governments for the project and this has led to project delays (i.e., political interference, delays from MoFPI in releasing grants, issues regarding acquisition of contiguous land, obtaining the necessary clearances and approvals like power and water, and no fiscal incentives were provided for units to locate in the food park).

In addition, the timeline to operationalize the park was limited to 30 months which was tight and did not take into account the contingencies. It is therefore a challenge for a food park to work with farmers in improving the quality of raw materials, creating linkages, and implementing new ideas 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 Japan, Korea, the US, Australia, and the EU as these countries cannot invest in a grant-based scheme. Their preference would be for joint ventures such as in the case of food industrial parks development in China, Thailand, and Vietnam. In these parks, foreign collaboration lead to the technology upgrade, access to finance, knowledge spillover, and best management practices.

In other countries, such as Morocco, the government also promoted the concept of agri-industrial parks (agropoles) as part of its Green Plan. Six agropoles should have been created in different agro-ecological zones between 2009 and 2015. The aim of these parks, established in areas varying between 100 to 200 hectares, was to strengthen the processing and marketing of agricultural products. They benefited from substantial funds for their development (ranging from US\$45 to 92 million per site). Each agropole was designed to offer investors, mainly operating in the agri-food sector, an adequate environment to realize their projects, with serviced industrial plots

and quality infrastructure (access roads, power, communication, conference facilities, training centers, logistics, food laboratories, and other common facilities). To 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, in Berkane and Meknes, are currently operational. The difficulties encountered in rolling out the plan can be linked to the following: (a) the limited consultations with the key value chain actors (including domestic business and local communities) to ensure that demand/support is based on the reality of the potential of the area (market demand and political economy); (b) weak institutional capacity in terms of planning and implementation of the concept of agropoles; and (c) 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, Mohamed Coulibaly, & Smaller, 2017). This has happened only to a limited extent. At this stage, however, it is too early to assess success or failure of these investments as they are still under construction or development, but there are clear operational challenges.

Experiences with agri-clusters

In 2014 the Democratic Republic of Congo (DRC) initiated an ambitious program to establish 22 agri-cluster parks (Parcs agroindustriels) across the country on over 1.5 million hectares. The program aimed to boost agricultural

production, encourage private and foreign capital investments, and increase agricultural exports. Its concept is 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 with funding from the government in Bukanga Lonzo some 260 km southeast of the capital Kinshasa (estimated at U\$90 million public funding). It covered an area of 80,000 hectares of land and involved major investments in basic infrastructure (including roads, buildings, 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 agri-cluster parks program for nation-wide up-scaling. However, its implementation has been slowed by political instability, inconsistency in government agenda and vision; lack of stable funding for infrastructure; good governance and management. Several NGOs also raised concerns around land grabbing, including the opacity of land acquisition, the lack of consultation with local populations, the lack of a contract between the company and the locals, and forced displacement of local farmers.

This experience points out 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 engage in the identification of 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 to their commitments. Furthermore, the complexity of an integrated project such as the Bokanga Lonzo park requires a wide range of expertise and institutions that are in short supply 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, good governance and management, the loss of political buy-in is likely to hamper the success of the agri-cluster parks program in DRC.

A focus on international accreditations and standardization

With the objective of strengthening its share of the halal industry and positioning itself as a global leader in the industry, Malaysia implemented a comprehensive growth strategy which integrated, as a key activity, the systemic development of halal parks. These parks were designed to provide a green design for park infrastructure, cleaner production, pollution prevention, availability and accessibility of raw materials and ingredients, energy efficiency, intercompany linkages, consolidated services from public agencies, and linkages for marketing. Within the parks, businesses enjoy special incentives, shared and efficient infrastructure (land, preferential utility rates, etc.) and shared services (access to raw materials and R&D, enhanced logistics, etc.). The parks are part of a broader government strategy supporting the industry that includes: (a) enhanced R&D; (b) establishment of halal standards/certifications; (c) capacity building of SMEs; and (d) marketing of Malaysia as a center for halal products/services (World Bank, 2017). The parks development was successful. The emphasis on food safety standards and bringing local food standard at par with global standards has been one of the key elements of the success

of the halal parks. These are monitored by the Halal Industry Development Corporation (HDC) which laid down the guidelines for the HALMAS status—an accreditation given to Halal Park operators as a mark of excellence, indicating that the products are of the highest quality.

While the HDC helps the developers to get the HALMAS status, this status makes operators, industry players and logistic operators eligible for various incentives provided by HDC and the Ministry of Finance in Malaysia. Eligible companies under the Halal Malaysia guidelines receive various incentives such as full tax exemptions of statutory income for 10 years, or 100 percent income tax exemption on capital expenditure for a period of 5 years and exemptions from import duties and sales tax on equipment used for the manufacture of halal products. Thus, Malaysia has been able to link incentives with quality and safety standards. On the contrary, in the case of the Lake Victoria fishing cluster initiated in the early 1980s, the industry suffered a severe shock when fish exports to the European Union were banned in 1997 over a lack of conformity to sanitary and safety regulations. Most factories closed down for several years leading to thousands of job losses (Nogales, 2010)). Note that resource-based clusters, especially those in the agriculture and fisheries sectors, need to find ways to avoid resource depletion and upgrade their products.

Location of the agri-industrial parks matters

The location of agri-industrial parks and SEZs is in most cases crucial and should be based on grounded policy objectives with limited political interference and/or non-market driven initiatives. As pointed out earlier, it is essential to consider locations near existing population centers, national/international transportation networks, to provide easy access to labor, raw materials, suppliers, and distribution markets. The example of the Penang International

Halal Hub, covering 100 acres of industrial space and catering to sea food processing, herbs extraction, bakery products, canned food and beverages, and soya products deserves a special mention. This is because of its strategic location between large and growing markets of India and China and its linkages to good ports and international airports. Penang is also strategically located in the North Corridor Economic Region and the Indonesia–Malaysia–Thailand Growth Triangle. The strategic location is complemented by an efficient transport and logistics system and soft infrastructure such as availability of resource development and training through the Penang Skill Development Centre.

The need for long-term investments

A general observation is that cluster development projects require time to implement and sustained investment over a long period. The cases of Morocco and DRC described are good examples showing that “quick wins” are difficult to achieve and that cluster development requires long-term investments and iterative solutions to problems that arise. Other projects, such as the Mpal Agropole in Senegal, took more than 10 years to start operations and still require additional infrastructure investments. This is also the case for other agri-industrial parks, such as Bagrèpôle in Burkina Faso and a few other parks in Cameroon. In addition to the shortage of investment, agri-parks in sub-Saharan Africa experience other challenges, including poor coordination among key stakeholders (public and private), poor governance and management issues, land availability and allocation, and insufficient consideration to the local context/communities (Ouattara, 2016). In some cases, these agro-industrial park initiatives face poor financial management (including elite capture and

corruption), a lack of targeted strategies to attract investment, poor infrastructure planning, and inadequate assessment of market demand.

Concluding remarks

In pursuing agricultural transformation through the development of agricultural value chains and modernization of food systems, the main challenge is the convergence of key assets in due time and right place. Natural process alone cannot guarantee such alignments in time and space; there must be a commitment from all actors across the development spectrum to achieve the required convergence of assets.

Although cluster development for agricultural transformation is not a panacea, this review suggests that, when driven by the private sector, their implementation is often accompanied by assets and coordination mechanisms that reinforce synergies between all stakeholders. Hence, they have the potential to contribute to the integration of upstream and downstream value chain links, and the establishment of a comprehensive supply of services for investors and agricultural enterprises.

By design, each cluster should be market driven and provide a favorable business environment, including specialized counseling, mentoring, innovation and support services for entrepreneurs to consolidate and develop markets, access to secured financing, and establish smart partnerships that stimulate agricultural transformation based on local and regional potentials. As a hub, a given cluster should facilitate access to processing, storage and marketing facilities in a PPP context between government, private investors, service providers, smallholder farmers, and development partners.

Regarding the government, its role should be to facilitate the clustering process by

promoting an enabling environment and conditions that unleash private-sector led transformation. It should be unwaveringly committed to work with the private sector in partnerships which deliver both significant returns on investments and overall agricultural transformation. In promoting clusters, policy makers should develop a clear vision and roadmap for what they want to achieve; be more selective about the investor, the business model, and the enterprise; set up transparent process in all steps (i.e., site selection and land

allocation); review investments systematically and encourage alternatives to large-scale land investments; support first movers, but not at scale; and finally have alternative plans in case of failure to make use of initial investments (i.e., basic infrastructure). On the contrary, policy makers should not offer more incentives to foreign investors than to local ones. They also should not promote mega land deals, allow people to have land without making productive investments, and short cut existing land regulations.

References

- AfDB. (2015). *2015 Feeding Africa Conference*. Abidjan, Cote d'Ivoire: African Development Bank (AfDB).
- Alder, S., Shao, L., & Zilibotti, F. (2013, February). The effect of economic reform and industrial policy in a panel of Chinese cities (Discussion Paper). Economic Research Council, London, UK. Retrieved from https://www.economicdynamics.org/meetpapers/2013/paper_1309.pdf
- Brautigam, D., & Tang, X. (2014). Going Global in Groups: Structural Transformation and China's Special Economic Zones Overseas. *World Development*, 63, 78–91.
- Cling, J.-P., Razafindrakoto, M., & Roubaud, F. (2005). Export processing zones in Madagascar: A success story under threat? *World Development*, 33(5), 785–803.
- Cling, J.-P., Razafindrakoto, M., & Roubaud, F. (2007). *Export processing zones in Madagascar: The impact of the dismantling of clothing quotas on employment and labour standards* (DIAL Document de Travail 2007-6). Paris, France: Développement Institutions et Analyses de Long Terme.
- Delgado, M., Porter, M.E., & Stern, S. (2014). Clusters, convergence, and economic performance. *Research Policy*, 43(10), 1785–1799.
- Farole, T. (2011). *Special economic zones in Africa: Comparing performance and learning from global experience*. Washington, D.C.: The World Bank.
- Farole, T. & Akinci, G. (2011). Introduction. In T. Farole & G. Akinci (Eds.), *Special economic zones: Progress, emerging challenges, and future directions*. Washington, D.C.: The World Bank.
- Farole, T., & Moberg, L. (2017). *Special economic zones in Africa: Political economy challenges and solutions*. Published to Oxford Scholarship Online. Retrieved from doi: 10.1093/acprof:oso/9780198796954.001.0001.
- Garanti, Z., Zvirbule-Berzina, A., & Yesilada, T. (2014). Cluster concept in policy planning documents: the cases of Latvia and Northern Cyprus. *Business Theory and Practice*, 152(2), 129–139.
- Kamath, S., Agrawal, J., & Kris, C. (2012). Explaining geographical cluster success: The GEMS model. *American Journal of Economics and Sociology*, 71(1), 184–214.

- Nogales, E.G. (2010). *Agro-based clusters in developing countries: Staying competitive in a globalized economy*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). (Also available at www.fao.org/docrep/012/i1560e/i1560e.pdf)
- Nogales, E.G., & Webber, M. (Eds.). (2017). *Territorial tools for agro-industry development—A sourcebook*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). (Also available at www.fao.org/3/a-i6862e.pdf)
- Ouattara, N. (2016). *Les Pôles de Croissance Agricole: La Panacée aux Maux de l'Agriculture Africaine?* Bulletins de synthèse Souveraineté alimentaire N°24. Ouagadougou, Burkina Faso.
- Picard, F., Mohamed Coulibaly, M., & Smaller, C. (2017). *The rise of agricultural growth poles in Africa. Investment in agriculture* (Policy Brief #6). International Institute for Sustainable Development (IISD).
- Sharma, S., & Guatam, A. 2014. Agro-based clusters: A tool for competitiveness of Indian agriculture in the era of globalization. *Global Journal of Finance and Management*, 6(8), 713–718.
- Staritz, C., & Morris, M. (2013). *Local embeddedness and economic and social upgrading in Madagascar's export apparel industry* (Working Paper). Vienna: Austrian Foundation for Development Research (ÖFSE).
- Wolman, J., & Hincapie, D. (2015). Clusters and cluster-based development policy. *Economic Development Quarterly*, 29(2), 135–149.
- World Bank. (2017). *Agri-spatial solutions to support agribusiness development*. Washington, D.C.: The World Bank.
- Yang, P., & Cai, J. (2015). Economic clusters: A bridge between economic and spatial policies in the case of Beijing. *Cities: The International Journal of Urban Policy and Planning*, 42, 171–185.
- Zeng, D. (2008). *Knowledge, technology and cluster-based growth in Africa*. World Bank Institute Learning Resources Series. Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank. Retrieved from <https://doi.org/10.1596/978-0-8213-7306-4>
- Zeng, D. (2012). China's special economic zones and industrial clusters: the engines for growth. *Journal of International Commerce, Economics and Policy*, 3(3), 1250016-1-1250016-28.

06 Agricultural Trade in Africa in an era of Food System Transformation: Policy Implications

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Key Messages

- 1** Africa's food output and imports have grown rapidly over the past 40 years, at a pace similar to that of Asia. Most of the growth has been in diet diversification or non-food grain products such as fruits and vegetables, roots and tubers, meat and fish and dairy, and edible oils, and in convenience grains such as rice and wheat. At the same time, Africa's food systems have transformed with increasing urbanization, changing diets, and growing food demand. All these represent massive intra-African trade opportunities, added to the well-known world trade opportunities.
- 2** In the face of these opportunities, Africa is significantly lagging behind other regions around the world in its ability to leverage trade as an engine of growth. The share of its food output that is exported somewhat lags behind Asia's, its export growth rate is generally slower and only started catching up in the past few decades, and still has a way to go.
- 3** The agri-food trade policy debate in Africa needs to transform along with the increase and diversification of demand and the transformation of the food system in Africa with rapid urbanization similar to developing Asia's, and supply chain transformation afoot. In particular, insufficient attention has been paid to the opportunities inherent in the diet transformation in Africa "beyond food grains" products and processed products. The trade literature to date has not adequately adjusted to the deep and rapid changes taking place in the food system.
- 4** Regional intra-African trade in agricultural and food products is very small in comparison to that of the rest of the world. The level of intra-Africa food trade is consistently below 18% while it is much higher in Europe (69%), Asia (59%), and North America (31%). The very low levels of intra-African food trade suggest that trade presents a great opportunity for the creation of larger regional markets that could help boost economic growth and sustainable development in Africa.

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- 5** The engagement of the private sector at each level of the agri-food value chain is indispensable for the realization of the benefits of intra-regional trade and large-scale investments in food processing and services. These opportunities could be transformational if more public policies and investment initiatives target the “hidden middle” of the food value chain, which has experienced significant changes in recent years.
- 6** There are greater opportunities for expanding intra-African food trade through a more pervasive and consistent change in how African governments and public institutions engage food markets and the private sector. Specifically, less government intervention and control of food markets is necessary to achieve a more effective and better performing agri-food sector. This is a clear lesson learned from emerging and developed economies around the world, which have developed a robust and more diversified agri-food market.
- 7** The low level of trade facilitation due to poor investment and business environment for private sector activities is a major constraint to agri-food trade in Africa. A few other constraints in need of public policy attention include trade-distorting policies, volatile policy regimes, poor governance and weak physical and soft infrastructure; membership in overlapping regional economic unions, which sometimes have conflicting rules.
- 8** The way forward is now in sight. The recent signing of the African Continental Free Trade Agreement (AfCFTA) in March 2018 by 54 African countries is arguably the single most important continental trade-enhancing initiative in Africa. If the AfCFTA objectives of removal of tariffs and non-tariff barriers are aggressively supported and properly implemented by the signatories, this trade agreement has the potential to significantly boost the volume and value of intra-African agricultural and food trade and services. To achieve its objectives for boosting intra-African trade, an effective implementation strategy should include better harmonization of activities and trade rules among the regional economic unions in Africa (e.g., the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC).

Introduction

Africa's food output and imports have grown rapidly over the past 40 years, at a pace similar to that of Asia. Most of the growth has been in diet-diversification or non-food grain products such as fruits and vegetables, roots and tubers, meat and fish and dairy, and edible oils, and in convenience grains such as rice and wheat. At the same time, Africa's food systems have transformed with increasing urbanization,

changing diets, and growing food demand. All these represent massive intra-African trade opportunities, in addition to the well-known world trade opportunities.

In the face of these opportunities, Africa is significantly lagging behind other regions around the world in its ability to leverage trade as an engine of growth. The share of its food output that is exported somewhat lags behind Asia's, and its export growth rate is generally

slower and only started catching up in the past few decades; it still has a way to go.

The trade policy debate, and trade and general business policies have held back Africa's response to the rapidly emerging opportunities. In this chapter, we lay out trends in output and trade in Africa by subregion to highlight the opportunities. We then identify the constraints arising from the policy debate itself as well as from policies and institutions that have held back Africa from responding to the opportunities. We then discuss the needed policy priorities and the way forward.

Long-term trends in food output and trade in Africa: pointing to opportunities

We lay out trends over 1970, 1990, and 2013 in output, exports, imports, and consumption by disappearance (approximated by output less exports plus imports). We chose the year points to signpost the situation before (1970) and at the approximate start (1990) of structural adjustment and the surge in urbanization and eventual rise in incomes, and the latest year our data source has, 2013. We use FAOSTAT Food Balance Sheets (<http://www.fao.org/faostat/en/#data/FBS>) to discern broad patterns.

These data are in physical terms (millions of tons), not value terms. But because they are in tons and not dollars, relative to having data in dollar terms, our data overemphasize the share of heavier, bulky items like roots and tubers, and underemphasize the share of high value items like fruit. However, our goal is rough approximation of changes and of comparisons over subregions to indicate trends and identify general opportunities—and limitations in trade.

The data are presented in five tables. Table 6.1 takes Africa (sub-Saharan Africa) as a whole, and compares it with Asia as a whole. Tables 6.2 to 6.4 show the results by subregions—Central

Africa, developing Eastern and Southern Africa (with South Africa presented separately in Table 6.4 for comparison), and West Africa. These tables use broad product categories, except to highlight cereal subcategories (rice, wheat, and other cereals), and in fruit (bananas/pineapples) exports. Table 6.5 highlights some trends for specific products such as coffee. We only deal with agricultural and food products; the Food Balance Sheets do not present non-food crops like cotton or rubber.

Overview at the African and Asian levels

We compare Africa with developing Asia for a variety of good reasons. Africa and Asia are in broad terms peers competing in the world food market, but also will be increasingly linked by trade and foreign direct investment (FDI). Developing Asia was poorer than Africa only 40 years ago and has since pulled a little ahead, but both regions are transforming fast. Chapters 2 and 3 of this volume note that there are similar transformations of food systems afoot. But perhaps most interesting for this comparison is that Asia is often held up as a success story, with Africa often said to be very different, very behind. The numbers here rather show a number of similarities between Africa and Asia, especially from 1990 to 2013.

Table 6.1 shows Africa tripling in population over the period of 43 years, and Asia doubling. During that period, Africa's food output in tons rose 3.2 times, while Asia's rose almost 4 times. A closer look, however, shows that from 1990 to 2013, the food output of both Africa and Asia doubled. Africa had mainly lagged behind in volume increase in the earlier period, 1970–1990.

The same sort of narrowing of the gap occurred in consumption (measured in disappearance terms) per capita. In 1970, the per capita consumption in Africa was well above Asia's; they closed the gap to equality in 1990, and

then Asia pulled ahead to some 10% more per capita. This comparison is rough because the diet composition differs. However, the main point is that Africa and Asia moved to and roughly stayed at convergence in broad terms. It also indicates that food availability in Africa improved over the period. This says nothing about food distribution over the population; it just indicates the aggregate figure per capita.

While the import bill is an important policy issue in Africa, it is interesting to see that the dependence on imports has roughly tracked in Africa versus Asia. Over the full period, imports in tons rose 10 times in both continents. The shares of imports in consumption also roughly

tracked. In 1970 the share of imports (again, in ton terms) was 3% of total consumption in Asia, and 4% in Africa. Both grew over the next 2 decades, but only to 4.3% in Asia and 5% in Africa. From 1990 to 2013, there was a surge of imports in both regions, but the resultant overall share of imports stayed at a modest 9% in Africa and 8% in Asia.

Asia's exports rose 10 times over 1970–2013, while Africa's only rose 2.5 times. However, again as with consumption, comparing just 1990–2013, the gap is reduced, as Africa's exports doubled, and Asia's tripled. By 2013, a total of 4% of Africa's output was exported, and nearly 6% of Asia's.

Table 6.1. Comparing Africa and Asia on food output, imports, and exports, 1990–2013

	1970	1990	2013
Africa (SSA) Overall, in tons			
Africa (SSA) population (in millions)	267	464	830
Africa total food consumption by disappearance (<u>output</u> less exports plus imports)	215m	340m	749m
Africa food consumption by disappearance in tons/capita/year	0.81	0.73	0.90
Africa total domestic food <u>output</u> (all items in FAO food balance sheet, FBS), in millions	220	335	709
Imports into Africa, tons (share of total consumption by disappearance), all items in FBS	7.3 (4%)	17.9 (5%)	69.2 (9%)
Exports from Africa, total food tons (share of total domestic output), all items in FBS	12 (6%)	13.2 (4%)	29.1 (4%)
Developing Asia			
Developing Asia population (in Millions)	1087	2083	3078
Asia total domestic food consumption by disappearance (output less exports plus imports) in millions	1020	2010	4270
Asia food consumption by disappearance in tons/capita/year (tons)	0.55	0.71	1.13
Food output in tons (all in FBS) (millions)	1070	2030	4180
Imports into Asia, tons (share of total consumption by disappearance) (all in FBS), in millions	33 (3%)	85.5 (4.3%)	327 (8%)
Exports from Asia, tons (share of total domestic output) (all in FBS), in millions	24 (2.4%)	78 (3.8%)	237 (5.6%)

Note: SSA = sub-Saharan Africa; FBS = Food Balance Sheets, FAOSTAT

Table 6.2. Product Composition of Output, Imports, & Exports: West Africa 1970-2013, in millions of tons

	1970	1990	2013
Overall			
Output of all food	78.6	125.5	306.9
Imports of all food	3.2	7.5	32.9
Exports of all foods (share of output)	3.2 (4%)	3.1 (2.5%)	7.1 (2.3%)
Consumption by disappearance (output – exports + imports)	78.6	130	332.7
Cereals			
Rice output in milled equivalents	01.4	3.7	9.7
Wheat and wheat products output	0.02	0.07	0.12
Other cereals output	14.1	23.8	42.7
Share of all cereals in total output	18%	19%	14%
Rice imports (share in total imports)	0.5 (16%)	2.0 (27%)	8.2 (25%)
Wheat and products imports (share in total imports)	0.7 (22%)	1.5 (20%)	7.0 (21%)
Other cereals imports	0.02	0.3	0.8
Rice exports	*	0.01	0.3
Wheat and wheat product exports	*	*	*
Other cereal exports	*	*	*
Cereals consumption in total consumption by disappearance	21%	24%	21%
Roots and tubers except potatoes (latter in vegetables)			
Output (share of all output)	33.2 (42%)	47.6 (38%)	149.7 (49%)
Imports	*	*	*
Roots & tubers except potatoes, in total consumption by disappearance	42%	37%	45%
Edible oils and oil crops			
Output (share of all output)	5.5 (7%)	7.5 (6%)	14.1 (5%)
Imports	0.1	0.2	2.4
Exports	1.6	0.7	1.5
Fruit & vegetables (including potatoes)			
Output (share of all output)	12.5 (15%)	18.9 (16%)	42.0 (14%)
Imports	0.01	0.03	2.7
Exports (share of output that is exported)	0.3 (2%)	0.3 (2%)	0.6 (1%)
Exports that are bananas & pineapples	0.3	0.3	0.3
Consumption by disappearance of fruits/vegetables (and share of total consumption)	15%	14%	13%
Animals and animal products (meat, fish, dairy)			
Output (share of total output)	3.6 (5%)	5.8 (5%)	12.3 (4%)
Imports	0.8	2.3	6.7
Exports	0.1	0.3	0.7
Other foods			
Output (share of total output)	8.3 (11%)	17.5 (14%)	35.9 (12%)
Imports	1.1	1.2	4.1
Exports	1.2	1.8	4.6

Source: Authors' Calculations from FAOSTAT Food Balance Sheets. * means "negligible"

West Africa: Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

Table 6.3. Product Composition of Output, Imports, & Exports: Central Africa 1970-2013, in millions of tons

	1970	1990	2013
Overall			
Output of all food	15.2	19.4	65.9
Imports of all food	0.7	2.1	8.2
Exports of all foods (share of total output)	1.4 (9%)	0.6 (3%)	0.6 (1%)
Cereals			
Rice output (milled equivalents)	0.06	0.09	0.40
Wheat output	*	*	*
Other cereals output	2.0	1.7	7.0
Share of all cereals in total output	17%	13%	11%
Rice imports (share in total imports)	*	0.2 (10%)	1.2 (15%)
Wheat and products imports (share in total imports)	0.2 (29%)	0.6 (29%)	2.0 (24%)
Other cereals imports	0.07	0.3	1.3
Roots and tubers except potatoes (latter in vegetables)			
Output	5.5 (36%)	7.0 (36%)	28.5 (43%)
Imports	*	*	*
Edible oils and oil crops			
Output	0.9 (6%)	1.03 (5%)	2.3 (3%)
Imports	*	0.09	0.5
Exports	*	*	*
Fruit & vegetables (including potatoes)			
Output	2.5 (16%)	4.0 (21%)	16.0 (24%)
Imports	*	0.07	0.4m
Exports	*	*	*
Animals and animal products			
Output (share of total output)	1.2 (8%)	1.5 (8%)	2.5 (4%)
Imports	0.01	0.6	1.5
Exports	0.03	*	*
Other foods			
Output (share of total output)	3.04 (20%)	4.08 (21%)	9.2 (14%)
Imports	0.5	0.3	1.3
Exports	1.4	0.6	0.6

Source: Authors' Calculations from FAOSTAT Food Balance Sheets. * means "negligible"

Central Africa: Angola, Cameroon, Central African Republic, Chad, Congo, Gabon, Sao Tome and Principe

Table 6.4. Product Composition of Output, Imports, & Exports: Developing ESA (Eastern and Southern Africa) and South Africa 1970-2013, in millions of tons

	1970	1990	2013
Overall – Developing ESA			
Output of all food	74.6	111.3	242.2
Imports of all food	2.1	4.1	18.5
Exports of all foods (share of output)	3.5 (5%)	4.2 (4%)	9.4 (4%)
Consumption by disappearance (output – exports + imports)	73.2	111.2	251.3
Overall – South Africa			
Output of all food	32.7	49.1	63.3
Imports of all food	0.9	2.4	7.5
Exports of all foods (share of output)	3.4 (10%)	4.8 (10%)	11.7 (19%)
Cereals – Developing ESA			
Rice output in milled equivalents	1.5	2.3	4.7
Wheat and wheat products output	0.4	0.8	5.1
Other cereals output	8.5	13.4	42.7
Share of all cereals in total output	14%	15%	22%
Rice imports (share in total imports)	0.1 (5%)	0.3 (7%)	2.1 (12%)
Wheat and products imports (share in total imports)	0.5 (24%)	1.1 (27%)	5.7 (31%)
Other cereals imports	0.5 (24%)	0.9 (22%)	2.3 (12%)
Rice exports (share in output)	0.07 (5%)	*	1.6 (34%)
Wheat exports	0.1	0.02	0.4
Other cereals exports	0.3	1.1	0.7
Cereals in consumption by disappearance	15%	16%	24%
Cereals – South Africa			
Rice output in milled equivalents	*	*	*
Wheat and wheat products output	1.4	1.7	1.9
Other cereals output	6.7	9.9	12.3
Share of all cereals in total output	24%	24%	23%
Rice imports (share in total imports)	0.07	0.3	1.3
Wheat and products imports (share in total imports)	0.1	0.6	1.5
Other cereals imports	0.3	0.2	0.4
Rice exports	*	*	*
Wheat exports	0.01	0.2	0.5
Other cereals exports	1.3	2.1	3.1
Roots and tubers except potatoes (latter in vegetables) – Developing ESA			
Output (share of all output)	14.6 (20%)	24.1 (22%)	49.5 (20%)
Imports	*	*	*
Roots and tubers in consumption by disappearance	20%	22%	21%

	1970	1990	2013
Roots and tubers except potatoes (latter in vegetables) – South Africa			
Output (share of total output)	0.04 (*)	0.05 (*)	0.07 (*)
Imports	*	0.01	0.06
Roots and tubers in consumption by disappearance	*	*	*
Edible oils and oil crops – Developing ESA			
Output (share of all output)	2.3	2.7	7.5
Imports	0.1	0.5	2.6
Exports (share of output)	0.5 (22%)	0.2 (7%)	0.9 (12%)
Edible oils and oil crops – South Africa			
Output (share of all output)	0.5	1.4	2.0
Imports	0.05	0.3	1.1
Exports	0.1 (20%)	0.08 (6%)	0.3 (15%)
Fruit & vegetables (including potatoes) – Developing ESA			
Output (share of all output)	15.9	22.5	44.2
Imports	0.1	0.3	1.4
Exports (share of output that is exported)	0.2 (1%)	0.3 (1%)	1.1 (3%)
Exports that are bananas & pineapples	0.04	0.1	0.3
Fruit & vegetables (including potatoes) – South Africa			
Output (share of all output)	4.0	7.0	11.9
Imports	0.06	0.04	0.9
Exports (share of output that is exported)	0.7 (18%)	1.2 (17%)	4.4 (37%)
Animals & animal products (meat, fish, dairy) – Developing ESA			
Output (share of total output)	4.5	8.8	21.6
Imports	0.5	0.5	1.4
Exports (share of output that is exported)	0.2 (4%)	0.2 (2%)	1.2 (6%)
Animals & animal products (meat, fish, dairy) – South Africa			
Output (share of total output)	5.3	4.9	7.6
Imports	0.2	0.9	1.1
Exports	0.6 (11%)	0.3 (6%)	1.1 (15%)
Other foods – Developing ESA			
Output (share of total output)	26.9 (36%)	36.7 (32%)	66.7 (28%)
Imports	0.34	0.5	3.0
Exports	1.23	2.58	3.5 (5%)
Other foods – South Africa			
Output (share of total output)	14.76 (45%)	24.2 (49%)	27.5 (44%)
Imports	0.12	0.05	1.1
Exports	0.7	0.9	2.3 (8%)

Source: Authors' Calculations from FAOSTAT Food Balance Sheets. * means “negligible”

Developing Eastern & Southern Africa (ESA) [ESA with South Africa excluded]: Botswana, Djibouti, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Uganda, United Republic of Tanzania, Zambia, Zimbabwe, South Africa

Table 6.5. Non-traditional High-Value vs Traditional Export Products, 1970, 1990, 2013, in millions of tons

	1970	1990	2013
Traditional Export Products			
Exports of groundnuts	0.74 (4%)	0.10	0.17
Exports of Coffee, cocoa, tea	1.82 (11%)	2.53 (17%)	3.51 (9%)
Exports of palm kernels & palm	0.49	0.25	0.77
Non-traditional high-value products			
Fish			
Output	3.14	3.84	5.81
Imports	0.43	2.01	4.85
Exports (share of total African exports)	0.97 (6%)	0.55 (3%)	1.57 (4%)
Poultry			
Poultry output	0.4	1.2	3.1
Poultry imports	0	0.08	1.34
Milk			
Output	9.3	14.4	28.8
Imports	1.03	1.84	3.72
Exports	0.07	0.21	1.08
Sugar			
Imports	0.85	1.29	7.98
Exports	1.73 (10%)	1.88 (13%)	2.64 (7%)
Edible oil crops and oil output			
Output	9.2	12.6	25.9
Imports	0.7	1.1	6.6
Exports	2.2	1.0	2.7
Fruit and vegetables (with potatoes)			
Output	35	52.4	114.1
South Africa share of output	11%	11%	11%
Imports	0.2	0.44	5.4
Exports	1.2	1.8	6.1
South Africa's share of exports	58%	67%	72%
South Africa's share of all Africa food exports	20%	32%	30%
Cote d'Ivoire share of exports	19%	13%	5%
Kenya share of exports	2.5%	9%	6%
Ghana share of exports	0%	*	2%
Nuts beside groundnuts			
Exports (share of all exports)	0.27 (2%)	0.12	1.68 (4%)
Wine, beer, other alcohol	0.03	.08	1.47 (4%)

Comparison of subregions of Africa through the lens of product category composition

We first preview the main points from Tables 6.2–6.4, and then discuss in more detail the comparison over subregions. We first compare West and Central Africa as the diets are more similar than those of Eastern and Southern Africa.

West Africa

Overall. While Africa's output tripled, West Africa's food output rose 3.9 times over the full period, growing especially fast from 1990, rising 2.5 times just in that time. Like Africa (and Asia) in general, the tons of imports rose 10 times. Food exports rose by a factor of 2, a little less than the rate Africa-wide. The food economy actually became less export oriented—going from 4% in 1970 to 2.3% as the share of exports in output by 2013.

Cereals. While total cereals output rose 3.8 times over the whole period, the share of cereals in output dropped from 18–19% by 1990 and to 14% by 2013. Part of that was taken up by an increase in another staple (at the same time with traits of a vegetable in the diet), roots and tubers.

There was a shift in composition of cereal consumption toward rice and wheat and relatively away from domestic coarse grains (millet, sorghum, and maize), following the trend in the rest of Africa. Rice output rose sevenfold over the whole period, from 10% to 20% of all cereal output. Rice imports increased fourfold just from 1990 to 2013, to 8.2 million tons. Wheat imports rose even faster, fivefold over that period to 7 million tons by 2013. They went from a third of imports in 1970 to a half of imports by 1990 and 2013. Some researchers (Kennedy & Reardon, 1994; Reardon, 1993) observed the early surge of rice and wheat imports and linked it to the rising opportunity cost of time of women in urban households in

West and East Africa, in the face of high home-processing costs of coarse grains. This paralleled a similar shift in Asian countries where wheat had been little consumed (Pingali, 2007)

The upshot of the rise of cereal imports was that the total share of cereals in consumption by disappearance reached 21% in 2013, the same share as in 1970.

Roots and tubers. Non-food grain staple foods rose in share over the period: roots and tubers moved from 33% of output (in tons) in 1970 to 49% by 2013. The output of roots and tubers jumped 4.5 times over the period. Roots and tubers, including cassava, sweet potato, yams, and other roots, can be thought of as a mixed category, as it is both a starchy staple but also a category that provides many of the vitamins and micronutrients that vegetables do. Hence, one could posit that the movement into roots and tubers is a diet diversification, at least vis-à-vis a grain-based diet. Hollinger and Staatz (2015) note that the rapid increase in tuber consumption occurred disproportionately in the humid and sub-humid coastal zones of West Africa, such as the southern part of Nigeria, while the drier Sahelian areas stayed more cereal oriented. Note that roots and tubers, being bulky, are mainly non-traded.

Edible oils (crops and oil). This category includes soybeans and oil, groundnuts and oil, sunflower seed and oil, rape and mustard seed and oil, cotton seed and oil, coconuts including copra, sesame seed and oil, palm kernels and oil, palm oil, coconut oil, other oil crops and oil, olive oil, rice-bran oil, and maize germ oil. In West Africa, output of this category rose threefold over the period, but imports rose even faster—24 times over the whole period and 12 times over just 1990 to 2013. This is a “diet diversification” item, increasing lipids in consumption; Bennett's Law predicts it will rise disproportionately with income increase. There were also some exports of edible oils, around 10% of total output.

Fruits and vegetables. Another rapid change in output was in fruits and vegetables (including potatoes), again, as Bennett's Law predicts. Output rose 2.5 times from 1990 to 2013, and reached 15% of food output. It is mainly non-trade, with few imports and exports. Its share in total consumption (by disappearance) is about 14% over the whole period. Compare that with 16% in Asia and the US today (Reardon et al., 2019), albeit the Asia and US figures are in value shares.

Exports stayed nearly all of the “traditional export crops” of bananas and pineapples (although neither of these crops is genetically from Africa) in 1970 and 1990. However, by 2013 there had been a doubling of exports and half are now of other products.

Animal products. West Africa saw a slightly slower rise in meat/fish/dairy output compared with overall food, at 3.4 times over the period. However, imports nearly quadrupled from 1990 to 2013. Hollinger and Staatz (2015) note that imports were especially focused on frozen chicken from Brazil and frozen fish from Asia.

Central Africa

Overall. While Africa's output tripled, Central Africa's food output rose four times over the full period, growing especially fast from 1990, and more than tripling to 2013. Like Africa in general, the tons of imports rose about 10 times. However, unlike overall Africa, food exports dropped by a factor of two times. The share of exports went from 9% in 1970 to 1% in 2013. The fall was due to the rapid drop in “other foods” exports.

Cereals. While total cereals output rose 4 times (from 1.8 to 7.4 million tons over 1990 to 2013), the share of cereals in total output dropped over the whole period from 17% to 11%, apparently with its relative role displaced with rising root and tuber consumption.

There was a sharp shift in composition of cereal consumption toward rice and wheat and

relatively away from domestic coarse grains (millet, sorghum, and maize), following the trend in the rest of Africa. The imports of rice and wheat were only 13% of the level of domestic grains output in 1970. The imports rose fourfold over 1990 to 2013; in those years, these imports were 44% of the level of domestic cereal output.

Roots and tubers. As with West Africa, a non-food grain staple food rose in share over that time: roots and tubers moved from 36% of output in 1970 and 1990 to 43% by 2013. The output of roots and tubers jumped nearly 6 times over the period.

Fruits and vegetables. Another rapid change in output was in fruits and vegetables (including potatoes). Output rose four times from 1990 to 2013, to a quarter of output. It is essentially a non-tradeable as it was very little imported and not exported. The output surge was satisfying internal demand, as one would expect from Bennett's Law that holds that non-grain consumption rises disproportionately with income over time and over households.

Edible oils (crops and oil). In Central Africa, this category stayed static from 1970 to 1990 and then only doubled after, with no exports, and a rise of imports to about 20% the level of output.

Animal products. However, Central Africa did not see much increase in meat/fish/dairy output over the period, only doubling in the whole 43 years. Imports rose quickly to half of the level of output, and there were no exports.

Developing Eastern and Southern Africa compared with South Africa

Overall. Developing Eastern and Southern Africa's overall food output tripled over the 1970–2013, tracking that of the region. Like West Africa, the tons of imports rose nearly 10 times. Food exports rose 2.6 times, similar to Africa as a whole. As with West Africa, the food economy actually became slightly less export oriented—going from 5% in 1970 to 4% in 1990 and 2013.

In contrast, overall output of food in South Africa only doubled over the whole period. Imports also rose slower than in the rest of the subregion and region, eightfold. However, exports tripled and the share of output jumped from 10% in 1970 and 1990 to 19% by 2013, becoming 5 times more export oriented than the rest of the subregion and the rest of Africa.

Cereals. In developing Eastern and Southern Africa, while total cereals output rose 5 times over the whole period, and the share of cereals in output rose from 15% in 1970–1990 to 22% by 2013.

There was a shift in composition of cereal consumption toward rice and wheat and relatively away from domestic coarse grains (millet, sorghum, and maize), following the trend in the rest of Africa. Rice output tripled over the whole period, and rice imports increased sevenfold to 2.1 million tons by 2013 from 0.3 million in 1990.

The upshot of the rise of cereal imports was that the total share of cereals in consumption by disappearance reached 24% in 2013, up from only 15% and 16% in 1970 and 1990. This may seem at odds with Bennett's Law that predicts that the share of cereals would fall with income increases. However, Bouis (1990) found a similar phenomenon in the Philippines where cereal consumption rose with rising incomes at the early stage of income-increasing development, as consumers "caught up" to their goals of caloric consumption. This might be the case in developing Eastern and Southern Africa as well.

In contrast, cereal output in South Africa rose much more slowly only nearly doubling from 1970 to 2013. Rice and wheat imports also remained a relative low share of consumption. The share of cereals in total output stayed at about 24% for the whole 43-year period. South Africa has been self-sufficient in grains. Maize exports tripled over the time, and reached a quarter of cereal output.

Roots and tubers. In developing Eastern and Southern Africa, this category was far less than in Western and Central Africa, at only around 20% of total output. Recall that this is well above its share in total output in value terms as these are mainly bulky, low value items. In South Africa, the share of this category was negligible.

Edible oils (crops and oil). In developing Eastern and Southern Africa, output of this category rose slowly from 1970 to 1990 and then jumped threefold from 1990 to 2013. Imports rose even faster as they did in West Africa, and at the same rate—25 times over the whole period and 5 times over just 1990 to 2013. There were also some exports of edible oils, with a strong jump in 1990 to 2013 and reaching around the same share of output (12%) as in West Africa.

In contrast, in South Africa, output of edible oils tripled from 1970 to 1990 and then rose slowly thereafter. Imports reached about half of consumption, tripling in the latter 1990 to 2013 period. Exports quadrupled.

Fruits and vegetables. In developing Eastern and Southern Africa, this category tripled in output over the period. Imports rose but ended at a tiny share of consumption, as did exports. Only 3% of output was exported by 2013 (after being at 1% in the earlier years). Unlike in West Africa, only a third of these exports were of the traditional exports, bananas and pineapples. Moreover, bananas and pineapple total exports declined fast from 1970 to 1990, and then rose again only to reach near the 1970 level by 2013. Thus, as in West Africa, there was rapid development of the fruits and vegetables sector, but almost entirely to feed domestic consumption. The fruit and vegetable sector rose due to Bennett's Law—non-staple foods rise more than proportionately with increases in income.

The South African fruit and vegetable story contrasts sharply with that of developing Eastern and Southern Africa, as it has

been export-oriented. It is one of the great horticulture export success stories in the world. Note that in volume terms it is similar to the sector growth story of developing Eastern and Southern Africa—in both output tripled over 1970 to 2013. But in South Africa the share of output that was exported leapt from 18% in 1970 and 1990 to a stunning 37%—similar to the horticultural export rate in similar “counter-season fruit” cases in Chile and New Zealand that sell to the US and Europe, and increasingly to Asia, in winter.

Animal products. This category grew much faster in developing Eastern and Southern Africa than in West Africa. Output grew nearly fivefold over the period. As with fruits and vegetables, imports and exports rose quickly from low bases and ended the period at a small share of consumption and of output, with the share of output exported reaching only 6%. As with horticulture, the rapid growth of the meat/fish/dairy sector was focused on the fast developing domestic market, mainly in urban areas.

Interestingly, the meat sector output grew from a (relative to population) larger base but grew little over the period, rising only 50%. Imports rose quickly from a low base. Exports first dipped and then rose again reaching an export rate (share of output exported) of 15%. That was twice the rate of developing Eastern and Southern Africa, but about the same volume.

The “other foods” category was a high share in developing Eastern and Southern Africa (reaching 28%) and a stunning 44% in South Africa, 2–4 times higher than in West Africa. Part of this was due to wine and tea production. But interestingly, in both Eastern and Southern Africa and South Africa the export rate was low, at only 5% and 8% in the 2 areas. This implies there was a lot of domestic diversification of diets and growth of domestic markets for these items.

Focus in on non-traditional high value products versus traditional-export products

In the previous section, we showed that even in fast-growing domestic market categories like fruits and vegetables, some traditional export items like bananas and pineapples grew slowly or fell. Reardon and Flores (2006) note that in the 1990s and 2000s very stiff competition arose in these products, including from Asia and Latin America. At the same time, world market standards rose so competition was not just about cost but also about quality. While consumption of these items grew fast in importing countries like the US, Germany, France, and UK (which together trebled their imports of bananas and pineapples over 1970–2013), Africa’s share fell as an exporter.

Table 6.5 shows other cases of a similar plight in other “traditional export” items. Such traditional mainstays of exports such as groundnuts plummeted from 0.7 million tons in 1970 to 0.17 million tons in 2013. Palm kernel exports fell then inched up over the period. Even coffee, cocoa, and tea, much discussed as growth motors of exports, barely grew over the period, from 1.8 m tons to 2.5 to 3.5 in 43 years. Again, one can point to stiff competition from Asia and Latin America in these world markets in the past decades.

The contrast with the non-traditional high value products is extreme. Sometimes the rapid growth is mainly on the import side. Table 6.5 shows that fish output only doubled over the whole 43-year period, but imports rose tenfold to nearly the level of total output.

Sometimes the growth is in both output and imports. Poultry shows both extremely rapid output growth, eightfold in the period (a similar growth to what occurred in China but from a lower base), and imports rose from nothing to nearly half of the level of output over the period. Milk follows a similar dynamic pattern

in output—tripling over the full period—and in imports, quadrupling over the period (but reaching only a small share of consumption by 2013). Sugar imports soared tenfold over the period, while exports decreased as a share of output. Edible oils followed a similar pattern—nearly tripling in output, with imports soaring nearly tenfold, and exports stagnant.

These cases show that domestic demand grew very quickly; in all the cases domestic output raced to keep pace, but not quick enough, as imports soared. It is interesting that the ratio of increase of domestic output was often three- to fourfold, and imports, tenfold, while exports of these products changed little.

The case of fruits and vegetables is perhaps the most interesting. Africa's output nearly quadrupled in the period to race along with growing domestic demand (especially in urban areas, Reardon et al., 2019), as predicted by Bennett's Law. Imports increased 25 times to a small share of consumption from a low base, while exports soared fivefold but only reaching 5% of output Africa-wide, a little above the share in Asia.

It is fascinating that the domestic horticultural output boom was shared in developing Eastern and Southern Africa and West Africa, but the interface with the world market was highly concentrated in South Africa. Table 6.5 shows that South Africa's share of all horticulture exports in Africa grew from 58% in 1970 to 72% in 2013. Again, making such a gain involved a series of investments in volume, pan-seasonality, and quality competitive with others in the Southern Hemisphere such as South America. So far, the other countries in Africa have done much less of that. The closest competitors are Côte d'Ivoire, Kenya, and Ghana; Table 6.5 shows that by 2013 they together only had 13% of Africa's horticultural exports. Côte d'Ivoire had even had a fourfold decline in its share over 43 years.

Finally, Table shows that several export success stories have been somewhat unexpected but dynamic. Non-groundnut nuts exports rose nearly fifteen fold from 1990 to 2013 (albeit only to 4% of African food exports), mainly from cashew demand. Wine (and beer) exports skyrocketed from 1990 to 2013, mainly from South African investments.

In sum, we have showed that output growth in Africa has been comparable to that of Asia, and has, based on the prediction of Bennett's Law, been biased toward growth beyond food grains into edible oils, horticulture, animal products, and in West and Central Africa, into tubers. These have been largely focused on meeting demand. Imports have soared to make up for any gap, again especially in these non-food grain categories, with the exception of “convenience grains”, rice and wheat. Finally, there have been export booms but not in traditional export products, that have stalled, but in the diversification products such as horticulture. Yet these exports are still concentrated in a few countries per product, with South Africa standing out.

These developments represent what we think are massive opportunities for increasing intra-African trade to meet soaring domestic demand for these “diversification foods”. An addition to our lens of opportunity is the observation of the rapid transformation of the African agri-food system discussed in Chapters 1–3 of this volume. Urbanization, diet change toward non-food grain and processed foods, longer supply chains, and huge aggregate investments by millions of small and medium enterprises (SMEs) in the “hidden middle” segments of supply chains throughout Africa mean that there is demand pull as well as commerce facilitation building fast in the food system, by a dynamic private sector, mainly of SMEs but also of emerging domestic and foreign large firms.

Given the opportunities, the pending issue is whether Africa's trade debate and policy has kept

pace facilitating the needed intra-African trade response to opportunities in African trade and in world trade. We turn to that next.

Challenges for Africa grasping intra-African and global trade opportunities

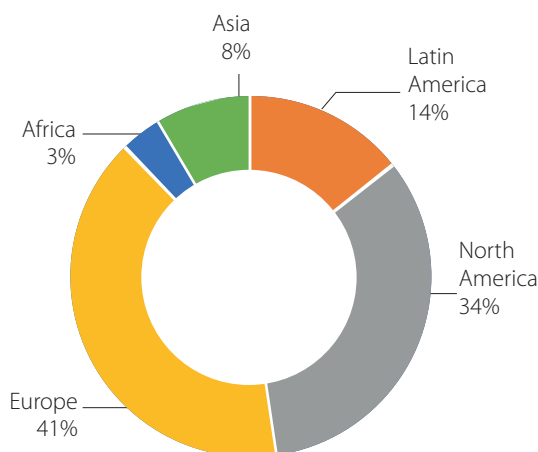
Africa's lagging trade response to opportunities

In the face of the above opportunities, Africa is significantly lagging behind other regions around the world in its ability to leverage trade as an engine of growth. As already noted, the share of its food output that is exported somewhat lags behind Asia's, its export growth rate is generally slower and only started catching up in the past few decades, and still has a way to go.

Moreover, regional intra-African trade in agricultural and food products is very small in comparison to the rest of the world. The level of intra-Africa food trade is consistently below 18% while it is much higher in Europe (69%), Asia (59%), and North America (31%). The very low levels of intra-African food trade suggest that trade presents a great opportunity for the creation of larger regional markets that could help boost economic growth and sustainable development in Africa.

Despite the well-recognized gains from trade, Africa is significantly lagging behind other regions around the world in its ability to leverage trade as an engine of growth. Africa's share of global trade is very low (see Figure 6.1). Over 2010–2016, Africa's proportion of total food exports was less than 3%. In contrast, the European Union (EU), North America, Latin America, Asia, and Oceania account for 40%, 33%, 14%, 8%, and 3% of global food exports respectively (FAOSTAT, 2019). The proportion of intra-African trade is even smaller in

Figure 6.1. Share in Total Value of World Ag Exports (2010–2016)



Source: FAOSTAT (2019)

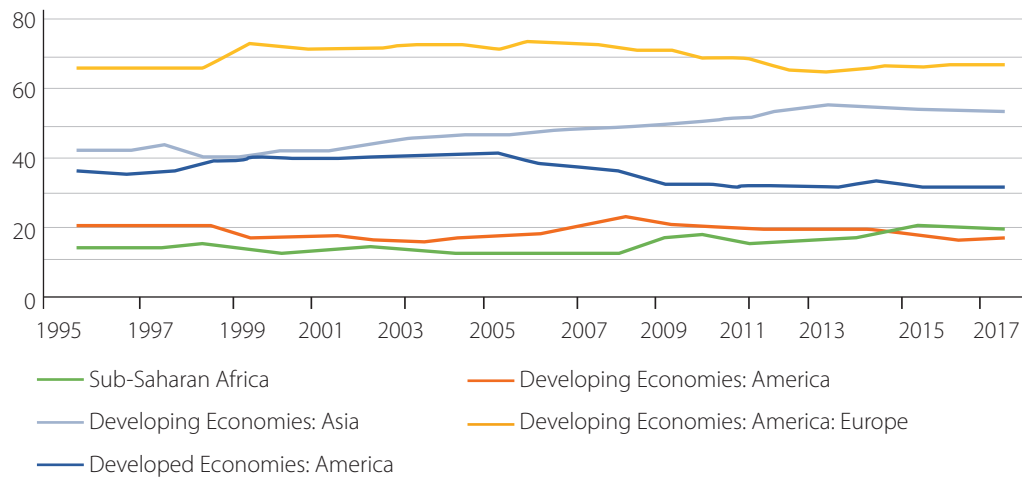
comparison to that of the rest of the world. The level of intra-Africa food trade has been consistently below 20% in recent decades (see Figure 6.2). Although the share of intra-African exports as a percentage of total African exports has increased a little, it is still very low in comparison to levels in Europe (69%), Asia (59%), and North America (31%). This low level of intra-African food trade suggests that trade presents a great opportunity for boosting economic growth in Africa (Songwe, 2019).

The challenges to trade in Africa

There are several key constraints to more trade in Africa.

- Low productive capacity—low food productivity
- Market and trade distorting policies—policies that send wrong signals that create price disincentives for higher production and trade
- Physical infrastructure barriers to better integrate markets
- Increased integration with the global economy results in higher vulnerability to external economic shocks in global system

Figure 6.2. Intra-Regional Exports, 1995-2017 (Percentage of Total Exports)



Source: FAOSTAT (2019)

The importance of getting trade right for overall African development

One of the lessons from globalization is the essential role of trade as a mechanism for achieving economic growth and development. There is strong conceptual foundation and empirical evidence in the growth and development literature showing a positive link between trade openness (especially export promotion) and national economic growth (Awokuse 2007) (; Irwin & Terviö, 2002).

Export expansion can be a catalyst for output growth both directly, as a component of aggregate output, and indirectly through efficient resource allocation, greater capacity utilization, exploitation of economies of scale, and stimulation of technological improvement due to foreign market competition. Exports provide foreign exchange that allows for increasing levels of imports of capital goods and intermediate goods that in turn raise the growth of capital formation, stimulating output growth.

Furthermore, export growth through an expanded market base allows for the exploitation

of economies of scale for open economies and promotes the transfer and diffusion of technical knowledge in the long run). Exports can be viewed as economies of scale that are external to the individual firms in the non-export sector but internal to the overall economy.

Empirical evidence from several African countries shows that trade has a positive impact on economic growth (Fosu, 1990; Onafowora & Owoye, 1998; Sachs & Warner, 1997; Savvides, 1995). Nevertheless, trade balance between exports and imports matter as a negative terms of trade could dampen the gains from trade (Fosu, 2001; Bleaney & Greenaway, 2001).

The policy debate's traditional path and needed transformation

The long-term path of the trade policy debate in Africa

Over the past 50 years, the trade debate has revolved around several axes.

The first axis of debate has been, in each country, how to shift from colonial marketing boards (for imports of grain and exports of commodities such as coffee, cocoa, etc.) to liberalized/ privatized trade, post-marketing boards. This has

been encased in structural adjustment policies of reduction of tariffs and subsidies that were administered by these marketing boards.

The second axis of debate has been how to shift, for the aggregate of African countries, from individual country relations with European colonial countries to trade arrangements among African countries and between Africa and the rest of the world. This has involved the establishment of various regional economic integration arrangements such as the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC).

The policy debate needs to add themes that have been relatively neglected and are now highly relevant to reducing trade constraints

First, there should be an increase in policy debate about how to reduce transaction costs (not just fiscal, such as tariffs, but also hard and soft infrastructure related costs, as well as waiting time, bribes, etc.) in cross-border trade.

Second, there should be more policy debate about how to shift from unfair trade policy dominated by restrictive non-tariff barriers to fair trade and global market access that could help increase the opportunities for gains from trade for African exports. For instance, the African Growth and Opportunity Act (AGOA) arrangement facilitated a trade relationship between Africa and the US that ensures easier access to US markets for African countries in exchange for more trade liberalization in African countries. This is a step in the right direction. Many more instances exist where preferential trade arrangements exclude and restrict trade with African countries. This is especially so with value-added products beyond the farm gate with some level of processing.

Third, the debate about and provisions of current trade policies are skewed toward traditional export products. The debate and the policies need to be updated to include much more attention to the trends, opportunities, and needs of the products that have actually become the leading growth sectors both in African markets and in foreign markets. These include: (1) fresh produce, meat, fish, dairy; (2) edible oils and packaged processed foods. These products require attention to cold chain in trade supply chains, to food safety and quality standards and monitoring and compliance, to integrity of packaging and labeling veracity, and so on. Moreover, many of these products are not traded merely on faceless “spot markets” internationally but are exported and imported via specialized distributors and logistics agents, large processors and supermarket chains. They thus must meet the private standards and commercial requirements of these actors. To compete, countries must not only be cost competitive but also have “customized competitiveness” (Reardon and Flores 2006) to meet the requirements of markets that go beyond costs, such as private quality and safety standards of European and US supermarkets, and increasingly of African and Asian supermarket chains.

In sum, the agri-food trade policy debate in Africa needs to transform along with the increase and diversification of demand and the transformation of the food system in Africa with rapid urbanization similar to developing Asia's, and the private sector supply chain transformation afoot. In particular, insufficient attention has been paid to the opportunities inherent in the diet transformation in Africa in “beyond food grains” products and processed products. The trade literature and policy debate to date have not adequately adjusted to the deep and rapid changes taken place in the food system.

The Private Sector needs to be harnessed to boost trade and good policies and institutions are the keys

The engagement of the private sector at each level of the agri-food value chain is indispensable for the realization of the benefits of intra-regional trade and large-scale investments in food processing and services. These opportunities could be transformational if more public policies and investment initiatives target the hidden middle (see Chapters 1–3, this volume) of the food value chain, which has experienced significant changes in recent years.

There are greater opportunities for expanding intra-African food trade through a more pervasive and consistent change in how African governments and public institutions engage food markets and the private sector. Specifically, less government intervention and control of food markets is necessary to achieve a more effective and better performing agri-food sector. This is a clear lesson learned from emerging and developed economies around the world who have developed a robust and more diversified agri-food market.

The low level of trade facilitation due to poor investment and business environment for private sector activities is a major constraint to agri-food trade in Africa. A few other constraints in need of public policy attention include:

- Trade-distorting policies
- Volatile policy regimes
- Poor governance
- Weak physical and soft infrastructure
- Membership in overlapping regional economic unions, sometimes with conflicting rules
- Inadequate implementation of regional and continental goals and policies

- Overlapping regional economic community (REC) memberships: In the 8 RECs recognized by the African Union (AU), 43 countries have dual memberships, 9 countries have triple or more memberships, and Kenya has quadruple memberships. Multiple memberships make it impossible to implement a continental agreement on food market integration

The way forward to meet the challenges has emerged—now to its good implementation

The concrete steps needed to address trade policy constraints to grasp emerging trade opportunities in Africa and the world market are:

- First, there needs to be trade policy harmonization and reduction of high tariffs between African RECs and non-tariff barriers in the RECs.
- Second, there needs to focus on regional and continental implementation of the Comprehensive Africa Agriculture Development Programme (CAADP) and the African Continental Free Trade Agreement (AfCFTA).
- Third, there needs to be a shift from policies that only focus on the top and bottom of the “food system sandwich” towards policies and programs that better target the challenges to the growing hidden middle.

The way forward is now in sight. The recent signing of the AfCFTA in March 2018 by 54 African countries is arguably the single most important continental trade-enhancing initiative in Africa.

If the AfCFTA objectives of removal of tariffs and non-tariff barriers are aggressively

supported and properly implemented by the signatories, this trade agreement has the potential to significantly boost the volume and value of intra-African agricultural and food trade and services.

To achieve its objectives for boosting intra-African trade, an effective implementation strategy should include better harmonization of activities and trade rules among the regional economic unions in Africa (e.g., COMESA, EAC, ECOWAS, and SADC).

References

- Awokuse, T.O. (2007). Causality between exports, imports, and economic growth: Evidence from transition economies. *Economic Letters*, 94(3), 389–395.
- Awokuse, T.O. (2008). Trade openness and economic growth: is growth export-led or import-led? *Applied Economics*, 40(2), 161–173.
- Bleaney, M., & Greenaway, D. (2001). The impact of terms of trade and real exchange rate on investment and growth in Sub-Saharan Africa. *Journal of Development Economics*, 65, 491–500.
- Bouis, H. E. and Haddad, L. J. (1990). Agricultural commercialization, nutrition, and the rural poor: a study of Philippine farm households. Boulder: Lynne Rienner Publishers, Inc.
- FAOSTAT. (2019). <http://faostat.fao.org>.
- Fosu, A.K. (1990). Exports and economic growth: the African case. *World Development*, 18(6), 831–835.
- Fosu, A.K. (2001). Economic fluctuations and growth in Sub-Saharan Africa: the importance of import instability. *Journal of Development Studies*, 37 (3), 71–84.
- Hollinger, F., & Staatz, J. (2015). *Agricultural Growth in West Africa: Market and Policy Drivers*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO).
- Irwin, D., & Terviö, M. (2002). Does trade raise income? *Journal of International Economics*, 58(1), 1–18.
- Kennedy, E., & T. Reardon. (1994). Shift to non-traditional grains in the diets of East and West Africa: Role of women's opportunity cost of time in prepared-food consumption. *Food Policy*, 19(1), 45–56.
- Pingali, P. (2006). Westernization of Asian diets and the transformation of food systems: implications for research and policy. *Food Policy* 32 (3), 281–298.
- Onafowora, O.A., & Owoye, O. (1998). Can trade liberalization stimulate economic growth in Africa? *World Development*, 26(3), 497–506.
- Reardon, T. (1993). Cereals demand in the Sahel and potential impacts of regional cereals protection. *World Development*, 21(1), 17–35.
- Reardon, T., Echeverría, R., Berdegue, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2019). Rapid transformation of Food Systems in Developing Regions: Highlighting the role of agricultural research & innovations. *Agricultural Systems*, 172, 47–59.

- Reardon, T. and L. Flores. (2006). Viewpoint: 'Customized Competitiveness' Strategies for Horticultural Exporters: Central America Focus with Lessons from and for other Regions, *Food Policy*, 31(6). 483-503
- Sachs, J.D., & Warner, A.M. (1997). Sources of slow growth in African economies. *Journal of African Economies*, 6 (3), 335–376.
- Savvides, A. (1995). Economic growth in Africa. *World Development*, 23(3), 449–458.
- Songwe, V. (2019). Intra-African trade: A path to economic diversification and inclusion. In *Boosting Trade and Investment* - Brookings Institution.

07 Labor markets during the “quiet revolution”: Implications for the private sector in the agri-food system

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Key Messages

- 1** While it is often noted that some 70–80% of people in rural Africa are employed in own-farming, we find that only 40% of actual employed time (full time equivalents (FTEs)) of rural youth and adults (15–64) is in own-farming. Non-farm employment occupies 60% of rural employment time. Many rural Africans work only part time in agriculture, and many work most of their time in non-farm employment, most of it in rural areas.
- 2** About 40% of non-farm employment is in “agri-food system” work, such as wholesale, logistics, processing, and retail. This means that about 25% of overall rural employment is in this work, making it crucial for rural families. It is especially important in peri-urban areas and in areas just beyond the peri-urban, the intermediate rural area, to women and youth.
- 3** Non-farm employment in the agri-food system is mostly self-employment in small and medium enterprises (SMEs; from tiny enterprises based in homes to medium firms in rural towns). By definition it is linked to and grows with food demand and farm output. As the Quiet Revolution in SME growth in food supply chains proceeds in Africa, this employment grows. The two are linked.
- 4** A review of evidence shows that agri-food system businesses in general do not consider labor quantity and skills/quality substantial constraints (compared to other constraints like energy costs and roads). Rather, improved basic education and training in socio-emotional/organizational skills (for the workplace) are considered by firms as more important than general technical training per se.
- 5** However, where specific skills are needed, especially those that are forward-looking in the light of the digital revolution (such as skills related to new technologies, production, food safety, and commercial procedures enabled by information and communication technologies (ICT)), there is a case for targeted but multi-dimensional training. Several institutions, including the International Fund for Agricultural Development (IFAD), the Food and Agriculture Organization of the United Nations (FAO), and others, have such targeted training programs that address multiple constraints including skills, financial, and institutional ones.

¹ All authors are at the Research and Impact Assessment Division (RIA) of the International Fund for Agricultural Development (IFAD). The authors thank the IFAD East and Southern Africa Division (ESA) for providing input on case studies. Comments from the editor and two reviewers are greatly appreciated. Any remaining errors are the sole responsibility of the authors.

Introduction

The changes outlined in Chapter 2 (“the quiet revolution”, including changes in urbanization, processed food demand, and transitioning supply chains) have profound implications for the labor market in the post-farm segments of the agri-food system (AFS) in Africa. The AFS is defined as the set of supply chains stretching from the supply of inputs and services, through production on the farm and to post-farm activities that result in the retailing of food (including food prepared and consumed away from home) and other agricultural commodities to consumers. Although the AFS stretches all the way from pre-farm to fork, most of the existing narrative on labor markets in the AFS focuses on the farm sector, mostly analyzing issues of labor constraints and seasonality of labor on the farm and implications of both seasonal and longer term migration (Behrman, 1999; FAO, 2016; Mochebelele & Winter-Nelson, 2000). Moreover, the literature predominantly takes a supply-side perspective, looking at (un) employment of rural youth and women, and at tradeoffs between family and hired labor on the farm (Lovo, 2012). Numerous reports and studies have indeed discussed the need to create employment for the increasing numbers of youth or women, in general (AfDB, 2016; AGRA 2015; Bassi, Busso, Urzúa, & Vargas, 2012, 2012; IEG, 2013; ILO, 2016). Meanwhile, the narrative on the private sector has been somewhat limited, focusing on the skills gap faced by employers, often in the non-AFS (Almeida & Aterido, 2011; Palmer, 2007).

The on-farm segment of the AFS, however, accounts for only around 40% of all labor in Africa as measured by full time equivalents (FTE) (Dolislager et al., 2018). FTE is a measure that makes the workload across different contexts and sectors comparable, hence provides a better understanding of the

importance of different employment categories in the labor market. The off-farm segments of the AFS become even more important in terms of labor as rural transformation unfolds along with the dynamics of change discussed in Chapter 2, and its share in employment is projected to increase by 50% (from 8% to 12%) between 2010 and 2025 while that in farming will decrease (Townsend et al., 2017a). In FTE terms, Africans rely more on off-farm AFS employment—mostly self-employment—compared to more transformed economies in Asia and Latin America and the difference is highest in hinterland areas, which decreases as one gets closer to urban areas (Dolislager et al., 2018).

This chapter shifts the focus of the existing narrative on rural labor markets in Africa *off the farm*. We document how much labor is actually employed by the AFS using nationally representative data from six African countries. We also introduce a novel spatial dimension to understanding the different patterns of AFS employment in the hinterlands, intermediate, peri-urban and urban zones. Finally, the chapter draws on other data sources on labor market constraints faced by the private sector and provides a synthesis of the most recent literature on the topic.

The changing role of AFS in providing employment in Africa

Structural transformation in rural areas manifests itself not only in input and output markets, but also in the labor market. An *employment transformation* occurs as labor shifts from self-employment on the farm, first to self-employment off the farm and then towards wage jobs in small and medium enterprises (SMEs) and large firms (Fox, 2018; Haggblade, Hazell, & Reardon, 2007). The sectors in which wage jobs are created also change over time with

the share of jobs in the AFS first increasing and then decreasing as the supply chains transition into the modern phase (Reardon et al., 2018). Most of Africa will be in this transition phase in the next couple of decades, during which the definition and boundaries of the AFS shall expand in step with the complexity of the supply chains.

At the same time, Africa is the only continent that will see its population double (increase by 105%) by 2050, while its youth population will more than double (increase by 112%) (UNDESA, 2017). This is mainly due to the continent's slow demographic transition, which refers to the period of time during which populations experience first a decline in mortality rates followed by declining fertility rates. Fertility rates in Africa have not come down much as in other continents and remain the highest in the world, leading to the slow demographic transition (Stecklov & Menashe-Oren, 2018). Asia, for example, experienced a fast demographic transition that mostly coincided with its employment and supply chain transformations (Canning, Raja, & Yazbeck, 2015). This puts Africa in a unique place in terms of the labor market dynamics faced by its private sector during a time of “quiet revolution”.

The AFS in the continent are already creating employment for a large share of the population (youth and adults), where the number of people employed in the off-farm segments of the AFS have been expanding rapidly—though from a low base (Yeboah & Jayne, 2018). Although the farm segment of the AFS still dominates the labor market in terms of the number of people engaging in economic activities in Africa, this is expected to change in the coming decades (Tschirley et al., 2015). In terms of both income shares and FTEs, however, the share of the non-farm sector is becoming increasingly high and the non-farm AFS sector absorbs more than 60% of total work effort in rural Africa (Dolislager et al., 2018; Nagler & Naudé, 2017;

Reardon, Berdegue, Barrett, & Stamoulis, 2007). Although most AFS enterprises are micro and small family-owned businesses with limited employment creation and income generation potential (Nagler & Naudé, 2017; Reardon et al., 2007), the fact that around two-thirds of the total labor time is dedicated to this sector underlines its importance in African economies.

As rural transformation unfolds in the continent, whether and how governments can organize and channel the potential of this workforce towards sectors with higher employment generation potential will determine the course of the youth employment challenge (IFAD, 2019). Given emerging evidence showing that young rural women participate in the private AFS sector almost as much as young rural men, and that they dedicate more of their working time to self-employment activities in the sector (Dolislager et al., 2018; Van den Broeck & Kilic, 2019), this also has implications for Africa's demographic transition. Increased economic participation of women in the workforce is correlated with decreases in fertility rates, which in turn would accelerate the demographic transition and hence rural transformation.

How much of the work effort does the private sector of AFS absorb?

This chapter documents the distribution of work effort in Africa using Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) data from six countries, namely Ethiopia, Malawi, Niger, Nigeria, Tanzania and Uganda. The data cover 150,000 individuals representing 372 million people. These data are designed to be nationally representative at the household level and therefore are more likely to capture micro- to small-scale and informal private enterprises, rather than the more formal “private sector”

with more employment generation potential that tends to dominate the discussions on the labor market. While this may seem to be a drawback to our analysis, we complement the discussion with findings from the World Bank's enterprise surveys, which mostly cover the formal private sector. Nonetheless, given the low rural transformation stage in these countries, which are characterized more by small and informal enterprises, the bulk of our analysis used the LSMS-ISA data to provide a rich source of information on most of the labor force.

We used FTEs to make the workload across different contexts and sectors comparable, and to provide a better understanding of the importance of different employment categories in the labor market. This approach is superior to the analysis of simple labor force participation statistics. FTE shares show how much of the individual's full-time labor availability (considered to be 40 hours per week) is allocated towards each employment activity throughout the year (Dolislager et al., 2018). Figure 7.1 shows the labor force participation rates and FTE shares across employment categories by age group. The first three sets of bars represent different functional categories of employment in the AFS comprising work for wages (both on farm and post-farm) and self-employment in AFS enterprises. Examples of AFS enterprises in our data include processing, manufacturing, and

marketing of all types of food and beverages. As noted by Nagler and Naudé (2017) most of these are small family businesses with no more than three workers (based on earlier rounds of the data from five of our countries). The last two sets of bars represent the non-AFS sector.

Note: Own farm labor force participation and FTE shares, 72% and 34% respectively, are not included in the figures as their large scale makes the rest of the differences hard to observe. Both figures show weighted averages of the values depicted across all countries.

Although 72–89% of working age population participates in own farm work, the share of total working hours dedicated to this activity is much lower at 33–59% (Dolislager et al., 2018). This is partly due to the seasonality of work in agriculture and partly due to income source diversification strategies implemented by households in rural areas, where other risk management and coping strategies are imperfect or missing all together (de Janvry & Sadoulet, 2001; Reardon et al., 2007). Another important observation is that overall, the FTE shares are larger than the labor force participation rates in self-employment in AFS and non-AFS sectors.

The right panel of Figure 7.1 shows that wage work in the post-farm segment of the AFS is the only category where youth between the ages of 18 and 24 spend more time than any other age

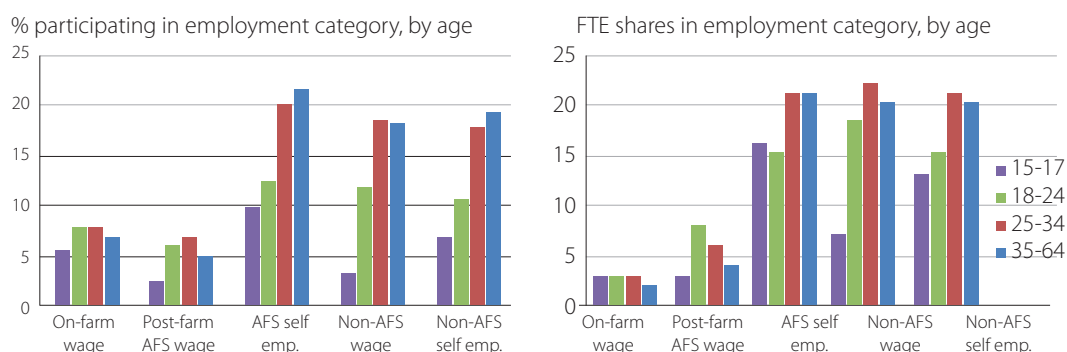


Figure 7.1. Labor force participation and full time equivalent shares in employment categories, by age

Source: Author's elaborations using data from Dolislager et al. (2018)

group. Young adults between the ages of 25 and 34 also dedicate more time to wage work in the AFS sector than do adults.² Unsurprisingly, self-employment in AFS is most important for those above 25 years of age given the time needed to accumulate savings, experience, and skills to start up one's own business. As countries and their food systems transform, the importance of wage work in the AFS increases as the boundaries of the AFS radiate further from the urban centers toward hinterland areas.

These changes that occur in the labor market during rural transformation have salient implications for women's employment outcomes. Significant gender differences in participation in wage and self-employment activities in rural areas are commonly observed in the literature (Dolislager et al., 2018; van den Broeck & Kilic, 2019). Men are much more likely to participate in and dedicate a larger share of their time to off-farm wage employment than women. These differences have decreased over time in rural areas, although men are still two to three times more likely to participate in wage employment, especially in the off-farm sectors, while women are more likely to participate in agricultural wage work that is informal and low-paying (van den Broeck & Kilic, 2019).

In terms of self-employment, however, women are equally or more likely to be self-employed and spend more time on AFS self-employment than men (Dolislager et al., 2018). The shift of labor from self-employment to wage employment implied by the *employment transformation* that progresses along with rural transformation, may therefore potentially exacerbate the gender gap unless specific measures are taken to improve labor market outcomes for—particularly young—women (IFAD, 2019).

How do the returns to labor in the AFS and non-AFS sectors compare?

An important aspect of the labor market is the returns to labor. As rural and structural transformation take root, the returns to labor are expected to increase, in general. However, the differentials in the returns to labor across sectors should also play an important role in inducing and reinforcing rural and structural transformation (McMillan, Rodrik, & Sepulveda., 2017; Teal, 2011; Tomich, Kilby, & Johnston., 1995). Labor is expected to move into those sectors with higher returns to labor, barring any constraints to such movement of labor across sectors (e.g., skills requirements or restrictive laws and policies). As such, a comparison of the returns to labor across sectors is informative in as far as drawing some inferences about the propensity for the private sector AFS to pull labor away from farm sector employment and contribute toward *employment transformation* and potentially compete with non-AFS employment, which is typically about 1.5 times the FTE share of AFS employment (Dolislager et al., 2018).

We used a novel country-level approach to returns to labor and calculated the total amount of income generated per FTE in each sector to compare the structure of the economies in the six countries in our data set. To make the returns to FTE in self-employment in AFS comparable to wage income, the self-employment income is net of operating costs (i.e., gross profits). Table 7.1 shows the estimates of returns to labor in each sectoral and functional category analyzed. All sub-Saharan African countries in the data set, but Nigeria, are classified as low rural transformers, defined as having lower value added in agriculture than the median in all low and middle income countries in the world (IFAD, 2019). We, therefore, present the

² The United Nations defines youth as individuals between the ages of 15 and 24, whereas the African Union definition includes those up to 34 years of age. We refer to the 25–34 age group as young adults.

Table 7.1. Returns to work in different sectors and functions (US\$ per FTE)

	AFS				Non-AFS	
	Own farm	On-farm wage	Post-farm AFS wage	AFS enterprise	Non-AFS wage	Non-AFS enterprise
Ethiopia	2.47	3.68	2.43	6.04	2.60	3.83
Malawi	1.74	0.20	1.41	2.61	2.48	3.36
Niger	1.28	1.38	1.70	5.51	2.94	3.64
Nigeria	1.24	3.65	2.17	2.83	5.05	3.33
Tanzania	3.11	1.08	1.97	4.47	3.23	4.96
Uganda	1.29	0.91	1.22	11.62	1.99	27.42
All countries	1.68	1.51	2.15	3.98	3.96	3.97
All countries, excluding Nigeria	2.21	1.21	2.14	5.59	2.71	5.19

Note: Incomes are converted to constant US\$ values using the 2011 PPP (Atlas Method). The returns to labor are calculated by dividing the total income generated by all households in each category to the total amount of FTEs worked by everyone in that category in each country during the survey year. The extremely high values for Uganda's enterprise sectors are primarily driven by a few observations in the data. This warrants caution in interpretation of the estimated returns to labor in Uganda's enterprise sectors.

Source: Authors, using World Bank LSMS-ISA data (various years spanning from 2013 to 2017)

overall averages by also excluding Nigeria to demonstrate the differences in the comparison between low and high rural transformation levels. Results show that returns to labor are, on average, highest in the AFS and non-AFS self-employment subsectors and are generally lowest in the AFS wage sectors (especially on-farm wage, except in Nigeria and Ethiopia).

For the six countries analyzed, the gross income generated per FTE in the AFS self-employment sector was estimated to be US\$3.98 while in the non-AFS enterprise sector it was US\$3.97, implying that the returns to labor are comparable between AFS and non-AFS. This comparability holds, to some extent, even after Nigeria is excluded from the analysis (US\$5.59 versus US\$5.19) to observe how the country's high rural transformation level affects the average values in the sample. Note that in these countries included in the analysis, the bulk of AFS and non-AFS self-employment is informal in nature, thus emphasizing how remunerative these kinds of informal jobs can be.

Returns to labor in enterprise activities are found to be more than double the returns to on-farm wage employment and own-farm sectors. AFS wage activities offer the lowest returns to labor and in the worst case scenario of on-farm wage, less than US\$1.60. In this regard, recall that Figure 7.1 shows on-farm wage employment accounts for less than 5% of total FTE shares. The results on returns to labor reveal that the private enterprise sectors (both AFS and non-AFS) are substantially remunerative, hence expanding their share of overall labor absorption would seem to be an effective strategy for accelerating employment transformation.

The average income generated per FTE on one's own farm is also quite significant in some countries, reinforcing the notion that own-farm employment and more importantly income thereof, will continue to play a crucial role in rural Africa's transformation. Given the recent literature that shows that a large share of labor participation, even among the youth, remains on the farm (Kafle, Benfica, &

Paliwal, 2018; Sumberg, Abay, Asnake, Ayalew, & Chamberlin., 2018; Yeboah & Jayne, 2018), it would be important to also consider how returns to labor on the farm can be sustained at high levels to spur poverty reduction.

As shown in Table 7.1, returns to own-farm employment in Ethiopia are US\$2.47 while they are US\$3.11 in Tanzania. In contrast, the returns to labor for own-farm employment in Nigeria, Niger and Uganda are much lower (less than US\$1.30). These results show the heterogeneity in the returns to labor by sector and across countries, which exists in sub-Saharan Africa, in general. This heterogeneity may be the result of several factors, including differences in policies and institutional environments, capital, and infrastructure as well as the stage of demographic transition that each country may have reached, which all have a bearing on the structure of returns to labor. Another source of heterogeneity would likely be the composition of agricultural production, with those countries that have a larger share of high value commercial agricultural production enjoying much higher returns to labor compared to those countries whose agricultural composition is dominated by subsistence and staple food (grain) production. Thus, special attention must be paid to addressing unique contexts across the African continent, to effectively spur employment transformation that results in broad-based and inclusive prosperity.

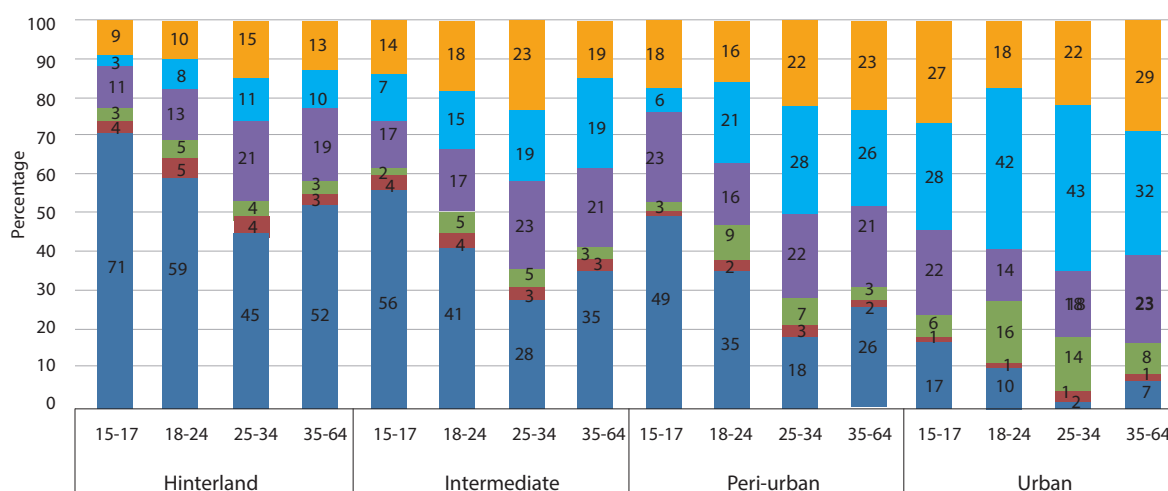
Overall, it is clear that the private sector self-employment in own enterprises (be it in AFS or non-AFS) generally creates higher incomes per FTE than the wage employment sectors. In part, this is an artifact of the employment transformation process in itself but is perhaps also driven by the nature of wage employment in these countries. In many instances, wage employment in rural areas of Africa features as an ad hoc source of income, which is mostly informal and part-time in nature (Kafle et al., 2018; van den Broeck & Kilic, 2019). Moreover,

the skills required to perform such jobs are oftentimes rudimentary, implying that there may be a labor quality premium in the private sector (both for AFS and non-AFS). These considerations are worth considering as countries invest and position themselves to accelerate employment transformation.

Location matters

The quiet revolution in the food systems also unfolds over space and the opportunities it generates for private sector employment connects the rural hinterlands increasingly to urban areas. The implications for the rural opportunity space are better understood using population density-based rural–urban gradient categories rather than administratively defined binary rural and urban delineations (IFAD, 2019). The rural–urban gradient is created using population density data from the WorldPop project and dividing the whole world into quartiles of population density. The least densely populated areas are called rural/hinterland, the second least densely populated areas are called semi-rural/intermediate, followed by peri-urban and urban spaces (IFAD, 2019, Box 2.1, p. 71). Figure 7.2 shows the FTE shares by employment categories and age over this rural–urban gradient (Dolislager et al., 2018).

The overall average share of all post-farm gate employment in the AFS (combining work for wage and self-employment) is 25% in sub-Saharan Africa, which masks the variation over space and age categories. For all ages combined, this share is 22% in the hinterlands and increases gradually to 25%, 26% and 31% in the intermediate, peri-urban and urban areas respectively (Dolislager et al., 2018). The share of wage employment in that total is 35% in urban areas and below 20% in the rest, leaving more than 65% to self-employment in the AFS. Broken down by age, Figure 7.2 shows that the



■ Own farm ■ On-farm wage ■ Post-farm AFS wage ■ AFS self emp. ■ Non-AFS wage ■ Non-AFS self emp.

Figure 7.2. FTE shares by sectoral and functional employment categories over space, by age in years

Source: Author's elaborations using data from Dolislager et al. (2018)

importance of own farm work is highest for 15–17 year olds, and this decreases by age category before slightly increasing for adults. This is as expected given the ease of combining school and work for those of secondary school age. As one moves from the hinterlands to urban areas, the importance of own-farm work decreases and that of post-farm AFS wage increases. Young adults (ages 25–34) dedicate the lowest share of working time to own-farm work compared to other age groups everywhere. This share sharply declines with population density from 45% in hinterlands, to 28%, 18%, and only 2% in intermediate, peri-urban and urban areas respectively.

African youth (ages 18–24) and young adults rely on post-farm AFS wage employment much more than adults. They spend around twice as much of their working time on wage employment in the post-farm segments of AFS in hinterland and intermediate areas. This ratio goes up to three in peri-urban areas, underlining the importance of wage jobs created for youth by the private sector in the AFS closer to cities. Self-employment in AFS is

most important for young adults, especially in intermediate and peri-urban areas where they spend more than one-fifth of their working time in this sector.

A related consideration about the importance of location is that returns to labor (measured by income generated per FTE) are differentiated over space. Urban centers tend to offer higher pay compared to the hinterlands, in general. In part, this is what drives rural–urban migration, such that excess labor in the rural areas is expected to be alleviated by jobseekers migrating (permanently or seasonally) to urban areas in search for work.

However, there can be differentiation in the returns to labor by location in the sense that some sectors may be more remunerative in rural settings while others are more remunerative in peri-urban or urban locations. Christiaensen and Kanbur (2017) review the role of secondary towns and contend that while the evidence is still in its infancy, enough evidence exists pointing to the importance of investing in secondary towns (i.e., those located in the intermediate rural and peri-urban areas)

as these investments tend to be pro-poor. To shed more light on this, we once again analyzed the LSMS-ISA data from the six countries to look at the returns to labor by location. Table 7.2 shows the results of this analysis.

The returns to labor in self-employment in the AFS sector are in fact highest in the urban areas, followed by the hinterlands, and then the peri-urban areas. This is perhaps due to low investment in intermediate rural areas of Africa, particularly in terms of infrastructure, electricity, and access to public services. The finding also highlights the importance of AFS enterprise within the hinterlands, where own farm and farm wage categories also rank highest, as expected.

This implies that strategies designed to help expand the AFS enterprise in the hinterlands and intermediate rural areas would be best positioned to increase labor absorption. Therefore policies and interventions that promote AFS private sector investments in the hinterlands and intermediate rural areas ought to be encouraged.

Conversely, returns to labor from the non-AFS wage sector are highest in the peri-urban areas (US\$4.83). Peri-urban areas also have the highest returns to labor in the post-farm AFS wage category, potentially due to the high-value nature of fresh produce that tends to be

processed and marketed there to meet urban demand (Reardon & Timmer, 2014). Moreover, large industrial and light manufacturing enterprises tend to locate in peri-urban areas, due to slightly lower land and rental values and the proximity to markets in the city. In addition, agglomeration effects may play a part as they generate benefits for private sector enterprises located in peri-urban areas. These are all likely to contribute to the higher returns to labor observed in the peri-urban areas. The same explanations can be given for the relatively high non-AFS enterprise returns to labor in the peri-urban areas as well (US\$4.41).

These analyses provide a rich snapshot of the labor market thanks to age, spatial, and sectoral-functional disaggregation, however, they cannot tell us about the dynamics in the AFS labor market as they are based on cross-sectional data. Using panel data from all countries except Niger, van den Broeck and Kilic (2019) document a dynamic and unstable (especially for women) off-farm job market in sub-Saharan Africa, where a substantial share of the employed switched status between 2010 and 2016. Yeboah and Jayne (2018) combined various data sources over time and found that wage employment is growing at nearly three times the rate of growth in self-employment in Ghana, Rwanda, Zambia, and Malawi. This translates into a relatively small number of

Table 7.2. Returns to FTE in different sectors and functions over the rural–urban gradient

Location	AFS				Non-AFS	
	Own farm	On-farm wage	Post-farm AFS wage	AFS self-employment	Non-AFS wage	Non-AFS self-employment
Hinterlands	1.92	1.89	1.54	4.45	3.74	3.21
Intermediate	1.57	1.01	1.23	3.46	3.65	3.40
Peri-urban	1.27	1.64	4.39	3.78	4.83	4.41
Urban	1.64	1.55	1.83	4.64	3.53	5.09
All areas	1.68	1.51	2.15	3.98	3.96	3.97

Source: Authors' calculations using LSMS-ISA and IFAD (2019)

jobs each year, however, given the low share of wage employment in total employment. Moreover, they reported that most wage employment growth has been in the non-farm sector created by the private sector, thanks to the pace of economic growth and the shrinking public sector in most countries. Interestingly, education had no effect on participation or continued employment in the off-farm wage employment, suggesting that most jobs are low-skilled (van den Broeck & Kilic, 2019).

In the next couple of decades, most countries in Africa are set to see their youth shares in total population either remain stable or slightly increase. This corresponds to a significant increase in absolute numbers (UNDESA, 2017) and will imply sustained increases in the number of people in the labor force that are seeking employment. Given the evidence on the importance of private sector AFS (primarily in self-employment but also for wages) in the labor markets of Africa and particularly across geographic space, carefully positioning the private sector AFS will be imperative to creating many jobs that are not only more remunerative and sustainable, but also have growth potential. This can only be achieved by identifying and addressing the constraints faced by the private sector AFS in the labor market.

Labor market related constraints faced by the private sector AFS

Quantity: Labor supply is generally high in rural areas of Africa, in the sense that there are and will continue to be more people entering the labor force to seek employment across all sectors (Losch, 2012). With the imminence of the youth bulge, the numbers of people available to work in rural sub-Saharan Africa will increase dramatically (ILO, 2018; UNDESA, 2017). This is despite increased rural–urban migration—especially among the youth—

which is expected to continue, albeit at a relatively slow pace (Kessides, 2006). Thus, it is unlikely that labor supply, as measured by the number of people available to work, is or will be a constraint for the private sector AFS (and for all sectors, in general). In addition, many of those who are employed are considered to be in vulnerable employment, implying that they too may exert pressure on labor supply, hence adding to the sustained unemployment challenge in sub-Saharan Africa (ILO, 2017). In essence, the numbers game, in as far as labor in rural sub-Saharan Africa is concerned, is stacked against the suppliers of labor and unless major investments can be made to increase the demand for labor in rural Africa unemployment and underemployment will continue to be a challenge (Filmer & Fox, 2014).

Quality: Conventional wisdom would have it that labor skills are a binding constraint for the private sector. The discussion around skills goes on to highlight a problem of skills mismatch, which is linked to the supposedly low quality of labor, in the sense that firms may find it difficult to find the quality or specific type of labor they demand, even though people seeking employment may be in abundance. While there may be some instances where specific skills are missing or cannot be found, little evidence exists to support the notion that this is currently a major challenge for the private AFS in rural sub-Saharan Africa (McGuinness, Pouliakas, & Redmond, 2017).

Within the AFS and in particular the farm sub-sector, for a long time numerous efforts have been geared toward upgrading labor skills through the provision of agricultural extension and advisory services in rural sub-Saharan Africa, with the notion that there exists labor skills constraints on the farm (Davis, 2008). Similarly, many program interventions have been implemented to enhance the capacity of agricultural marketing entities such as cooperatives, commodity associations, SMEs,

and agrodealers, which operate in the non-farm segments of the AFS (Francesconi & Wouterse, 2019; Mano, Iddrisu, Yoshino, & Sonobe, 2012; Wanyama et al., 2014). All these interventions assume that labor skills are a major constraint which can be remedied. While labor skills may always need to be upgraded to further increase productivity and profits—especially as the structure of the economy evolves, increasingly demanding new types of skills that were not needed before—it is unclear whether labor skills are necessarily *the* binding constraint for private sector AFS in rural Africa. In contexts of joint inputs that go into production processes, it may in fact be other factors of production that are binding in the current economic structure.

Nonetheless, there is a clear indication of the changing nature of work, today versus tomorrow (World Bank, 2019a). The kinds of skills that will be required in future may be quite different from those demanded by the labor market today. As rural economies transform, the share of the labor force that is self-employed in AFS will decrease as SMEs and large enterprises that hire people for wages expand. Which enterprises sustain and grow and which go out of business (transitioning their labor into wage work) will depend on the skills of both the SMEs in managing their business in a dynamic working environment and those of the labor force. This implies that, though skills may not be the binding constraint for the private sector of today, they may be so in the future, underlining the importance of the policy and programmatic environment in providing transferable cognitive and non-cognitive skills to prepare for that future.

With this in mind, several programs and government policies in sub-Saharan Africa have been developed to enhance technical skills that are projected to be in demand by the private sector in the future, especially focusing on the youth. Given the

unprecedented nature and pace of change in digital technologies that reshape the business environment, investments in training to increase the productive use of information and communication technologies (ICTs) and entrepreneurship capacity building programs attract particular attention; 400 digital development programs have been launched in the past decade (Aker, Ghosh, & Barrell, 2016; Aker & Mbiti, 2010; Rotberg & Aker, 2013). The evidence base on their impacts, however, is mixed and weak, at best (IFAD, 2019). The challenge is that it is difficult to predict with any degree of confidence, which specific skill set will be critical in the future in the private sector. As such, several experts have advocated for positive youth development programs to ensure a basic quality education in addition to paying attention to non-cognitive skills that may lend to the workforce of tomorrow the ability to adapt and fit the unpredictable needs of the labor market in the future (Filmer & Fox, 2014; Fox, 2018).

With respect to basic education, analyses of education levels in Africa generally show that the rural population has completed fewer years of formal education than the urban dwellers. Moreover, the quality of education may be low, especially in rural areas, due to a myriad of challenges, including teacher absenteeism and poor maintenance of education facilities (Fox, 2018; Lewin, 2009). Beyond the challenges of the formal education system, the quality of learning may also be compromised by a variety of factors, including food insecurity, under-nutrition, and health comorbidities (World Bank, 2018a).

A separate but related debate pertains to the value of non-cognitive skills (also called socio-emotional skills) and whether low levels of non-cognitive skills present a constraint for the private sector (Heckman & Kautz, 2013). Practical examples of these skills include the ability to take initiative, reliability, maturity,

integrity, morals, planning and networking, and they are reportedly among employers' main concerns related to the quality of labor force in both rural and urban areas of Africa (Adeleja et al., 2018; Fox, 2018). While there is reason to believe that non-cognitive skills are important for increasing flexibility and productivity within the private sector AFS, there currently is limited rigorous evidence on this aspect of the labor market and how it affects the private sector AFS in the context of the quiet revolution.

Fundamentals: Among more pertinent factors other than the quality of labor, which might be limiting the potential of the private sector AFS to positively impact today's and tomorrow's labor markets in Africa, are constraints that relate to the fundamentals of an economy such as lack of access to financial capital, policy constraints (such as taxes or trade restrictions), and the lack of infrastructure (roads, rail, electricity, etc.) (Eifert, Gelb, & Ramachandran, 2008; Martin & Anderson, 2011; Wang, 2016). These fundamentals are usually discussed in the context of the enabling environment for linking smallholders to value chains (AGRA, 2017), but they have not received enough attention in the narrative on the private sector that tends to focus on skills.

A series of reports from the World Bank's enterprise surveys constantly showcase these other factors related to fundamentals as constraints highlighted by the formal private sector (Bigsten & Söderbom, 2005; Chavis, Klapper, & Love, 2010; Kuntchev, Ramalho, Rodríguez-Meza, & Yang, 2014). Similarly, the World Bank's doing business indicators and enabling the business of agriculture indicators rarely mention issues of labor skills and labor quality as the main constraining factors to production or profitability (World Bank, 2019b, 2018b, 2017). Rather, it is the other factors such as ad hoc agricultural policy changes, restrictive trade policies, poor macroeconomic

management, etc. that are fundamental to investment and which are reported as prohibiting private sector investment and growth in the first place. These factors, in turn, block creation of employment, making the issue of labor quality and skills somewhat secondary.

Detailed evidence from the World Bank's enterprise surveys tell a compelling story around this argument, particularly in terms of how poor access to finance, electricity and other infrastructure by the private sector, in addition to policy constraints, are debilitating investments (Fowowe, 2017; Wang, 2016). Similar evidence is also available from enabling the business of agriculture indicators of the World Bank, which are focused on the agriculture sector and related policy constraints (World Bank, 2017).

Addressing the constraints to unleash private sector AFS labor market synergies

Governments and development institutions have been promoting interventions with the goal of addressing some of the constraints that the private sector faces to ultimately stimulate its growth. Although the first generation of such programs narrowly focused on vocational skills training particularly for youth, the effectiveness of such programs has been questioned in the literature for being temporary at best and causing job replacement, rather than job creation at worst (Fox & Kaul, 2018). Such training can only address one supply side constraint among the multitude of supply and demand side interventions needed to stimulate rural employment (Townsend et al., 2017b).

Evidence from rural areas of developing countries is catching up with ample evidence from urban areas of developed countries and offers some lessons for policy and

programming (Stöterau, 2019 and references therein). This growing literature shows that programs that include performance-based payment systems to training providers to ensure high quality training are more likely to be effective. Capital constraints were found to limit investments in training among youth in low-income settings, therefore programs that provide financial support during the training phase are more likely to be effective (Filmer & Fox, 2014). Skills training in and of itself for rural youth has no effect and is subject to high dropout rates, whereas combining training with stipend and paid apprenticeships leads to improved wage employment outcomes for youth (Cho, Kalomba, Mobarak, & Orozco, 2015; Crépon & Premand, 2019). For self-employment, combining these types of interventions with start-up cash grants is shown to increase self-employment and earnings, however, these effects dissipate in the long run in multiple settings (Blattman, Fiala, & Martinez, 2018; Blattman, Franklin, & Dercon, 2019; Brudevold-Newman, Honorati, Jakiela, & Ozier, 2017).

In many settings, significant gender differences in impacts of such programs exist due to social norms and connectivity issues that constrain women's economic participation, especially for young rural women (Doss, Heckert, Myers, Pereira, & Quisumbing, 2018). Multidimensional programs that combine vocational skills with life skills delivered in a safe space, such as the Empowerment and Livelihood for Adolescents (ELA) program of Building Resources Across Communities (BRAC) have proven to have the potential to address the gender gaps—even after four years in the case of Uganda (Bandiera et al., 2018). Especially in conservative societies or post-conflict areas women's limited mobility due to security concerns tend to be a more binding constraint, and such cost-effective programs are promising a solution.

The increasing evidence base seems to have influenced more recent interventions to combine various types of skills development (technical, practical, and life skills) with improved access to productive and financial resources for rural employment generation. An example of a multidimensional intervention is the one provided by FORMAPROD, the “Vocational Training and Agricultural Productivity Improvement Programme” funded by the International Fund for Agricultural Development (IFAD) in Madagascar to stimulate youth engagement in profitable farm and off-farm enterprises. FORMAPROD contributes to the implementation of Madagascar's National Agricultural and Rural Training Strategy in 13 regions and aims to enhance the entrepreneurial capacities of 100,000 rural youth, with a specific focus on young rural women. It provides formal training in accredited vocational training institutions on rural entrepreneurship (i.e., self-employment in farming and off-farm businesses), combined with practical training. Participants receive financial support for travel and boarding during their two to three years' training. The program also provides continuous learning (including life skills) and apprenticeship opportunities, and capital to start a business, which are found to positively affect youth opportunities in rural sector in other settings (Crépon & Premand, 2019; Shonchoy, Fujii, & Raihan, 2018).

Holistic value chain interventions to establish partnerships between private and public investors and service providers, which address the financial constraints that are ranked as highly important by the private sector in the AFS, have also recently gained currency among development actors. Innovative partnerships such as the *impact investing* movement that guides its investments by both financial and social returns are promising to achieve these

goals and contribute to rural transformation (Mudaliar & Bass, 2017). One example is the Ugandan Small and Medium Agribusiness Development Fund (SMADF), initiated between the European Union (EU), the Government of Uganda, and IFAD. Successful SMEs have the potential to both create wage employment and help smallholders improve their productivity by addressing constraints on input availability and access to value chains (Paglietti & Sabrie, 2013). SMADF addresses one of the main limiting factors for SMEs in achieving these goals by providing incentives for investee SMEs to access business development services and to supply these to smallholders (Milder, 2008). By providing sustainable and long-term financing to SMEs in the AFS, such impact investment funds aim to stimulate employment and rural transformation.

Successful long-run employment generation in the private sector eventually depends on the structure of the economy and its fundamental capabilities, such as education, infrastructure, health, and business environment, and narrowly focused programs can only be successful to the extent that the broad rural development policies are effective (IFAD, 2019). One of the most important fundamentals that concern the labor market is the provision of quality education that provides non-cognitive skills and teaches how to learn, which are flexible and transferable skills to complement technical/vocational training (Filmer & Fox, 2014). Whereas the private sector can provide many technical trainings effectively, it rarely provides life skills, and it is unclear how inclusive private training services may be due to potential connectivity or social exclusion constraints. Governments therefore have a role to play in facilitating access to information and investing in physical and digital infrastructure to spur inclusive rural transformation.

Conclusions

The quiet revolution is inevitably unfolding in Africa, transforming the food system and along with it the labor market. The implications for the private sector are crucial to understand given that Africa's employment challenge is projected to increase during the continent's delayed demographic transition. This chapter has demonstrated that, though most individuals in rural Africa may still be involved in farming one way or the other, self-employment in the AFS sector accounts for 60% of all labor time (measured by FTEs) and an increasing share of incomes. Although many of these businesses may be primarily micro/small family enterprises with little potential to create wage employment, the fact that they absorb the work effort of most individuals (especially for young adults in peri-urban and intermediate zones) underlines the importance of understanding the constraints that may prevent their creation and growth.

The slow demographic transition of the continent is practically poised to prevent the quantity of labor from becoming a constraint in the next couple of decades. Given the rudimentary skills needed for most of today's micro, small, and medium enterprises (MSMEs) in AFS in most parts of rural Africa, the lack of basic technical skills is also unlikely to be the current binding constraint for the private sector. From a dynamic perspective, however, the AFS that are currently in a transitional stage are expected to increasingly rely on a new set of skills if they are to benefit from the digital revolution and modernize. Predicting the right set of skills that will be needed in the future work environment may be difficult, but investments in multi-dimensional programs that improve skills to use ICTs in productive ways as well as non-cognitive skills that create an agile workforce, combined with access to apprenticeships and finance seem to be promising.

To be as effective for young women as for young men, special attention is needed to create safe spaces for young women, especially in hinterland areas where their mobility is more likely to be limited. As the employment transition moves labor out of self-employment in AFS into wage jobs, this will be even more important given that women are overrepresented in AFS self-employment

and underrepresented in (AFS and non-AFS) wage employment. Investments in the fundamental capabilities of rural economies, such as access to quality education covering cognitive and non-cognitive skills, finance, and infrastructure, remain crucial components of an inclusive rural transformation that fosters private sector participation.

References

- Adelaja, A.O., Peterson, H.C., Liverpool-Tasie, S., Me-Nsope, N., Howard, J.A., & Maredia, M.K. (2018). *Expanding employment and entrepreneurship opportunities for young women and men in Nigeria's agrifood sector: Prospects and challenges*. East Lansing: Global Center for Food Systems Innovation, Michigan State University.
- AfDB. (2016). *Jobs for youth in Africa. Strategy for creating 25 million jobs and equipping 50 million youth 2016–2025*. Abidjan, Côte d'Ivoire: The African Development Bank.
- AGRA. (2015). *Africa Agriculture Status Report: Youth in Agriculture in Sub-Saharan Africa*. Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).
- AGRA. (2017). *Africa Agriculture Status Report: The Business of Smallholder Agriculture in Sub-Saharan Africa* (Issue 5). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).
- Aker, J.C., & Mbiti, I. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232.
- Aker, J.C., Ghosh, I., & Burrell, J. (2016). The promise (and pitfalls) of ICT for agriculture initiatives. *Agricultural Economics*, 47(S1), 35–48.
- Almeida, R.K., & Aterido, R. (2011). On-the-job training and rigidity of employment protection in the developing world: evidence from differential enforcement. *Labour Economics*, 18, S71–S82.
- Bandiera, O., Buehren, N., Burgess, R., Goldstein, M., Gulesci, S., Rasul, I., & Sulaiman, M. (2018). *Women's Empowerment in Action: Evidence from a randomized control trial in Africa*. London, UK: Economic Organization and Public Policy Programme.
- Bassi, M., Busso, M., Urzúa, S., & Vargas, J. (2012). *Disconnected: Skills, education, and employment in Latin America*. Washington, D.C.: Inter-American Development Bank.
- Behrman, J. (1999). Chapter 43 Labor markets in developing countries. *Handbook of Labor Economics*, 3(Part B), 2859–2939.
- Bigsten, A., & Söderbom, M. (2005). *What Have We Learned From a Decade of Manufacturing Enterprise Surveys in Africa?* (World Bank Policy Research Working Paper 3798). Washington D.C.: The World Bank.

- Blattman, C., Fiala, N., & Martinez, S. (2018). *The Long Term Impacts of Grants on Poverty: 9-year Evidence From Uganda's Youth Opportunities Program* (NBER Working Paper Series No. 24999). Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
- Blattman, C., Franklin, S., & Dercon, S. (2019). *Impacts of industrial and entrepreneurial jobs on youth: 5-year experimental evidence on factory job offers and cash grants in Ethiopia* (BFI Working Paper 2019). Chicago, Illinois: Becker Friedman Institute, University of Chicago.
- Brudevold-Newman, A., Honorati, M., Jakiela, P., & Ozier, O. (2017). A firm of one's own: experimental evidence on credit constraints and occupational choice (IZA Discussion Papers No. 10583). Washington, D.C.: Strategic Research Program, The World Bank.
- Canning, D., Raja, S., & Yazbeck, A.S. (eds.) (2015). *Africa's Demographic Transition: Dividend or disaster?* (Africa Development Forum Series). Washington, D.C.: The World Bank
- Christiaensen, L., & Kanbur, R. (2017). Secondary towns and poverty reduction: Refocusing the urbanization agenda. *Annual Review of Resource Economics*, 9, 405–419, <https://doi.org/10.1146/annurev-resource-100516-053453>
- Chavis, L., Klapper, L., & Love, I. (2010). *International differences in entrepreneurial finance* (Enterprise Surveys Enterprise Note No. 11). Washington, D.C.: The World Bank.
- Cho, Y., Kalomba, D., Mobarak, A.M., & Orozco, V. (2015). *Differences in the effects of Vocational training on men and women: constraints on women and drop-out behaviour* (Employment Policy Working Paper No. 189). Geneva, Switzerland: International Labour Organization.
- Crépon, B., & Premand, P. (2019). *Creating new positions? Direct and indirect effects of a subsidized apprenticeship program* (Working Paper No. WPS8561). Washington, D.C.: The World Bank.
- Davis, K. (2008). Extension in sub-Saharan Africa: Overview and assessment of past and current models, and future prospects. *Journal of International Agricultural and Extension, Education*, 15(3), 15–28.
- de Janvry, A., & Sadoulet, E. (2001). Income strategies among rural households in Mexico: the role of off-farm activities. *World Development*, 29(3), 467–480.
- Dolislager, M., Reardon, T., Arslan, A., Fox, L., Liverpool-Tassie, S., Sauer, C., & Tschirley, D. (2018). *Livelihood Portfolios of Youth and Adults: A Gender-Differentiated and Spatial Approach to Agrifood System Employment in Developing Regions*. Background paper for the Rural Development Report 2019. Rome, Italy: International Fund for Agricultural Development (IFAD).
- Doss, C., Heckert, J., Myers, E., Pereira, A., & Quisumbing, A. (2018). *Gender, Rural Youth, and Structural Transformation*. Background paper for the Rural Development Report 2019. Rome, Italy: International fund for Agricultural Development (IFAD).
- Eifert, B., Gelb, A., & Ramachandran, V. (2008). The cost of doing business in Africa: evidence from enterprise survey data. *World Development*, 36(9), 1531–1546, doi:10.1016/j.worlddev.2007.09.007
- FAO. (2016). *Developing the Knowledge, Skills and Talent of Youth to Further Food Security and Nutrition*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). Retrieved from <http://www.fao.org/3/a-i5024e.pdf>

- Filmer, D., & Fox, L. (2014). *Youth employment in sub-Saharan Africa*. Africa Development Series. Washington, D.C.: The World Bank. Retrieved from doi:10.1596/978-1-4648-0107-5
- Fowowe, B. (2017). Access to finance and firm performance: Evidence from African countries. *Review of Development Finance*, 7(1), 6–17, <https://doi.org/10.1016/j.rdf.2017.01.006>
- Fox, L. (2018). *Economic Participation of Youth: What matters?* Background paper for the Rural Development Report 2019. Rome, Italy: International Fund for Agricultural Development (IFAD).
- Fox, L., & Kaul, U. (2018). *The evidence is in: How should youth employment programs in low-income countries be designed?* (World Bank Policy Research Working Paper WPS8500). , Washington, D.C.: The World Bank.
- Francesconi, G.N., & Wouterse, F. (2019). Building the managerial capital of agricultural cooperatives in Africa. *Annals of Public and Cooperative Economics*, 90(1), 141–159.
- Haggblade, S., Hazell, P.B.R., & Reardon, T. (2007). *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.
- Heckman, J.J., & Kautz, T. (2013). *Fostering and measuring skills: Interventions that improve character and cognition*. NBER Working Paper 19656. Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
- IEG. (2013). *Youth Employment Programs: An Evaluation of World Bank and International Finance Corporation Support*. Washington, D.C.: The World Bank. Retrieved from doi: 10.1596/978-0-8213-9794-7
- IFAD. (2019). *The Rural Development Report: Creating Opportunities for Rural Youth*. Rome, Italy: International Fund for Agricultural Development (IFAD).
- ILO. (2016). *Structural transformation to boost youth labour demand in sub-Saharan Africa: The role of agriculture, rural areas and territorial development*. Bruno Losch; International Labour Office, Employment Policy Department, Employment and Labour Market Policies Branch. Geneva, Switzerland: International Labour Organization (ILO).
- ILO. (2017). *Global employment trends for youth 2017: Paths to a better working future*. Geneva, Switzerland: International Labour Organization (ILO).
- ILO (2018). *World Employment Social Outlook:Trends 2018*. Geneva, Switzerland: International Labour Organization (ILO).
- Kafle, K., Benfica, R., & Paliwal, N. (2018). *Who works in agriculture? Exploring dynamics of youth involvement in Tanzania's and Malawi's agri-food system*. Paper presented at Agricultural and Applied Economics Association Annual Meeting, Washington, D.C.
- Kessides, C. (2006). *The urban transition in sub-Saharan Africa: Implications for economic growth and poverty reduction*. Washington, D.C.: Cities Alliance, The World Bank.
- Kuntchev, V., Ramalho, R., Rodríguez-Meza, J., & Yang, J.S. (2014). *What have we learned from the enterprise surveys regarding access to credit by SMEs* (Enterprise Analysis Unit Working Paper). Washington, D.C.: The World Bank.

- Lewin, K.M. (2009). Access to education in sub-Saharan Africa: Patterns, problems and possibilities. *Comparative Education*, 45(2), 151–174.
- Losch, B. (2012). *Agriculture: The Key to the Employment Challenge* (Perspective No. 19). Montpellier, France: CIRAD.
- Lovo, S. (2012). Market imperfections, liquidity, and farm household labor allocation: the case of rural South Africa. *Agricultural Economics*, 43, 417–428.
- Mano, Y., Iddrisu, A., Yoshino, Y., & Sonobe, T. (2012). How can micro and small enterprises in sub-Saharan Africa become more productive? The impacts of experimental basic managerial training. *World Development*, 40(3), 458–468. doi:10.1016/j.worlddev.2011.09.013
- Martin, W., & Anderson, K. (2011). *Export Restrictions and Price Insulation During Commodity Price Booms* (World Bank Policy Research Working Paper 5645). Washington, D.C: The World Bank.
- McGuinness, S., Pouliakas, K., & Redmond, P. (2017). *How useful is the concept of skills mismatch?* Geneva, Switzerland: International Labour Organization.
- McMillan, M., Rodrik, D., & Sepulveda, C. (2017). *Structural Change, Fundamentals and Growth: A framework and case studies* (NBER Working Paper 23378). Cambridge, Massachusetts: National Bureau of Economic Research.
- Milder, B. (2008). Closing the gap: reaching the missing middle and rural poor through value chain finance. *Enterprise Development and Microfinance*, 19, 301–316.
- Mochebelele, M.T., & Winter-Nelson, A. (2000). Migrant labor and farm technical efficiency in Lesotho. *World Development*, 28(1), 143–153.
- Mudaliar, A., & Bass, R (2017). *Evidence on the financial performance of impact investments*. New York: The Global Impact Investing Network. Retrieved from https://thegiin.org/assets/2017_GIIN_FinancialPerformanceImpactInvestments_Web.pdf
- Nagler, P., & Naudé, W. (2017). Non-farm entrepreneurship in rural sub-Saharan Africa: New empirical evidence. *Food Policy*, 67, 175–191. <https://doi.org/10.1016/j.foodpol.2016.09.019>
- Paglietti, L., & Sabrie, R. (2013). *Review of smallholder linkages for inclusive agribusiness development*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO).
- Palmer, R. (2007). Skills for work? From skills development to decent livelihoods in Ghana's rural informal economy. *International Journal of Education Development*, 27(4), 397–420.
- Reardon, T., Echeverria, R., Berdegue, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2018). Rapid transformation of food systems in developing regions: Highlighting the role of agricultural research & innovations. *Agricultural Systems*, 172, 47–59. <https://doi.org/10.1016/j.agsy.2018.01.022>
- Reardon, T., Berdegue, J.A., Barrett, C.B., & Stamoulis, K. (2007). Household income diversification into rural nonfarm activities. In S. Haggblade, P.B.R. Hazell & T. Reardon (Eds). (2007). *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.
- Reardon, T., & Timmer, P.C. (2014). Five interlinked transformations in the Asian agrifood economy: Food security implications. *Global Food Security*, 3, 108–117.

- Rotberg, R.I., & Aker, J.C. (2013). Mobile Phones: Uplifting weak and failed States. *The Washington Quarterly*, 36(1), 111–125.
- Shonchoy, A.S., Fujii, T., & Raihan, S. (2018). Barriers to labor migration for the rural poor: Experimental evidence from a vocational training program in Bangladesh. *SSRN Electronic Journal*. doi:[10.2139/ssrn.3395229](https://doi.org/10.2139/ssrn.3395229)
- Stecklov, G., & Menashe-Oren, A. (2018). *The Demography of rural youth in developing countries*. Background paper for the Rural Development Report 2019. Rome Italy: International Fund for Agricultural Development (IFAD).
- Stöterau, J. (2019). *Job training programs for youth in low-income countries*. Poverty Reduction, Equity and Growth Network (PEGNet) Policy Brief Nr. 15/2019. Kiel, Germany: Kiel Institute for the World Economy.
- Sumberg, J., Abay, K., Asnake, W., Ayalew, H., & Chamberlin, J. (2018). *Landscapes of Opportunity? How Young People Engage with the Rural Economy in Sub-Saharan Africa*. Background paper for the Rural Development Report 2019. Rome, Italy: International Fund for Agricultural Development (IFAD).
- Teal, F. (2011). *Structural Transformation, Employment Creation, and Labor Markets: The Implications for Poverty Reduction in Sub-Saharan Africa*. Center for the Study of African Economies, University of Oxford Working Paper. Oxford, UK: University of Oxford.
- Tomich, T.P., Kilby, P., & Johnston, B.F. (1995) (Eds). *Transforming Agrarian Economies: Opportunities Seized, Opportunities Missed*. Ithaca, NY: Cornell University Press.
- Townsend, R., Benfica, R., Prasann, A., & Lee, M. (2017a). *Future of Food: Shaping the Food System to Deliver Jobs*. World Bank Publication No. 26506. Washington, D.C.: The World Bank.
- Townsend, R., Benfica, R., Prasann, A., & Lee, M. (2017b). *Rural Youth Employment*. G20 Paper by World Bank and IFAD. Hamburg, Germany.
- Tschirley, D.L., Snyder, J., Dolislager, M., Reardon, T., Haggblade, S., Goeb, J., Meyer, F. (2015). Africa's unfolding diet transformation: Implications for agrifood system employment. *Journal of Agribusiness in Developing and Emerging Economies*, 5(2), 102–136.
- UNDESA. (2017). *World population prospects: The 2017 revision* (Volume I: Comprehensive tables). ST/ESA/SER.A/399. New York, NY: United Nations Department of Economic and Social Affairs (UNDESA). Retrieved from https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_Volume-I_Comprehensive-Tables.pdf.
- van den Broeck, G., & Kilic, T. (2019). Dynamics of off-farm employment in sub-Saharan Africa. A gender perspective. *World Development*, 119, 81–99.
- Wang, Y. (2016). What are the biggest obstacles to growth of SMEs in developing countries? An empirical evidence from an enterprise survey. *Borsa Istanbul Review*, 16(3), 167–176.
- Wanyama, F., Poulton, C., Markelova, H., Dutilly, C., Bijman, J., Francesconi, G. N., Wouterse, F. (2014). *Collective action among African smallholders: Trends and lessons for future development strategies* (IFPRI WCAO Thematic Research Note No. 5). Washington, D.C.: International Food Policy Research Institute (IFPRI).

World Bank. (2017). *Enabling the business of agriculture 2017*. Washington, D.C.: The World Bank. doi:10.1596/978-1-4648-1021-3.

World Bank. (2018a). *World development report 2018: Learning to realize education's promise*. Washington, D.C.: The World Bank. doi: 10.1596/978-1-4648-1096-1.

World Bank. (2018b). *Doing Business 2018: Reforming to Create Jobs*. Washington, D.C.: The World Bank.

World Bank. (2019a). *World Development Report 2019: The changing nature of work*. Washington, D.C.: The World Bank

World Bank. (2019b). *Doing Business 2019: Training for Reform*. Washington, D.C.: The World Bank.

Yeboah, F.K., & Jayne, T.S. (2018). Africa's evolving employment trends, *The Journal of Development Studies*, 54(5), 803–832. <https://doi.org/10.1080/00220388.2018.1430767>

08 A Digital Revolution without a Digital Divide for sub-Saharan Africa

Maximo Torero¹

Key Messages

- 1** Today, more than 1.2 million kilometers of Internet cables run across the oceans' floors, but just 20 years ago, Africa was completely disconnected from the world in access to digital technologies. Those in Africa who did have access—using Internet provided by satellites—paid 10 times more than users in other regions. Service was also slow and unreliable. Expanding access to affordable, high-speed Internet makes it easier to do business across State borders. It is also critical for the 21st Century workforce and for economic transformation.
- 2** The use of digital technologies for development in sub-Saharan Africa is constrained in three major areas (three Cs): connectivity, content, and capability.
- 3** Regarding connectivity, despite the increase in mobile phone penetration in the last decade, there is still a significant heterogeneity in access across countries, and within countries. Moreover, the market structure in the provision of digital technologies is concentrated in both access and in applications to consumers. As a result, there is a significant growing digital divide and limited and expensive broadband connectivity is slowing economic transformation in sub-Saharan Africa. The cost of 1 GB of broadband is more than double that of the average for Latin America and more than 5 times the average for Asia.
- 4** If the content provided is not the type of information farmers need, they may be less likely to use these technologies, thereby reducing the potential impact of digital technologies. The same logic holds true in the use of digital technologies for extension. Existing evidence suggests that currently the content is not responding directly to the demand, and the quality of the content matters if digital technologies are to be useful for development.

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5 Regarding capabilities, this is a major constraint for sub-Saharan Africa where the lowest literacy rates are observed making extremely difficult for them to use digital technologies which in most cases require to know how to read and write. Adult literacy rates are below 50% in 17 countries in the region—Benin, Burkina Faso, Central African Republic, Chad, Comoros, Côte d'Ivoire, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, and South Sudan. In Burkina Faso, Niger, and South Sudan literacy rates are still below 30%. However, there are innovative ways to resolve this major constrain and technologies need to adjust to be able to resolve this structural gap of extremely high levels of illiteracy. One option is to focus on the younger populations, as exemplified by the large share of 15 years+ population that have used mobile phone/internet to access financial account despite of the low level of education and no structured skill upgrading.

6 There is a clear need to continue improving both access to and use of new technologies in the poorest areas. In some countries, subsidies have been implemented in response to this problem. Their goal has been to improve access to telecommunications for rural households and ensure that poor people pay no more than their wealthier urban counterparts do for this access. The economic rationale for subsidies is because digital technologies have positive spillover benefits for people's consumption and production, create network externalities, and create the potential for economies of scale. The main problem with such schemes, however, is that they can be financially unsustainable. One solution is to use a small percentage of the gross operating revenues of existing private operators to pay for subsidies. Other countries should consider this option.

7 Alternative technologies should be further explored. Broadband technology, for instance, has the potential to provide access to both data, voice services, and therefore increase competition in the delivery of services. A dual broadband strategy, promoting both the deployment of wireless broadband networks and the adoption of voice telephony applications targeted to low-income users, is one approach that needs to be carefully assessed, including the appropriate roles of the public and private sectors. In addition, proper regulatory institutions at country level or potentially at regional level, as in the European Community, are urgently needed to assure competition in this sector.

8 There is a clear need to continue assessing the impact of the quality of information and of innovation on the delivery of the digital technologies to reduce the capabilities constraint. Many aspects of agricultural information constitute a public good, and governments need to invest in providing the best possible information regarding not only prices for different markets, produce varieties, and produce quality, but also production technologies and other agronomic information. If these investments are not made, the potential impact of digital technologies could be limited. We need innovative ways to bring together the public and private sectors to ensure that the three Cs are addressed as a whole.

Introduction

Because most of the world's poor live in rural areas, addressing global poverty requires paying special attention to rural populations in developing countries, especially smallholders. In sub-Saharan Africa the rural population represents more than half the total population; and of the world's 736 million extremely poor people in 2015, half of the total—368 million—lived in just 5 countries. The five countries with the highest number of extremely poor people are (in descending order): India, Nigeria, Democratic Republic of Congo, Ethiopia, and Bangladesh, that is, three out of five are in sub-Saharan Africa (World Bank, 2018). They also happen to be the most populous countries in sub-Saharan Africa. Moreover, almost half of the multidimensional poor in this region (28.2% out of 64.3% multidimensionally poor) experience simultaneous deprivations in consumption, education, and access to some basic infrastructure service. This proportion contrasts with that in other regions, including South Asia, in which only a quarter of the multidimensionally poor people suffer deprivations in all three of these dimensions. The implication is that in sub-Saharan Africa, the cumulative deprivations reinforce one another and make it much harder to fight poverty. Therefore, to make significant continued progress towards the global target of reducing extreme poverty (those living on less than US\$1.90 a day) to less than 3% by 2030, large reductions in poverty in these 3 countries will be crucial and infrastructure, especially digital infrastructure, will play a crucial role.

Clearly, these extensive rural areas are where the critical challenges lie. The major challenges faced by rural populations include lack of access to both physical products and new technologies and ideas. This lack of access may limit agricultural output and impede improvements to health and education

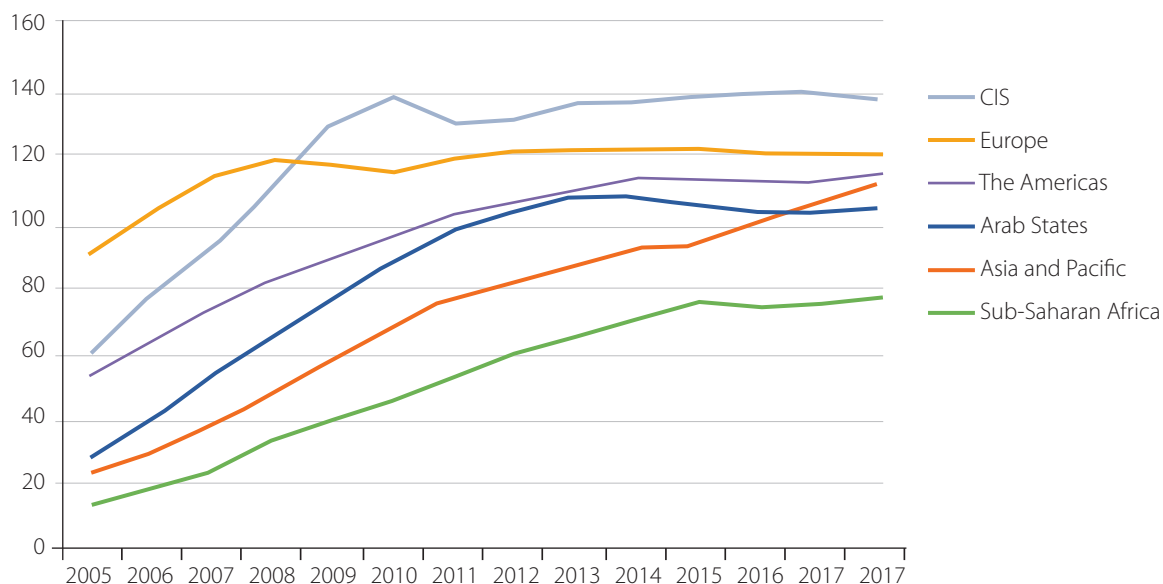
outcomes, and could arguably be related to environmental degradation through unsustainable agricultural practices and resource use. A growing body of evidence suggests that digital technologies, specifically mobile phones and access to the Internet, can help address these problems in many (though not all) circumstances by increasing access to both information and capacity-building opportunities for rural populations in developing countries. In turn, policy makers can also benefit from increased information sharing, gathering a more complete overview of the situation “on the ground” in their country.

To accomplish this agriculture is at the center as the main economic activity of the rural areas in sub-Saharan Africa. It is where there is a clear need to disrupt the way food is being produced; digital technologies are of core importance for this. Today, to be able to increase agricultural productivity in a sustainable way, is necessary to move towards precision agriculture, to manage risks more effectively, and to share information fast. Sub-Saharan Africa's farmers need to find ways to use automatization and artificial intelligence to facilitate agricultural trade, enhance traceability and food safety, provide detailed information on the nutritious content of food, improve trade finance, and enable the automation of trade contracts, with the so-called smart contracts. All of these are based on digital technologies and therefore the region needs to leapfrog and accelerate the development of these technologies so as to achieve the needed reduction of poverty. While today, the mobile and the Internet sectors in Africa is growing fast, Internet penetration levels are only about 20% and still there is a significant divide in mobile subscription between urban and rural populations. The aggregate indicators mask glaring disparities. At the high end of the spectrum, countries

such as Morocco enjoy penetration rates above 50%, but at the other end are countries with penetration rates below 2%, and most countries have Internet penetration of less than 10% (well below the 20% threshold that has been found to be critical for countries to reap the economic benefits of broadband investment). This chapter focuses on the major constraints faced by sub-Saharan Africa in access to mobile phones and the Internet as the core base of digital technologies. In the following sections, a detailed assessment of the current availability of digital technologies is carried out, followed by an analysis of the importance of digital technologies for agriculture, and the major constraints faced by sub-Saharan Africa. Finally, the conclusions section details some possible policy recommendations that could help reduce the costs of access, improve content and identify ways to minimize the existing capability constraint because of the high illiteracy rate in the region.

Assessment of the current availability of digital technologies

A prime example of the potential of digital technologies for development can be found in the use of mobile phones. The exponential increase in access to mobile phones in the last decade in sub-Saharan Africa has clearly reduced the digital divide between developed and developing countries (see Graph 8.1). In fact, several sub-Saharan African countries currently have higher rates of penetration per inhabitant than developed countries. In sub-Saharan Africa mobile voice subscriptions were 15 times higher in 2015–2017 than in 2010–2012. After rapid expansion over the past decade, almost 76% of the population in the region is covered by mobile networks, although this is still lower than coverage in emerging economies. Africa has fewer mobile phone subscribers than other regions, with about 24% of the population not



Graph 8.1 Ratio of mobile phones subscriptions per 100 inhabitants by region

Source: Mobile phone subscriptions are from the International Telecommunication Union (ITU).

yet having a subscription by the end of 2018, while other regions have already surpassed 100% penetration. Moreover, quality in mobile services, as shown in Jieun, Dutz, & Usman (2019), is poor relative to that in other regions. The percentages of unsuccessful calls (2.2) and dropped calls (1.1) in sub-Saharan Africa were larger than those of lower middle-income countries (1.5 and 0.8 respectively in 2015–2017). Furthermore, the affordability of mobile services is a concern. Connection charges and the fee for a one-minute call have decreased significantly in sub-Saharan Africa but are still high compared with income levels.

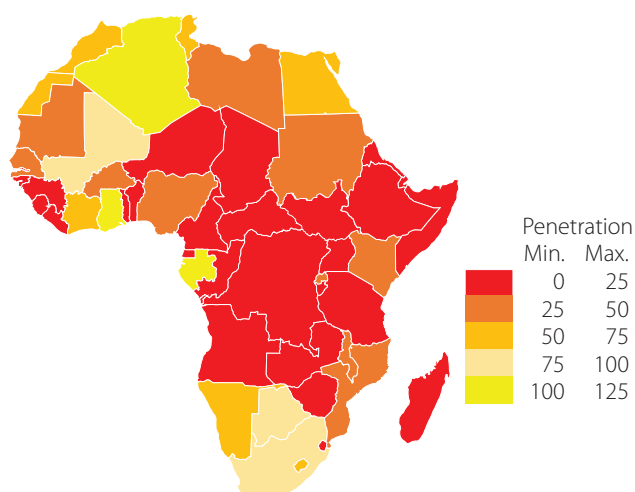
Despite the increase in mobile voice availability, sub-Saharan Africa continues to have limited access to broadband networks that provide Internet and data services as shown in Map 8.1. Compared to all other regions, Africa has the worst Internet connectivity, in terms of both price and quality. Even basic smartphones have already fallen below the “tipping point” of US\$100 per unit (in Rwanda, Tecno S1 mobile costs US\$33), and companies are introducing new affordable models specifically geared to the African market (McKinsey & Co., 2013). Yet, 20 out of the 25 least-connected countries, are in Africa. Only 22% of households in this region have Internet access and only 24% of the individuals in these households use it (ITU, 2018). In many African countries, 3G deployment beyond the major cities can be as low as 10% of the population in rural and remote areas. On a regional level, disparities are even higher, especially those related to the latest long-term evolutions like 4G. Only 6% of sub-Saharan Africa is covered by 4G, which is 7 times lower than Europe with 46% and Asia Pacific with 45% (GSMA, 2019). Graph 8.2 shows the percentage of 2G, 3G, and 4G coverage by region by 2018.

Moreover, as shown in Graph 8.3, the average price of one gigabyte relative to monthly income is far higher than in all other regions. These

disparities are even higher within the region. For example, in Egypt, average monthly broadband connection in 2018 cost approximately US\$14, but other African countries such Burkina Faso, Namibia, and Mauritania, with monthly average costs of US\$202, US\$384 and US\$768 respectively, confirm that disparities are high on the continent.

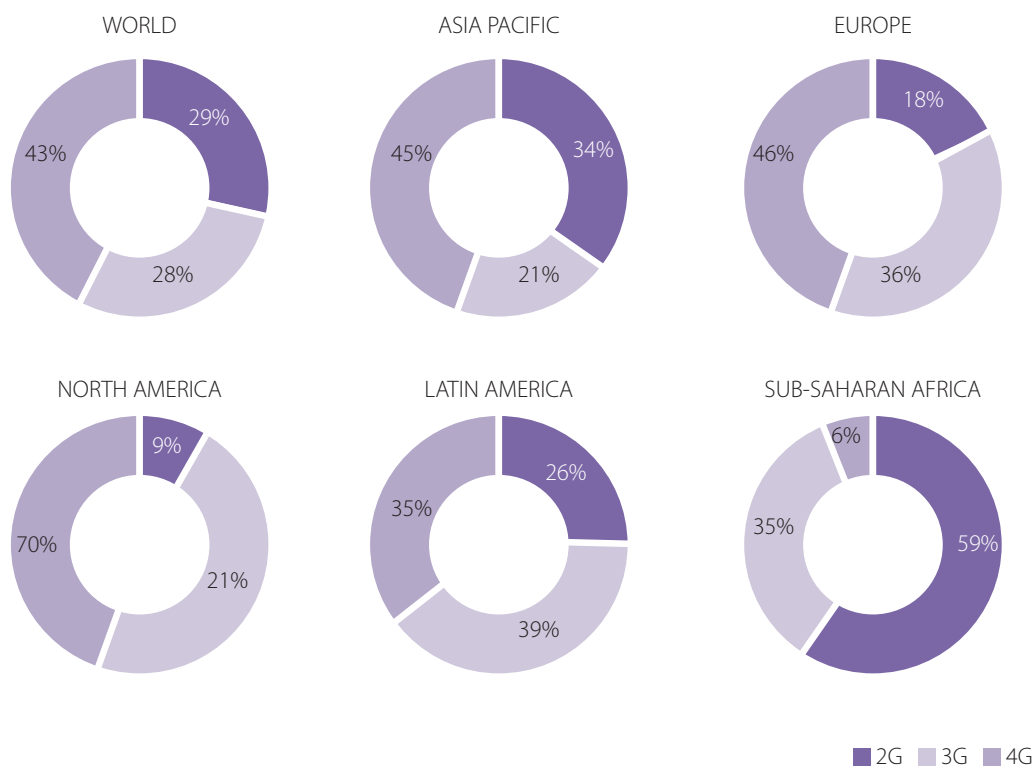
Despite these challenges, sub-Saharan Africa also has the largest potential for progress. Today, more than 1.2 million kilometers of Internet cables run across the oceans’ floors, but just 20 years ago, Africa was completely disconnected. Those who did have access—using Internet provided by satellites—paid 10 times more than users in other regions. Service was also slow and unreliable. Map 8.2 shows how quickly progress is evolving in Africa and the enormous expansion that will happen on the deployment of undersea cables but at the same time how today most of the active network on land is restricted to the countries that are not landlocked countries (see Map 8.3).

Map 8.1. Mobile Broadband Connectivity Status in 2017



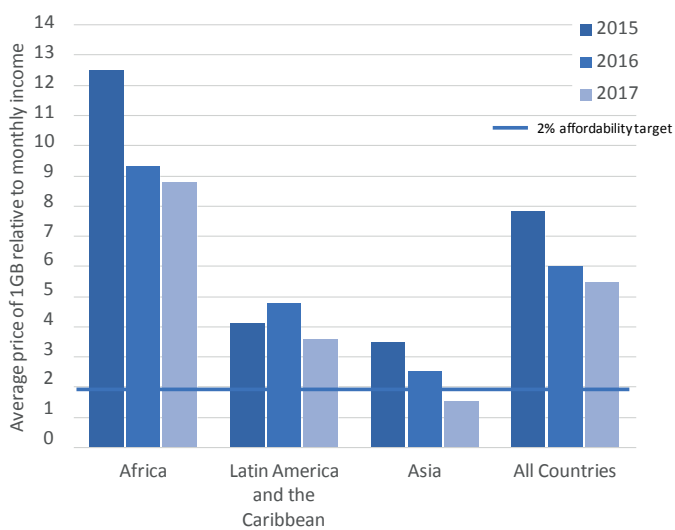
Source of data: Mobile phone subscriptions are from the International Telecommunication Union (ITU) 2019.

Graph 8.2. Percentage of 2G, 3G and 4G coverage by region, 2018



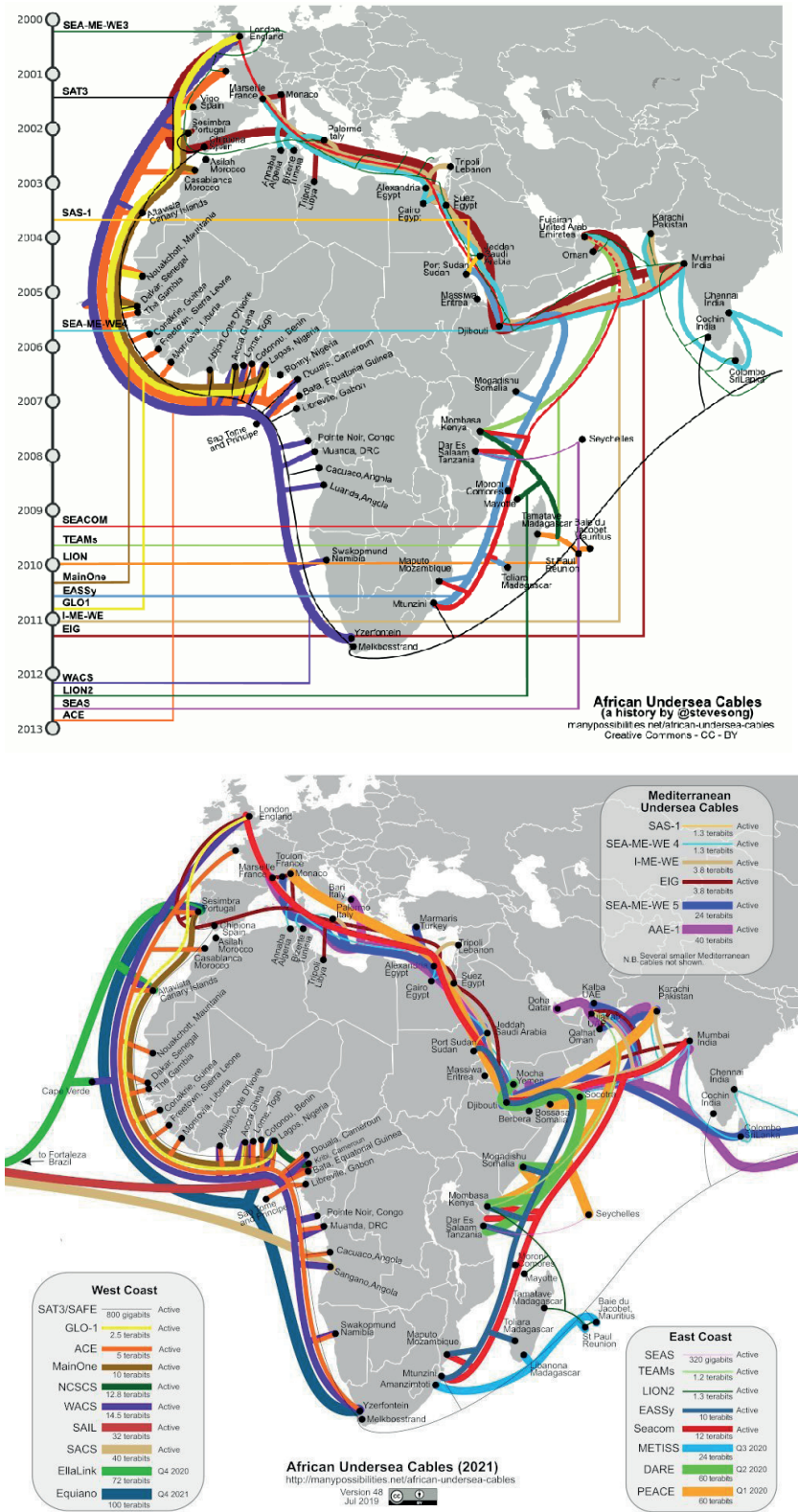
Source: GSMA, 2019

Graph 8.3. Average price of 1 GB relative to monthly income

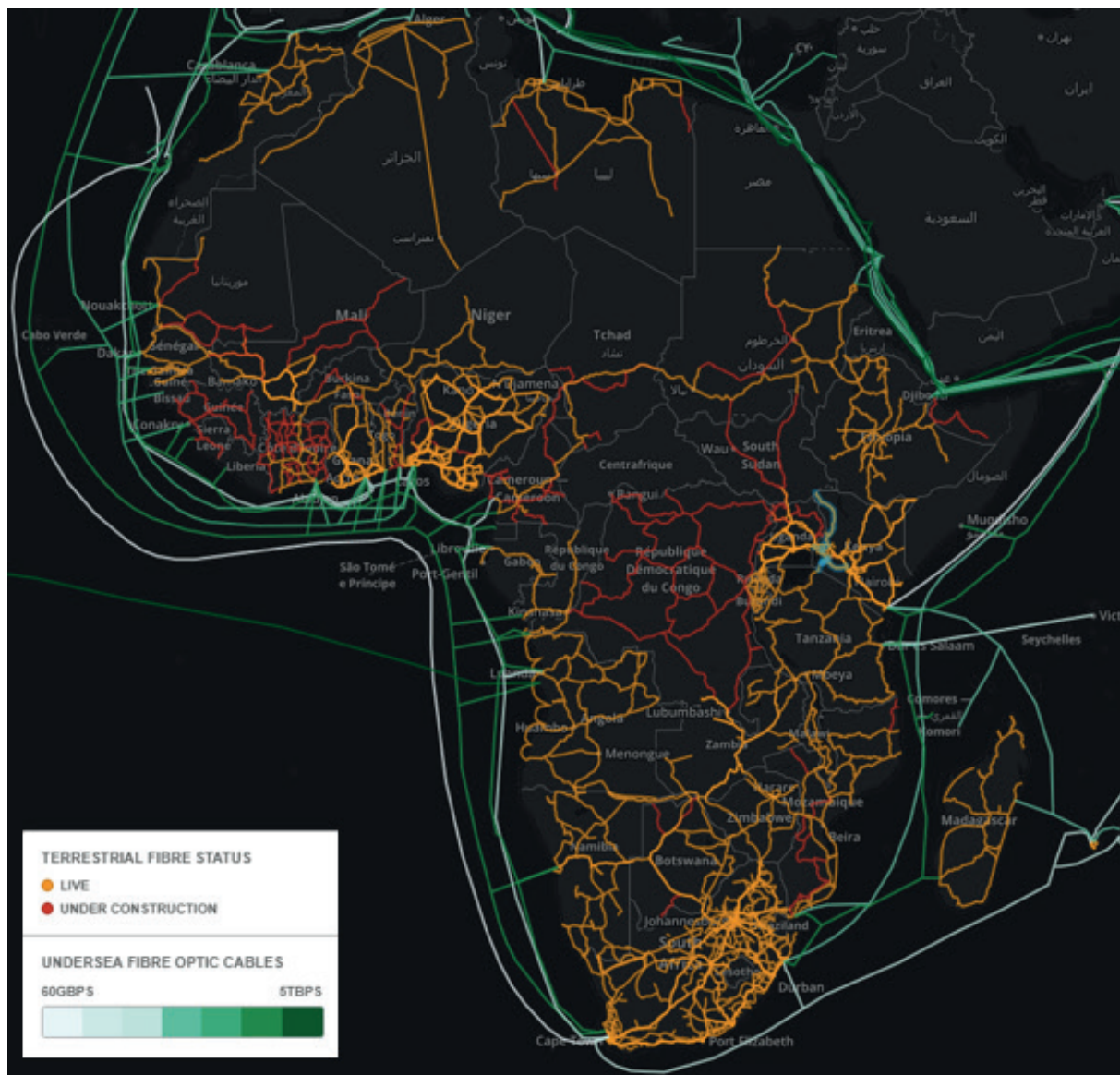


Source: Alliance for affordable Internet: 2018 Affordability Report

Map 8.2. Evolution of undersea cables deployment in Africa and plans for 2021



Map 8.3. Africa undersea cables by 2021 and terrestrial fiber optics



Source: Network Start-up Resource Centre NSRC

This huge jump in accessibility, despite the constraints mentioned, in combination with high quality information, could open a significant window for the use of digital technologies in development efforts, particularly in helping lift smallholders out of poverty through a better understanding of and

more active participation in lucrative markets and potentially increased gains from trade. In this chapter, we assess the potential of digital technologies, such as cell phones, for use in breaking the poverty trap faced by smallholders in developing countries.

Importance of digital technologies for agriculture, food systems and food security

An increasing body of evidence highlights the potential of digital technologies to improve the lives of poor people. Increased access to and adoption of new technologies can address the challenges of food insecurity from multiple fronts, including increasing access of households to non-farm income and enabling households to better gauge the safety, quality, and nutritional value of their food.

Digital technologies can make poor populations more resilient in several ways (Nakasone & Torero, 2016; Nakasone, Torero, & Minten, 2013; Torero 2013). First, access to technology can increase the amount, timeliness, and quality of the information available to the poor; this in turn can translate into better job opportunities (as better contacts can be established) and higher crop yields (as timely and better quality information regarding products and inputs, environmental conditions, and market conditions are gathered more cheaply, as suggested by the preliminary results of Klonner and Nolen (2010) for labor markets). Second, digital technologies may promote learning, which itself can enhance technology adoption among farmers (Bandiera & Rasul, 2006; Conley & Udry, 2009). Lastly, while no evidence is available, it is conceivable that improved access to health and nutritional information through digital technologies can contribute to the reduction in the prevalence of hunger amongst the poor.

There are many reasons to believe that digital technologies may have a large impact on agricultural markets and food systems. Digital technologies can allow different market agents to communicate more efficiently, thus

enhancing information flows. This can be critical for rural areas in developing countries, where markets tend to be less integrated due to inadequate infrastructure.

Jensen (2010) discusses some of the main potential gains from information use in agricultural markets. Most importantly, information can improve market efficiency. Prices, in essence, signal profitable opportunities for producers, consumers, and traders: opportunities where excess demand creates more profitable opportunities to sell or where excess supply leads to cheaper deals to buy. For example, through increased access to mobile phones, farmers can better plan how much to plant in each season and how much and what type of investments could be profitable based on demand and supply fundamentals (Aker, 2008a, 2008b; Aker, 2010; Abraham, 2007; Jensen, 2007; Muto & Yamano, 2009). They can also gather information from extended networks and cooperatives regarding market conditions and quality requirements needed to access higher end markets. Better information through the use of digital technologies can generate a more efficient allocation of products. This creates higher overall gains for all agents, allowing farmers to find markets offering higher prices or to better negotiate with traders.

There is also anecdotal evidence suggesting that digital technologies might impact transportation costs of both inputs and crops. A farmer in India states: “I was in process to transport my produce of (approx.. 1,000 boxes in 2 trucks) to Delhi when I got an SMS through RML that the freight rate from Kotgarh to Delhi is Rs 41.07 per box (approx 0.74US\$). I showed this message to the truck operator, who till then was citing a rate of Rs 44 per box (approx. 0.80 US\$). Following this I was able to settle the transporting deal at Rs. 41.07, finally saving around 3,000 rupees”(Reuters, 2012).

Digital technologies can also be used to reduce price variability. In a context of little information—and thus limited arbitrage—prices tend to vary based on the current local supply. However, as information flows improve, more opportunities for arbitrage emerge, effectively limiting the influence of local fluctuations and more closely relating market prices to (less volatile) aggregate supply. For example, farmers in areas with surplus harvests can sell their products in areas facing shortages. Finally, improved information can teach households about more profitable crops or previously unknown agricultural techniques, thus potentially impacting production patterns in the long term.

Though far from conclusive or uniform, some studies have provided a range of estimates for some of the hypothesized effects of information flows through digital technologies on smallholders' sale prices and profits. For example, Svensson and Yanagizawa's (2009) investigated the impact of price dissemination via radio and found large increases in farmgate prices for maize (around 15%) in Uganda. Similarly large effects are suggested by preliminary research in Peru (Beuermann, 2011; Chong, Galdo, & Torero, 2005) and the Philippines (Labonne & Chase, 2009). Others found much smaller (Goyal, 2010) or no effects (Fafchamps & Minten, 2012; Mitra, Mookherjee, Torero, & Visara, 2011).

Finally, digital technologies can also play a role in reducing the three main constraints faced by traditional extension services in developing countries (Cole & Fernando, 2012). First, poor infrastructure makes it harder and more costly to visit remote areas. Second, traditional extension programs usually provide only one-time information to farmers; this lack of follow-up information and feedback can restrict technologies the information's long-term benefits, access to digital technologies makes it cost-effective to give continue follow

up to farmers on the technology provided to them. Finally, traditional extension is plagued by principal-agent and institutional problems, including a lack of accountability among extension agents. Digital technologies can overcome these problems by reducing the cost of extension visits, enabling more frequent two-way communication between farmers and agents, and improving the accountability of agents. Aker (2011) also claimed that, in addition to reducing the cost of public information provided through extension services, digital technologies can allow farmers to better access private information through their own social networks. By increasing communication between farmers, extension agents, and research centers, digital technologies can thus facilitate coordination of relevant content among all agents.

Major constraints: The three Cs

The use of digital technologies for development in sub-Saharan Africa is constrained in three major areas: connectivity, content, and capacity. Regarding connectivity, penetration rates may exaggerate true access to mobile phones. Looking at detailed data from different household surveys in developing countries, we found significant differences between rural and urban access. For example, in Malawi 32.3% and 72.7%, Ghana 29.6% and 63.5%, Nigeria 60.3% and 88.3%, Ethiopia 12.80% and 65.20%, Uganda 53.1% and 86.80%, and Senegal 81.7% and 95.4%, of rural versus urban penetration respectively². Clearly, access to mobile phones varies considerably between countries, and there are still wide gaps in rural connectivity in many developing countries. Moreover, if we

2 The sources of the data are: (a) for Brazil and Bolivia was taken from OSILAC (<http://www.eclac.org/tic/flash/>), and are based on different household surveys; (b) for India the data were taken from Census of India (<http://tinyurl.com/kej98a8>); for Malawi the data were taken from the Demographic and Health Survey 2010 (National Statistical Office of Malawi, and ICF Macro, 2011); and for Ghana the data were taken from percentage of the population 12 years or older possessing mobile phones, 2010 Population and Housing Census (for further details see Nakasone & Torero, 2016).

look at Internet access, on average, close to 25% of individuals in urban areas have access while only around 10% of rural individuals have access to Internet. This is also reflected in a survey conducted by Chair and De Lannoy (2018): in several African countries the main reason for limited access to the Internet among youth population is the cost as shown in Table 8.1. In addition, high unemployment rate is a common characteristic in youth populations from these countries. The lack of local language content remains a significant barrier among the population aged 20–24 years old in Rwanda and the 15–19-year-olds in Tanzania.

One potential explanation for the variation in access between countries and for the access gap in rural areas is directly related to the cost of mobile phone and of Internet services. As shown in Figure 8.4, the cost of 1 GB of Internet in sub-Saharan Africa is significantly higher than in other regions. These high costs may stem from the lack of significant competition among mobile service providers and the lack of appropriate regulation. Network industries like mobile and Internet are subject to strong economies of scale due to significant initial investments needed to establish operations. As a result, to avoid excessive charges by incumbent firms governments need strong

regulatory authorities to allow that existing infrastructure (normally under monopoly or oligopolistic power) be made available to all competitors at a reasonable access charge (“access pricing”).

A second potential explanation is the lack of sufficient investment in digital technologies in the region because of the lack of proper incentives and an enabling environment for private business. The Enabling the Business of Agriculture (EBA) index for digital technologies³ tries to capture government efforts at creating an enabling environment for agricultural digitalization, considering that most actors in the agriculture value chain continue to be based in Africa’s rural areas. The EBA information and communication technology (ICT) data set features laws and regulations that promote an enabling environment for the provision and use of ICT services, with particular focus on rural areas. It covers information related to the licensing framework for mobile operators, spectrum management and infrastructure

³ The EBA measures laws, regulations and policies that promote an enabling environment for the provision and use of digital technology services, particularly in rural areas given is directly related to the agriculture sector. The index ranges from 0–9 (9 indicating high performance) and an aggregate EBA ICT score for each country is expressed on a scale from 0 to 100, where 0 represents the worst performance (Kayumova, 2019).

Table 8.1: Causes to limitation of Internet access in some countries

Age cohort	Nigeria		Rwanda		Tanzania	
	15-19 (%)	20-24 (%)	15-19 (%)	20-24 (%)	15-19 (%)	20-24 (%)
Lack of time	10.7	9.1	31.4	35.0	21.4	22.9
Expensive	35.1	47.5	70.6	50.2	41.3	42.3
Speed of internet	9.1	14.5	17.0	6.3	26.8	16.7
Surveillance/ Privacy concerns	4.5	3.4	3.6	5.4		0.9
Restricted use	2.7	1.3	2.0		7.8	
Find it difficult to use	1.2	1.3		24.0	3.1	5.4
Lack of local language content			2.0	33.6	11.7	1.5
No interesting content			5.9	4.1		3.7

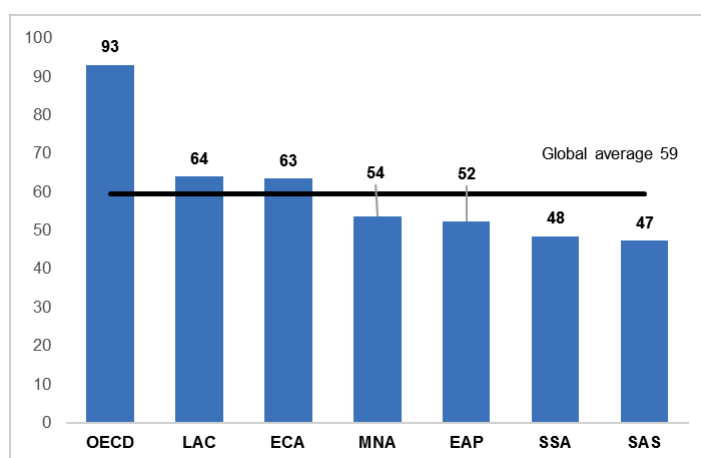
Source: Chair and De Lannoy (2018)

sharing. As shown in Graph 8.4, countries in sub-Saharan Africa have the greatest potential for improvement of their regulatory environments. The region faces particular barriers related to liberalization of the ICT sector. None of the countries in sub-Saharan Africa adopted a general authorization regime for mobile operators to enter respective telecommunication markets. General authorization regimes incentivize competition and pose fewer administrative barriers to market entry for telecommunication providers by reducing the regulatory burden associated with obtaining an individual operating license (World Bank, 2017). As a result, this could be an important reason why competition has not increased in the ICT sector and why consumers face disadvantageous levels of prices in this region.

The second constraint faced by digital technologies relates to the relevance of the information provided. If the content provided is not the type of information that farmers need they may be less likely to utilize these technologies thus reducing their potential

impact. This was discussed previously with respect to price information and is evident in the use of digital technologies for extension (Nakasone & Torero, 2016). For example, Fafchamps and Minten (2012) look at the effect of using short message service (SMS) to provide crop advisory tips (offered for one crop chosen by the farmer) and local weather forecasts. The assumptions was that this information would have changed cultivation practices or reduced harvest losses. However, the authors did not find evidence that the information provided impacted these outcomes. Other studies highlight how properly targeted, relevant information can impact farmers' production decisions. Cole and Fernando (2012) conducted an impact evaluation of the Avaaj Otalo (AO) program among cotton farmers in Gujarat, India, which delivered information through voice messages. This system provided both push content (weekly information on weather and crop conditions) and pull content (a hotline for specific advice). Farmers' calls to the hotline were processed by agronomists

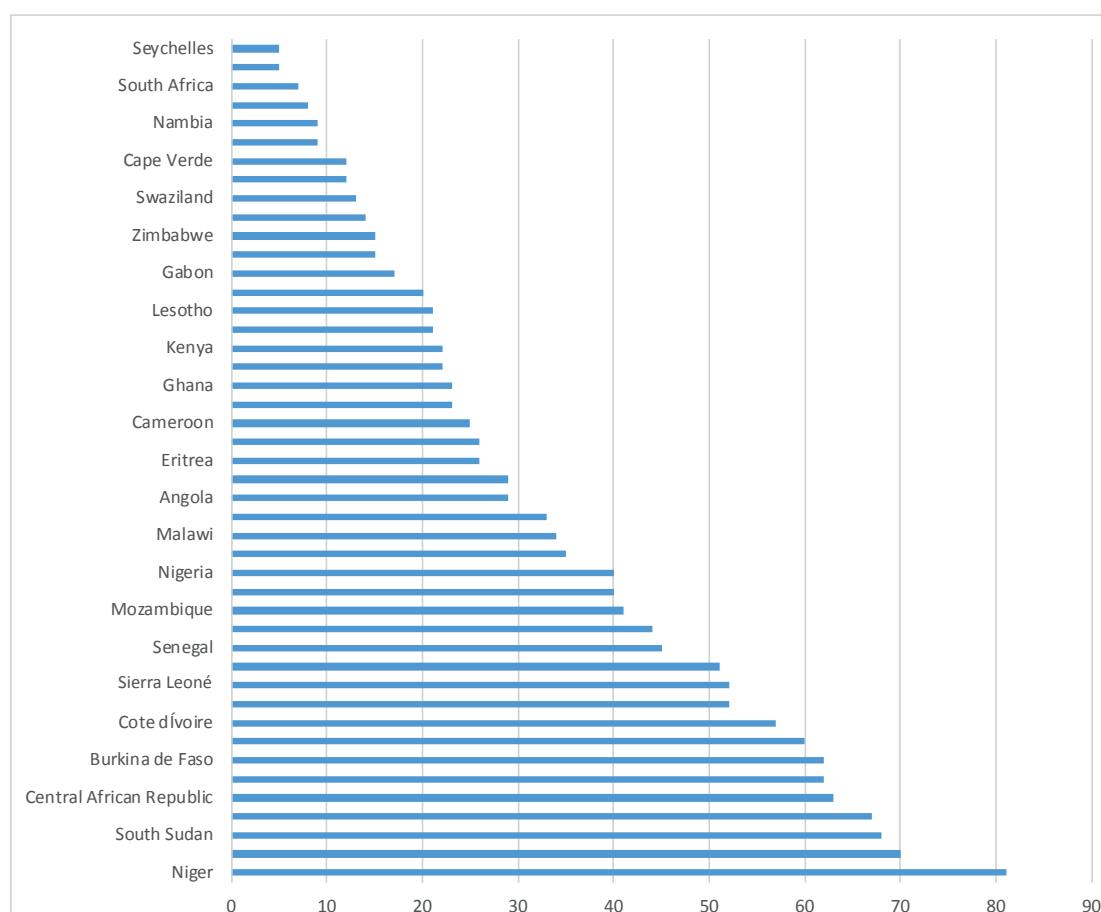
Graph 8.4. EBA ICT Score by Region



Note: OECD- High income OECD countries, LAC - Latin America & Caribbean, ECA- Europe & Central Asia, MNA- Middle East & North Africa, EAP - East Asia & Pacific, SSA-Sub- Saharan Africa, SAS- South Asia.

Source: World Bank (2017).

Graph 8.5. Illiteracy: Can an SMS campaign work? In most sub-Saharan African countries, a large share of adults ages 15+ are illiterate



Source: UIL 2017

across countries: higher-income sub-Saharan African countries tend to have higher literacy rates than poorer countries (33% of adults in Mali are literate, compared with 95% in the Seychelles). The level of basic skills also varies within countries by income level: for example, in Tanzania and Uganda, the pass rate for basic literacy and numeracy skills falls by nearly 50% from “non-poor” to “ultra-poor” populations (Evans et al., 2019).

Although it is important to mention that younger generations (aged 15 to 24 years) are progressively better educated than older generations reflecting increased access to

schooling, youth literacy rates still remain low in sub-Saharan Africa. These rates remain at 54% in rural areas while in urban areas this number is 87%. For example, in Niger, only 15% of youth in rural areas can read a simple sentence. In Burkina Faso and Chad this number is 19%, and somewhat better in Guinea and Côte d'Ivoire with 35%. As a result, this creates a significant challenge for sub-Saharan African countries to be able to really reap the benefits of access to digital technologies. Despite this, innovative ways exist to resolve this major constraint. Technologies need to adjust to be able to resolve this structural gap, as exemplified by the large share of the

population aged 15 years and above that have used mobile phone/Internet to access financial accounts despite low education and no structured skill upgrading.

Conclusions and policy recommendations

The accelerating adoption of digital technologies in sub-Saharan Africa provides a great opportunity but, at the same time, significant challenges remain that need to be resolved for the region to realize and leapfrog from the benefits of these technologies. The penetration of mobile phone technology has significantly increased although there is still an important gap between access in urban and rural areas, and significant costs to access these technologies being the highest costs to access Internet. Better access to price information can allow farmers to plan more effectively how much to plant each season, and how much and what type of investments could be profitable based on demand and supply fundamentals. Digital technologies can provide better access to price information and improved technology, and can promote learning. All these effects could potentially affect agricultural productivity and income-generating opportunities for the poor. The different benefits can go even further to issues related to extension, blockchain technologies, precision agriculture, and improving financial access to farmers as is clearly the case of M-Pesa in Kenya, which has resulted in increased rates of financial inclusion.

Taking advantage of these opportunities, though, depends not only on connectivity, but also on relevant content provided in accessible and useful forms, and in improving the capability of households to be able to benefit from this knowledge. These three Cs (connectivity, content, and capability) should progress simultaneously. Although the cost

of digital technologies is falling rapidly, there is still the need to continue improving access and use of new technologies in the poorest areas, given the significant difference in costs that are still present in sub-Saharan Africa. In response to this problem, several subsidy mechanisms have been implemented in attempts to improve access to rural households and ensure that poor people pay no more than their wealthier urban counterparts do for access to telecommunications. The economic rationale for subsidies is based on the existence of consumption and production externalities, network externalities, and scale economies. The main problem with such schemes, however, is sustainability and best practices such as the ones of the telecommunication investment funds in Chile and Peru (Cannock, 2001; Wellenius, 2002, Wellenius, Foster y, & Malmberg-Calvo, 2004) should be explored in which the resources came from a small percentage of the gross operating revenues of the incumbent private operators.

Similarly, certain telecommunication policy options can trigger higher mobile Internet market penetration in rural areas. For example, as mentioned by Kayumove (2019), the European Union (EU) regulations safeguard a free market for telecommunications to stimulate investments in less attractive geographic areas (Cambini & Jiang, 2009). Competition in the telecommunication sector is promoted through a general authorization regime, which allows mobile operators to start a business with license exempt entry, or a simple notification submitted to the regulatory authority as opposed to obtaining an individual operating license. These simplified entry requirements to start operations reduce regulatory barriers that could otherwise relate to discretionary, additional administrative charges or uncertainties over renewal of an operating license term. The expansion of mobile networks to remote areas is also

influenced by spectrum management regulations and policies. Spectrum type and availability have a direct impact on the maximum coverage and capacity of mobile base stations and therefore determine the investments required to cover a certain area. This is what will allow a dual broadband strategy, promoting both the deployment of wireless broadband networks and the adoption of voice telephony applications. Specifically, targeted interventions to low-income users is something that needs to be carefully assessed to better guide the roles of the public and private sectors. Lower radio frequencies significantly reduce the capital expenditures for base stations and provide greater coverage in rural areas (Kayumova, 2019).

In addition, to achieve more access at a lower cost through an increase in competition, the private sector should increase investment in sub-Saharan African countries. To achieve this, a clear need exists to improve the enabling environment for business in sub-Saharan Africa, which today is the worst of all regions in the world. This depends on several factors, one of which is the enabling regulatory environment (Ajani, 2014). Regulatory stimuli can trigger telecommunication operators to accelerate network rollouts, and new entry of operators. In addition, all the different dimensions of the EBA ICT index—for example the licensing framework for mobile operators, spectrum management, and infrastructure sharing normally referred to as interoperability—need to improve.

Regarding capabilities, this is a major constraint for sub-Saharan Africa where the lowest literacy rates in the world are observed. Adult literacy rates are below 50% in: Benin, Burkina Faso, Central African Republic, Chad, Comoros, Côte d'Ivoire, Ethiopia, The

Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, and South Sudan. In Burkina Faso, Niger, and South Sudan literacy rates are still below 30%. Despite this, there are innovative ways to resolve this major constraint. Technologies need to be adjusted to resolve this structural gap, as exemplified by the large share of the population aged 15 years and over that have used mobile phone/Internet to access financial account despite with low education and no structured skill upgrading. This capability constraint is a huge challenge, but at the same time, there is a clear opportunity in sub-Saharan Africa given that 43% of the population are below the age of 15 years. An opportunity exists therefore through significant investment in education in schools to improve the skills, especially the digital skills, of the youth.

Finally, content is also crucial, especially when mobile phone penetration is high. The existing evidence, although limited to a few cases, suggests the importance of content quality to the use of digital technologies for development. A clear need exists to continue assessing the impact of good quality information. In addition, many aspects of agricultural information constitute a public good, and governments need to invest in providing the best possible information regarding prices for different markets, produce varieties, and produce quality, as well as information regarding production technologies and other agronomic information. If these investments are not made, the potential impact of digital technologies could be limited, especially for high value commodities and markets. We need innovative ways to bring together the public and private sectors to ensure that the three C's are addressed as a whole.

and answered via voice message. In their evaluation, Cole and Fernando (2012) randomly selected a group of households which received toll-free AO service. The preliminary results suggest that households which benefited from AO shifted their pesticides use from hazardous to safer ones. These results also suggest that beneficiaries are more likely to harvest cumin, a high-value cash crop. These findings suggest that the content provided through the voice messages was useful for the farmers, and was thus adopted more willingly. Similarly Fu and Akter (2012) investigated the impact of a program called Knowledge Help Extension Technology Initiative (KHETI) in Madhya Pradesh, India. KHETI operates through agricultural specialists who travel across villages with special mobile phones. These mobile phones are able to record short dialogue strips (SDSs), short videos that depict a particular problem faced by a farmer. These SDSs are sent to scientists, who determine solutions for each case; the solutions are then passed back to the farmers. Using difference-in-differences estimations, Fu and Akter (2012) argue that those in the KHETI group⁴ increased their awareness and knowledge of extension services compared to a control group. The authors also provide before-and-after comparison of perceptions of beneficiaries, indicating that they perceive KHETI to be more useful, faster, and of better quality than other services. However, no clear impacts were identified.

These studies highlight the heterogeneity of extension projects: one-way versus two-way communication between farmers and agricultural specialists, SMS versus voice

transmission of advice⁵ and oral description of problems versus visual representations. However, there is still not much evidence regarding which projects work and which do not, as most agricultural extension work being conducted through digital technologies is recent.

Finally, digital technologies use can be constrained by smallholders' lack of capacity to actually use them. Delivery methods themselves face limitations. For instance, data restrictions (usually 160 characters) that can render SMS messages ineffective in providing more complex advice about agricultural practices or new technologies. Additionally, farmers might need higher levels of technical ability or literacy to process the contents of these messages. Thus, the way in which information is delivered must be considered, as should the need for education or capacity building to ensure that farmers can understand and use the information effectively.

Graph 8.5 clearly shows the major constraints faced by countries in sub-Saharan Africa which, despite the gradual increase in basic education and literacy rates in recent decades, still lacks basic skills needed to take advantage of digital technologies. The starting level was very low and recent gains in enrollment and completion do not necessarily translate into improvements in the quality of education. High repetition rates, teacher shortages, and underperformance in test scores all contribute to the poor quality of education in the region (UNESCO, 2017). Sub-Saharan Africa has the lowest literacy rates among all world regions. As mentioned by Choi et al. (2019), on average, only one-third of the population above the age of 15 is able to read and write, well below the global average of 86% (UNESCO, 2017). The level of basic skills varies significantly

⁴ All households in the KHETI group were previously part of an association of poor and marginalized farmers in Madhya Pradesh. Given that the treatment and control groups may have had different characteristics to begin with, these results should be interpreted with caution.

⁵ Mittal and Mehar (2013) argue that voice messages can come at unpredictable times during the day, so SMS might be more convenient. However, if the proportion of the illiterate population is substantial, voice messages can be a better dissemination tool.

References

- Abraham, R. (2007). Mobile phones and economic development: Evidence from the fishing industry in India. *Information Technologies and International Development*, 4(1), 5–17.
- Ajani, E. (2014). Promoting the use of information and communication technologies (ICTs) for agricultural transformation in sub-Saharan Africa: Implications for policy. *Journal of Agricultural & Food Information*, 15(1), 42–53.
- Aker, J.C. (2008a). *Does Digital Divide or Provide? The Impact of Cell Phones on Grain Markets in Niger*. Washington, D.C.: Center for Global Development.
- Aker, J.C. (2008b). “Can You Hear Me Now?” *How Cell Phones are Transforming Markets in Sub-Saharan Africa*. Washington, D.C.: Center for Global Development.
- Aker, J.C. (2010). Information from markets near and far: Mobile phones and agricultural markets in Niger. *American Economic Journal: Applied Economics*, 2(3), 46–59.
- Aker, J.C. (2011). Dial “A” for agriculture: Using digital technologies for agricultural extension in developing countries. *Agricultural Economics*, 42(6), 631–47.
- Alliance for Affordable Internet. (2018). *Affordability Report 2018*. Washington, D.C.: World Wide Web Foundation.
- Africa Undersea Cables. (2019). Africa Undersea Cables 2021. Retrived from [http:// many possibilities. net/African-undersea-cables](http://manypossibilities.net/African-undersea-cables). Version 48. July 2019.
- Africa Undersea Cables (2019). A history. Retrieved from [http:// many possibilities. net/African-undersea-cables](http://manypossibilities.net/African-undersea-cables). Version 48. July 2019.
- Bandiera, O, & Rasul, I. (2006). Social networks and technology adoption in northern Mozambique. *Economic Journal, Royal Economic Society*, 116(514), 869–902.
- Beuerrmann, D.W. (2011). *Telecommunication Technologies, Agricultural Productivity and Child Labor in Rural Peru*. Unpublished PhD dissertation, University of Maryland.
- Cannock, G. (2001). Telecom subsidies: output based contracts for rural services in Perú (World Bank Viewpoint Note 234). Washington D.C: The World Bank.
- Cambini, C., & Jiang, Y. (2009). Broadband investment and regulation: a literature review. *Telecommunications Policy*, 33(10), 559–574.
- Chair, C. & De Lannoy, A. (2018). *Youth Deprivation and the Internet in Africa* (Policy Paper No. 4, Series 5). Cape Town South Africa: Research ICT Africa.
- Chong, A., Galdo, V., & Torero, M. (2005). *Does Privatization Deliver? Access to Telephone and Household Income in Poor Rural Areas using a Quasi-Natural Experiment in Peru*. Washington, D.C.: Inter-American Development Bank.
- Cole, S.A., & Fernando, N. (2012). *The Value of Advice: Evidence from Mobile Phone-Based Agricultural Extension* (Harvard Business School Working Paper Series No. 13-047). Boston, MA: Harvard Business School.

- Conley, T.G., & Udry, C.R. (2010). Learning about a new technology: Pineapple in Ghana. *American Economic Review, American Economic Association*, 100(1), 35–69.
- Evans, D., Arias, O., & Santos, I. (2019). The Skills Balancing Act in Sub-Saharan Africa. Washington, D.C.: The World Bank.
- Fafchamps, M., & Minten, B. (2012). “The Impact of SMS-Based Agricultural Information on Indian Farmers.” *World Bank Economic Review*, 26(3), 383–414.
- Fu, X., & Akter, S. (2012, August). *Impact of Mobile Telephone on the Quality and Speed of Agricultural Extension Services Delivery: Evidence from the Rural India*. Paper presented at the 2012 Conference of the International Association of Agricultural Economists, Foz do Iguacu, Brazil.
- Goyal, A. (2010). Information, direct access to farmers, and rural market performance in central India. *American Economic Journal: Applied Economics*, 2(3), 22–45.
- GSMA. (2019). *The Mobile Economy*. London, UK: GSM Association Intelligence.
- ITU. (2018). *Measuring the Information Society Report: Volume 1*. Geneva: International Telecommunications Union (ITU).
- ITU. (2019). Data retrieved from www.itu.org.
- Jensen, R. (2007). The digital divide: Information technology, market performance and welfare in the South Indian fisheries sector. *The Quarterly Journal of Economics*, CXXII(3), 979–924.
- Jensen, R. (2010). Information, efficiency and welfare in agricultural markets. *Agricultural Economics*, 41(Issue Supplement S1), 203–216.
- Jieun C., Dutz, M., & Usman, Z. 2019. *The Future of Work in Africa. Harnessing the Potential of Digital Technologies for All*. A Companion to the World Development Report 2019 on the Changing Nature of Work. Washington, D.C.: The World Bank.
- Kayumova, M. (2019). *The Role of ICT Regulations in Agribusiness and Rural Development*. Enabling the Business of Agriculture. Washington, D.C.: The World Bank Group..
- Klonner, S., & Nolen, P.J. (2010). Cell Phones and Rural Labor Markets: Evidence from South Africa. Proceedings of the German Development Economics Conference, Hannover, 56, Verein für Socialpolitik, Research Committee Development Economics. Germany.
- Labonne, J., & Chase, R.S. (2009). *The Power of Information: The Impact of Mobile Phones on Farmers' Welfare in the Philippines* (The World Bank Working Paper Series No. 4996). Washington, D.C.: The World Bank.
- McKinsey & Co. (2013). *Lions go digital: The Internet's transformative potential in Africa*. New York: McKinsey Global Institute.
- Mittal, S., & Mehar, M. 2013. *Agricultural Information Networks, Information needs, and risk management strategies: A Survey of Farmer in Indo-Gangetic Plains of India*. Delhi, India: International Maize and Wheat Improvement Center (CIMMYT).

- Mitra, S., Mookherjee, D., Torero, M. & Visara, S.. 2011. *Asymmetric Information and Middleman Margins: An Experiment with Potato Farmers*. Boston, MA: Boston University.
- Muto, M., & Yamano, t. 2009. The impact of mobile phone coverage expansion on market participation: Panel data evidence from Uganda. *World Development*, 37(12), 1887–1896.
- Nakasone, E., Torero, M., & Minten, B. (2013). The Power of Information: The Digital Technologies Revolution in Agricultural Development. “Power of Information”. *Annual Review of Resource Economics*, Vol. 6 pp. 533-550, October.
- Nakasone, E., & Torero, M. (2016). A text message away: ICTs as a tool to improve food security. *Agricultural Economics, International Association of Agricultural Economists*, 47(S1), 49–59.
- National Statistic Office of Malawi and ICF Macro. 2011. *Malawi Demographic and Health Survey 2010*. September 2011. . Zomba, Malawi, and Calverton, Maryland, USA: NSO and ICF Macro.
- NSRC. (2019). Africa undersea cables by 2021 and terrestrial fiber optics. Network Start-up Resource Centre, University of Oregon. Retrieved from <https://nsrc.org/>
- Reuters. 2012. Reuters market light: impacts. www.Reutersmarketlight.com/impact.php. Access in 2012.
- Svensson, J., & Yanagizawa, D. (2009). Getting prices right: The impact of the Market Information Service in Uganda. *Journal of the European Economic Association*, 7(2–3), 435–445.
- Torero, M. (2013). *Information and Communications Technologies: Farmers, markets, and the power of connectivity*. 2013 Global Food Policy Report. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- UIL. (2017). *The Status of Adult Learning and Education in Sub-Saharan Africa*. Hamburg: UIL (UNESCO Institute of Lifelong Learning).
- UNESCO. (2017). *Reading the past, writing the future Fifty years of promoting literacy*. Paris, France: United Nations Educational, Scientific and Cultural Organization (UNESCO).
- Wellenius, B. (2002). Closing the gap in access to rural telecommunications: Chile 1995–2002 (World Bank Discussion Paper 430). Washington D.C.: The World Bank.
- Wellenius, B, Foster y V., & Malmberg-Calvo, C. (2004). *Private Provision of Rural Infrastructure Services: Competing for Subsidies* (World Bank Policy Research Working Paper 3365) Washington, D.C.: The World Bank.
- World Bank. (2017). *Enabling the Business of Agriculture 2017*. Washington, D.C.: The World Bank.
- World Bank. (2018). *Poverty and Share Prosperity. Piecing Together Poverty Puzzle*. Washington, D.C.: The World Bank.

09 Africa's Changing Fertilizer Sector and the Role of the Private Sector

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Key Messages

- 1** Africa, the recognized source of current and future demand growth for fertilizer, has experienced a significant expansion of public and private fertilizer investments in the last decade.
- 2** Though government subsidies are typically a smaller share of the total fertilizer consumed in many African countries, they continue to be the focus of the debate by policy makers and development partners.
- 3** The private sector activities in the midstream and downstream of fertilizer supply chains are not new. They have facilitated fertilizer supply for a long time though they are increasingly playing important roles in expanding timely access by smallholders to affordable and appropriate fertilizer (for their soil and crop needs), which can transform their productivity.
- 4** Government and donor efforts should realize the important role already being played by the private sector. They should increase the attention and resources allocated to understanding and improving the operations of the private sector in the fertilizer supply chain. This includes infrastructure, policy consistency, and appropriate legislation to provide a conducive environment for the private sector.

Introduction

Over the past decade, the African fertilizer market has been growing at over 8% per year (Wallace, 2017). Data from the International Fertilizer Association (IFA) reveal that fertilizer demand in Africa increased by 42% between 2015 and 2017. This was largely driven by West Africa, particularly Nigeria and Mali (Heffer, 2019).⁶ Higher demand growth in West Africa

is not surprising since fertilizer use per hectare was already greater than 30 kg per hectare in 7 of the 10 countries in East and Southern Africa, compared to 1 out of 15 countries in West Africa (Heffer, 2019). Fertilizer demand growth in Africa contrasts with global fertilizer market growth rates, which are declining—the global market is becoming saturated.

This growing market in Africa occurs alongside abundant continental natural resources for fertilizer production. Africa's potential for fertilizer demand and supply has been recognized and led to an expansion of fertilizer investments (both public and private) in sub-Saharan Africa in the last five years

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⁶ This is not to say that East and Southern Africa has not recorded any growth as significant increases in apparent consumption (between 2010 and 2017) also occurred in countries such as Ethiopia and Kenya (see Figure 9.1).

(Heffer, 2019; Wallace, 2017). In the presence of appropriate policies to guide the development, use of appropriate fertilizers (alongside other necessary inputs and farming practices), and an enabling environment, expanding investments in sub-Saharan Africa could create opportunities for improved access to affordable and appropriate fertilizer for African farmers that will translate into improved productivity.

This chapter presents the story of Africa's dynamic and rapidly changing fertilizer sector. It presents a summary of the nature and changing demand for fertilizer faced by the private sector, and how the private sector is organized to respond to this demand. It summarizes how policies (as well as programs of donor and non-governmental organizations (NGO)) have contributed to this recent growth and dynamism and affect the structure, conduct and performance of the private sector firms in the fertilizer supply chain. These firms include manufacturers, fertilizer wholesalers and retailers. The chapter concludes with some reflections on the way forward and implications for policy makers, donors, NGOs and the private sector.

Overview of fertilizer demand trends across sub-Saharan Africa

Inorganic fertilizer use in sub-Saharan Africa has been low but rising over the last decade. The International Fertilizer Association estimates that fertilizer demand in the region will be growing by 5% annually by 2022 (Heffer, 2019). Figure 9.1 shows apparent fertilizer consumption more than doubling for some groups of countries between 2010 and 2017 with consumption at 4.7 million tons (MT) of nutrients in 2017 alone. Fertilizer consumption tends to be concentrated in the top four country consumers (Zambia, Nigeria,

Ethiopia, and Kenya) accounting for over 50% of the total (see Figure 9.2). Although these same countries account for about half of total crop output in terms of total weight (FAOSTAT, 2019), they are also countries that have fertilizer use rates per hectare (46.2 kg, 128.2 kg, 45 kg and 46 kg respectively) significantly higher than the 16 kg per hectare commonly believed for Africa (World Bank, 2016). Generally, data availability across Africa is often poor and varies significantly by source and country. According to the World Bank (2016), the global average of inorganic fertilizer application per hectare is 135 kg while in sub-Saharan Africa the average fertilizer use stands at about 16 kg per hectare of cultivated land. This figure masks significant variation in fertilizer use between and within different African countries and across different crops (cash versus food) and farming types (industrial plantation versus smallholder farms). For example, fertilizer application rates in Kenya have more than doubled from about 18 kg of nutrients per hectare of arable land in the 1990s to 46 kg on average between 2010 and 2015 (Liverpool-Tasie, Jayne, Muyanga, & Sanou, 2017). Similarly, Sheahan and Barrett (2017) using data from recently available nationally representative and comparative household surveys in sub-Saharan Africa reveal that fertilizer use is considerably more prevalent than is often recognized. The surveys find a simple average nutrient application rate of 26 kg per hectare which is equivalent to 57 kg per hectare of total fertilizer (Sheahan & Barrett, 2017).

Africa's rising fertilizer demand is also demonstrated by the current levels and growth in imports over the last decade. The import (Figure 9.3) and consumption graphs are similar, partly because most fertilizer consumed in sub-Saharan Africa (above 80%) is imported (AFO, 2019).

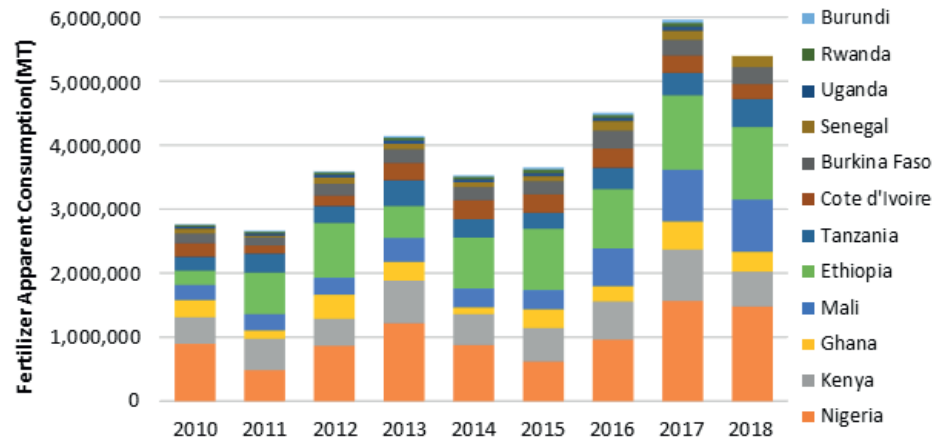


Figure 9.1. Fertilizer apparent consumption in Africa

Note that this figure presents a partial picture as it includes only the countries for which data are available over the relevant time period.

Source: www.africafertilizer.org

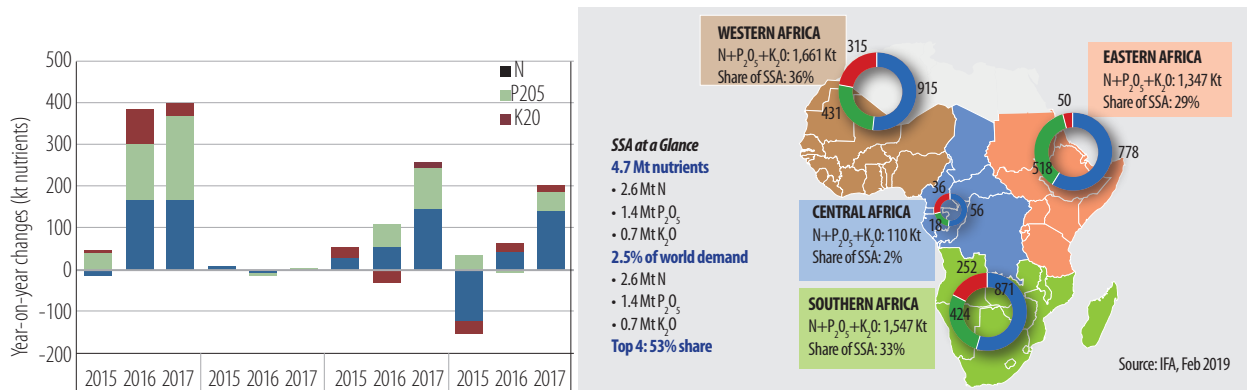


Figure 9.2. Change in tons of nutrients consumed across Africa

Source: Heffer (2019)

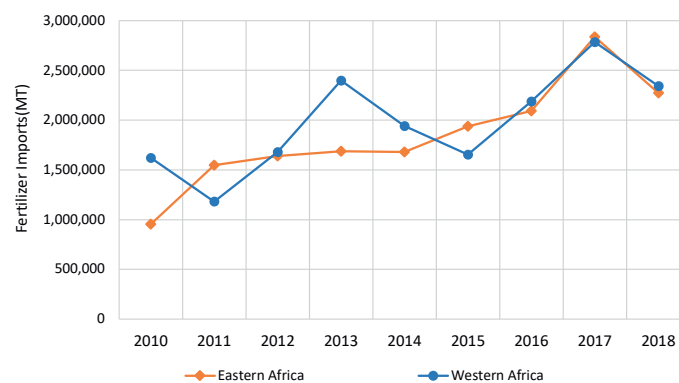


Figure 9.3. Fertilizer imports across sub-Saharan Africa

Source: Authors generated with data from Fertilizer.org

The growing fertilizer demand in Africa is said to be driven by several factors, including increased global and local fertilizer supply (and an increasing presence of local manufacturing and blending capacity) in the African market, higher output prices for certain fertilizer intensive products (such as cotton, some cereals, fruits and vegetables), improved crop yields, and government programs (Heffer, 2019).

Africa's Fertilizer Supply Chain

Countries have particular complexities and thus follow distinct paths to get fertilizer from the importer or domestic fertilizer manufacturer, via intermediaries to the farmer. However, Figure 9.4 presents a general description of the structure of the fertilizer supply chain in Africa. Since fertilizer product supply is currently dominated by imports, countries typically face a fixed price and most of the imports come through the seaports. From the ports, they are moved into the market mainly by trucks. Countries without seaports, rely on the ports of their neighbors and fertilizers are transported (predominantly by trucks) via the main highways through the land borders. Generally, from imports/production to delivery of the fertilizer products to farmers, there are between three and six steps/players, depending on whether the fertilizer supply chain fits into either of three broad categories depending on whether the product is for: (1) dedicated contract farming/out-grower scheme channel; (2) for the private fertilizer retail channel; or (3) a government intervention/subsidy program supply chain.

Private retail channel

When the products are channeled through private retail, they typically go from an import/production point to hub agrodealers (wholesalers), to retailers (bulk breakers) and sub-retailers before they are purchased by smallholder farmers. This is the primary way that most (often over 90%) smallholders acquire fertilizer in Africa. At each of these stages, there are handling costs which contribute to making the end price paid by farmers more than 50% higher than that of farmers in the origin countries of the product (IFDC, 2018).⁷ In a study covering 7 African countries that constituted over 60% of fertilizer consumption in sub-Saharan Africa, (Liverpool-Tasie, Jayne, et al., 2017) inland costs, particularly transportation and handling costs (including bagging, unloading, and storage), typically constitute between 30% and 50% of the final retail price of fertilizer. Apart from Ethiopia where inland costs are just over 10% of the final price, transportation costs from the import port to the capital city for other landlocked countries, including Zambia and Malawi, adds about 25% to the price of urea fertilizer (Liverpool-Tasie, Jayne, et al., 2017). In Nigeria, over 30% of the difference between the wholesale price and the import price is due to transportation (Liverpool-Tasie & Takeshima, 2013). These costs increase as you move to the rural areas. Transportation costs further increase the price of fertilizer by another 10% and 5% in Zambia and Malawi respectively. It is higher in other countries in sub-Saharan Africa (such as Ghana, Nigeria, and Tanzania) where farmers have to travel up to about 70 km to reach markets (Liverpool-Tasie, Jayne, et al., 2017) increasing their effective cost of the fertilizer (see Figure 9.5).

⁷ This does not imply that avoiding intermediaries would increase fertilizer availability and lower prices, but rather indicates the opportunities to reduce some costs along the supply chain by addressing infrastructure and handling costs.

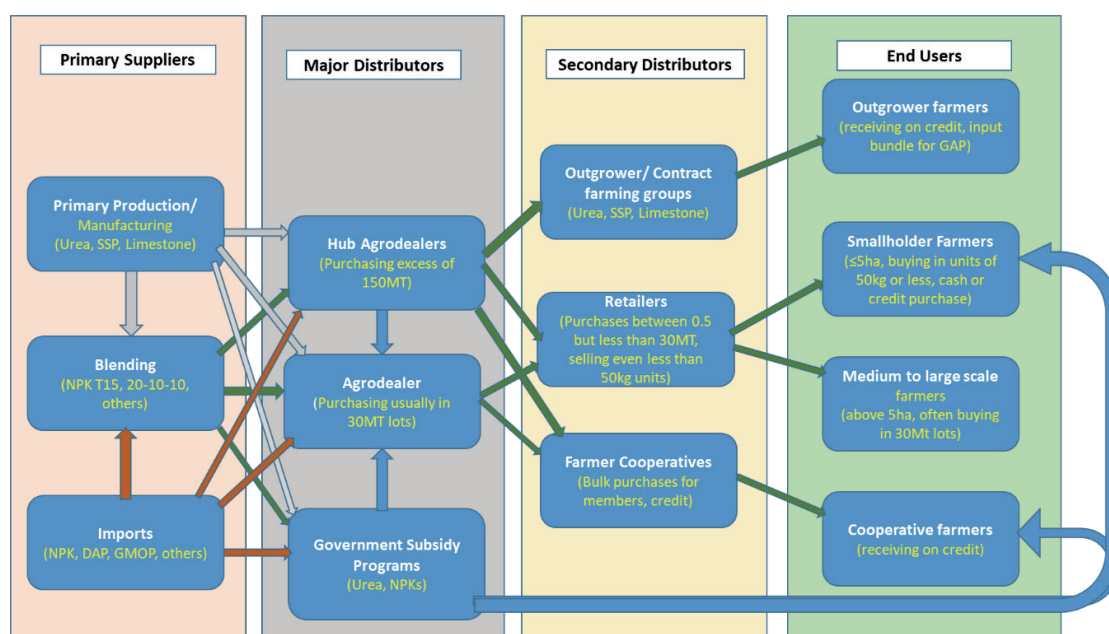


Figure 9.4. Illustration of fertilizer supply chain in sub-Saharan Africa

Source: Generated by authors

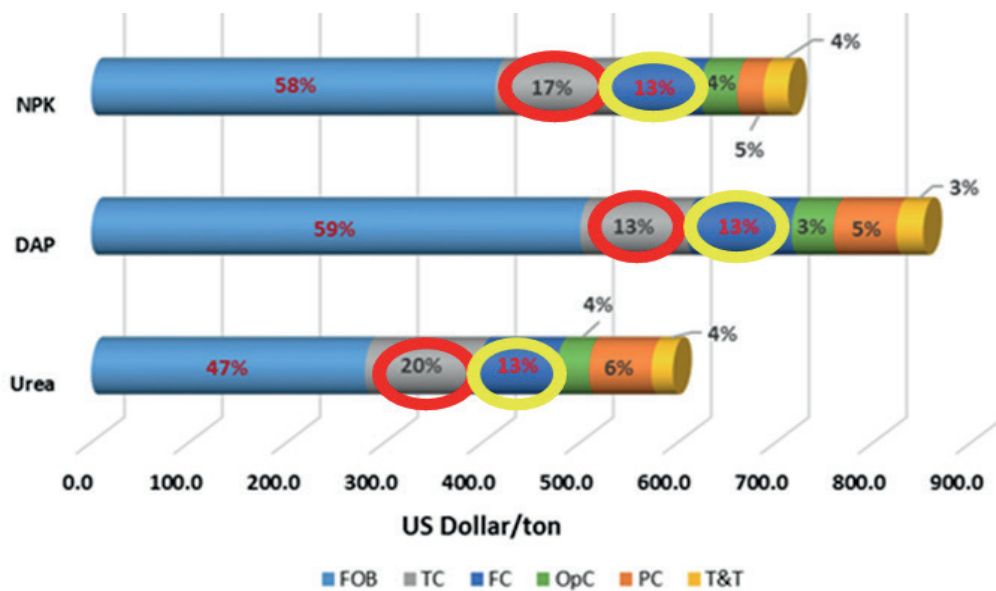


Figure 9.5. Cost build-up for fertilizer in sub-Saharan Africa

Note: FOB: free on board; TC: transport cost; FC: finance cost; OPC: other ports costs; T&T: tax and tariffs.

Source: IFDC (2018)

Contract farming channel

This channel often operates in a similar way to the government channel, but through contracts. Typically, the contractual relationship is between farmers and various users of farm produce we call counterparts—mainly processors, commodity exchange companies, produce merchants, and exporters of crop commodities. The main objective of the relationship is for farmers to produce and sell their outputs to the counterpart at either a pre-agreed price or following a pricing principle. To aid their production, farmers buy their fertilizers through the counterpart either by paying fully upfront, or partial credit, or fully on credit to be paid when the produce is delivered to the counterpart. A common characteristic of this channel is that the types of fertilizers often supplied to the farmer are determined by the client, and each channel focuses on specific crops. This differs from government channels which are generic in focus and often do not provide crop-specific fertilizers. This channel has been commonly used for traditional cash crops, including tobacco in Malawi and cotton in Zambia, and in many West African countries such as Mali and Burkina Faso (Reardon et al., 1997; Shaba, Edriss, Mangisoni, & Phiri, 2017; Tschirley & Kabwe, 2007).

Government subsidized channel

Traditionally, many governments directly procured fertilizer for their subsidy programs (directly or from importers through tenders) and then distributed it to farmers and/or farmer groups at designated locations or government depots where the fertilizer is sold at a subsidized price. This often eliminates the hub agrodealers and retailers and masks the true cost build up associated with the numerous layers in the private retail channel. Most government subsidy programs

have moved away from direct government distribution to farmers and farmer groups and now attempt to work more through private sector hub agrodealers, with varying levels of inclusion in terms of the number of such agrodealers that are able to participate in the government program.

Private sector activities in the upstream and midstream of Africa's fertilizer supply chain

Fertilizer production capacity in Africa has increased significantly in the last decade. However, the region still accounts for only about 2.5% of the global fertilizer production market (Heffer, 2019). Between 2018 and 2019 there was an estimated 35% growth in the number of fertilizer manufacturing and processing plants on the continent (AFO, 2019). Fertilizer production in Africa is concentrated in six countries: Egypt, Tunisia, South Africa, Algeria, Nigeria, and Morocco. With the exception of Nigeria whose industry has only recently taken off, the other five countries have well-developed fertilizer industries. Growth of fertilizer imports is expected to continue through 2021, due to increased fertilizer demand. Except in Ethiopia, the liberalization of the fertilizer market via lower government direct involvement in importation is a major contributor to the rise in the fertilizer imports (IFDC & AFAP, 2018). This has led to an expansion in distributors (typically an agent of a manufacturer or processor/ blending facility and fertilizer retailers) who are private traders (often small and medium-scale enterprises) that sell fertilizers to retailers or retail fertilizer to farmers. Across the continent now, there are likely about 100,000 fertilizer retailers. Bumb et al. (2011) estimate up to 10,000 retailers operating in Nigeria alone; IFDC & AFAP (2018) indicates about 8,000 in Kenya, almost 4,000 in Tanzania and over 2,000 in Mali (Table 9.1). Wallace (2017) estimates that a typical agrodealer services approximately 800 farmers in sub-Saharan Africa. While village

Table 9.1. Fertilizer production, processing and distribution in Africa

Country	Number of fertilizer processors or blenders in 2017	Number of fertilizer importers	Number of fertilizer distributors	Number of fertilizer retailers	Volume sold in 2017 (MT)
Burkina Faso	1	7	100	1,155	280,000
Ghana	4	45	178	1,380	438,050
Kenya	4	64	800	8,000	670,254
Malawi	2	8	8	929	315,000
Mali	3	6	5	2,177	785,000
Mozambique	4	7	59	980	87,000
Nigeria	28	51	61	397	1,502,250
Rwanda	1	5	5	1,066	57,901
Tanzania	1	6	--	3,855	348,966
Uganda	1	–	–	–	66,400

Notes: Manufacturing plants refer to those which undertake some type of chemical reaction to produce fertilizer. These include the large specific products plants such as Urea, Ammonium Nitrate, and Phosphoric Acid Plants. Processing plants refers to those companies which use pre-manufactured products to formulate products for end use, largely blending and steam granulation and distributors refers to wholesalers such as hub-agro dealers. Selected countries are those for which data was available and are not ordered in any systematic way. They just demonstrate the varying but active presence of activities along the fertilizer supply chain to complement information on the recent expansion of local manufacturing and blending plants in Africa.

Source: AFAP, 2018

promoters (farmers in rural communities who serve as salesmen and extension agents for private input dealers) in Nigeria service between 20 and 250 farmers, an agrodealer (particularly those who are trained) would service 250 to 500 farmers. The customer base in many cases is a key factor that drives the entrepreneur to invest in a retail shop, an investment that is sensitive to distortions due to changes in government interventions.

Of the three primary fertilizer nutrients—nitrogen, phosphorus, and potassium—the increases in production in Africa have largely been in nitrogen coming from countries with natural gas deposits. The production growth has primarily resulted from the additional nitrogen manufacturing capacity in Nigeria,

which has been producing over 2 million tons of urea annually since 2017 with capacity estimated to more than double by 2020–2021 with two new plants expected (AFO, 2019; Heffer, 2019).

Although global supply is not necessarily lacking, the domestic manufacturing level for phosphate fertilizer products in Africa have remained relatively stagnant while that of potassium products is either non-existent (AFO, 2019) or available (e.g., in Senegal) but not economically viable to justify investments in domestic production and blending facilities in the absence of strong trade links due to the small domestic market (Fuentes, Bumb, & Johnson, 2012). As at 2019, there are five major nitrogen fertilizer manufacturing facilities in

sub-Saharan Africa (one located in Madagascar, and two each in Nigeria and Zimbabwe), and seven phosphate fertilizer manufacturing plants (one each located in Kenya, Mali, Tanzania, Togo, and Zimbabwe, and two in Senegal) (AFO, 2019).

Overall, of the total of 4.7 MT—2.6 MT nitrogen, 1.4 MT phosphorus, and 0.7 MT potassium—of fertilizer nutrients consumed in sub-Saharan Africa in 2017, over 80% was imported from outside of the consuming countries (AFO, 2019). This supply was mainly by multinational corporations from Eastern Europe, the Middle East, and North America.⁸ Multinational companies such as Yara also have bases in several countries and import finished products from these countries to supply countries in sub-Saharan Africa such as Côte d'Ivoire (see <https://www.yara.ci/a-propos-de-yara/yara-cote-divoire/>). This is driven by oversupply, and a corporate strategy to increase profits (and demonstrating their ability to entertain fertilizer markets from A to Z—from ore extraction to production, and local distribution to investors) that has pushed producers to expand their activities and nodes of operation along the fertilizer supply chain to secure outlets for their product.

However, with increasing recognition of the huge potential fertilizer market in Africa, many multinational companies alongside local investors, are now establishing operations in sub-Saharan Africa to expand their market in the region. Some large companies, such as Saudi Arabia's Ma'aden (capitalizing on its proximity to East Africa), have expanded their marketing activities in the Eastern Africa market (Ma'aden, 2018). The company's strategy has included acquiring an input

distribution company as it tries to learn how to transition from being a trading to an integrated distribution company.

Other companies, such as OCP (the world's leading phosphate fertilizer), have used a different approach to stimulate imports of compound fertilizers such as the nitrogen, phosphorus, potassium blend (NPK) and phosphate from Morocco. OCP has sought to further integrate into the fertilizer supply chain in Africa through the creation of its Africa subsidiary, OCP-Africa Corporation, with new manufacturing facilities in 13 countries (AFO, 2019; Wallace, 2019). To build up their market share in the long run, companies maintain the supply of their products to countries while establishing these blending facilities. For example, in Nigeria, OCP delivers their product wholesale into the government program while investing in three domestic blending plants.

With more global interest in increasing the appropriate use of fertilizers across Africa (alongside fertilizer producers and distributors desire to grow their market shares), there has been significant growth in the number of fertilizer blending plants using two or more of the primary products to produce different formulations of NPK to supply balanced nutrients to farmers.⁹ For instance, there are now, already in operation, over 50 fertilizer processing/blending plants in West Africa and 30 in East and Southern Africa with 37 more under construction, mostly expected to be completed in 2019 (AFO, 2019). The distribution of these blending facilities is, however, significantly skewed in favor of countries such as Nigeria, with local primary fertilizer manufacturing capacity (of urea), government policies promoting the production and use of balanced fertilizers, an increasingly

⁸ Setting up business in the fertilizer industry requires huge capital investments and access to raw materials, particularly for potash and phosphate. These both create a barrier to entry and explain why the global fertilizer supply is highly concentrated such that the top five countries in fertilizer production control more than 50% of the global production capacity.

⁹ Blending growth is partially explained by the ability to address several crop and soil specific nutrient requirements with the same inventory of raw materials just by adjusting the formula.

private sector driven fertilizer industry, and a huge domestic market to justify such investments. Of the 37 blending facilities under construction, Nigeria alone accounts for 19 (AFO, 2019), consistent with its leading cropping share on the continent. Similarly, there has been a strong emergence of organic fertilizer manufacturers with 12 companies producing organic complements to chemical fertilizers across sub-Saharan Africa.

Thus, Africa is experiencing significant investment in fertilizer supply, almost exclusively driven by the private sector and with increasing local investment alongside multinational corporations (AFO, 2019). This is likely to reduce the level of import dominance and potentially lower fertilizer prices significantly for smallholder farmers on the continent by eliminating various import related costs (Figure 9.5).

Private sector activities in the downstream of Africa's fertilizer supply chains

Apart from the few government or donor programs that directly distribute fertilizers to smallholders, the private sector dominates the downstream of the fertilizer supply chain in Africa. These are usually small and medium-scale economic actors involved in the distribution of fertilizer and other complementary inputs. In the last decade, in addition to the rapidly increasing number of actors, the continent has experienced growth in the kinds of activities provided by fertilizer distributors/wholesalers and retailers, which is increasing smallholder access to and efficient use of fertilizers (AFO, 2019).

Downstream private sector growth across Africa has been largely driven by the increase in current and expected fertilizer consumption on the continent, government investment in

infrastructure, the reduction in public sector involvement in the fertilizer subsector in many countries and the rise in private investment in the sector, government investment in infrastructure, and government programs encouraging more private sector participation.

For example, Kenya has witnessed rapid investment in private fertilizer distribution networks leading to an increasingly dense network of fertilizer retailers (largely micro and small enterprises financed from personal savings) operating in rural areas which has reduced the distance smallholders have to go to buy fertilizer by half from 8.4 km in 1997 to 4 km in 2017 (Liverpool-Tasie, Jayne, et al., 2017). This was partly driven by the government's decision to reduce its role in the fertilizer sector and support private sector participation, for example, through infrastructure investment (Ariga & Jayne, 2009; Ariga, Shannon, Keating, Mason, & Wanzala-Mlobela, 2018; Liverpool-Tasie, Jayne, et al., 2017; Sheahan, Ariga, & Jayne, 2016).

In Ghana, rather than limiting competition by working only with a few big companies, the country's fertilizer voucher system created opportunities for many agrodealers by working directly with them in the program (PPRSD, 2018). Thus, the fertilizer value chain in Ghana currently includes over 135 active registered companies which import and distribute fertilizer (PPRSD, 2018). These companies import and distribute fertilizer downstream through a network of approximately 3,500 small agrodealers (IFDC, 2018).

In 2016 the Zambia Government shifted from a subsidy program that operated through direct government participation (procurement and distribution all the way to the retail stage) to one which worked with the private sector (through private sector agrodealers that distributed the fertilizer) stimulated the growth of the private sector. In response to

the opportunity to sell subsidized fertilizer alongside their other products (typically other agro-inputs), the country experienced rapid growth in its agrodealer network (Kuteya, Chapoto, & Lukama, 2019). The private agrodealer network in Nigeria also benefited from several adjustments made to government subsidy programs to allow broader participation of the private sector in distribution (versus the previous programs where the Nigerian Government was responsible for distributing fertilizer all the way to farmers), and an effort that subsidized private sector activities in rural areas, creating an opportunity for fertilizer suppliers to establish and expand their markets in these areas (Liverpool-Tasie, 2014).

While there has been significant growth in the number of fertilizer agrodealers and retailers over time, these actors were instrumental in the fertilizer supply chain even before the liberalization of parastatals. Historically, parastatals in many African countries either worked through crop specific farmer groups in the private sector (e.g., rice or tobacco farmers), or relied on private dealers for the “last mile”, getting fertilizer from government or public sector association depots to farmers. Due to leakages in numerous government programs (see Banful, Nkonya, & Oboh, 2010), private dealers engaged in fertilizer retail, often alongside other inputs in rural communities.

In their bid to supply fertilizer to smallholders, private sector retailers across Africa consistently engage in numerous complementary activities to fill gaps in the services needed by smallholders to encourage their successful use of fertilizer to improve productivity. Some examples include:

- **Filling knowledge gaps.** Some of the main casualties of the structural adjustment policies (of the 1980s and 1990s) are the public research and extension systems

across Africa. Consequently, the extension system in most of the continent is extremely weak (Asfaw & Admassie, 2004; Banful et al., 2010). Increasingly, the private sector across Africa is demonstrating the ability to overcome this shortfall and leapfrog farmer access to new technologies and application methods. Where private sector involvement has been encouraged and agrodealer networks established or strengthened, there has been a rise in private extension services for farmers by agrodealers.

In Nigeria, for example, Notore Chemicals has developed agrodealer networks supported by village promoters (rural sales agents who serve a dual role as extension agents to communities) to teach farmers how to properly use the various inputs being sold. These promoters also work with them to improve yield and general experience with the technology. This builds a link between Notore and farmers (who become regular customers) and is an integral part of their market development strategy. It also differs from cases where firms just supply wholesalers who then move the product to multi-brand retailers (Liverpool-Tasie, Omonona, Sanou, & Ogunleye, 2016; Notore Chemicals, 2019). While stimulating demand and building their market clientele, the Notore approach supplements the weak government extension services. Similarly, Indorama Eleme Petrochemicals Limited (IEPL), a poly-olefins producer based in Port Harcourt, Rivers State, Nigeria, has hired 60 agronomists to work with their retailers and the farming community to strengthen farmer input knowledge (Singh, 2017). These extension service provisions by fertilizer companies are similar to the Asian and Latin American experiences where fertilizer companies began to market their

products through training where they saw opportunities for market expansion. These strategies are now in operation in Africa by both multinational corporations and domestic companies.

- **Addressing the last mile problem.** In addition to the contribution by freight and domestic transport (from ports to major cities and towns) to high fertilizer cost in Africa, transportation costs from secondary towns to rural communities remain a huge impediment to the profitability of fertilizer among smallholder farmers due to poor rural infrastructure. Also referred to as the last mile problem, local transportation often increases fertilizer costs by African farmers by an additional 18–20% (Liverpool-Tasie, Omonona, et al., 2017). Despite decades of government and NGO programs focused on subsidizing the price of fertilizer and numerous discussions about the last mile problem, little has been done to address it.

Downstream actors in the fertilizer supply chain on the continent appear to be in a position to make some changes. The village promoter model discussed earlier is a private sector-led solution to the last mile problem. To build their market in rural areas, Notore Chemicals engages resident farmers in local communities to supply their inputs to smallholder farmers alongside training on how to use them. Having a fertilizer agrodealer/supplier in the community (or a neighboring community) significantly reduces the transportation costs farmers have to pay, potentially increasing the likely profitability of using the inputs. The transportation cost for the village promoter to get the product from the distributor to the community is distributed across a larger number of farmers and is usually lower than the cost of each farmer going to procure the produce, since one village

promoter serves several communities. In addition, when a village promoter orders a significant number of bags, the fertilizers are delivered at a subsidized transport cost as part of the distributors' customer service.

- **Reducing cash flow constraints.** The cost of financing inputs for smallholder farmers remains a challenge across Africa. Rural financing is typically limited and unaffordable for African farmers due to exorbitant interest rates typically ranging from 20% to 30% per annum (Harawa et al., 2015). Farmers typically finance the purchase of fertilizer and other inputs from their cash sales and other non-farm activities (Adjognon, Liverpool-Tasie, & Reardon, 2017). If farmers are low on cash during the lean season when fertilizer and other inputs are purchased, this could affect their decision to use the input. Fertilizer companies have supported cash constrained smallholders to access fertilizers through the introduction of small pack-sizes of between 1 kg and 10 kg. This practice enables the farmer to buy piecemeal (small 1 or 5 kg bags) over time before the planting season (at about US\$1 each time), rather than buy a 50-kg bag at US\$20–25. Again, where the product is available in the farmer's community, trip transportation costs are minimal or zero. Where products are well packaged, the farmer does not lose on quality due to exposure from open bags being sold by retailers with bowls/cups. Well-established village promoters (with good performance histories) are sometimes given a credit line in form of consignment stock which they release to the farmers and are paid for fully, before taking the next batch.
- **Improving incentives for fertilizer use through farm aggregation services.** There has been a recent rise of private companies innovatively addressing the

incentives for smallholders to access and use fertilizer (and other inputs) through an integrated service provision that addresses input supply and proper use, as well as market access. These companies, often called farm aggregator services (FAS), provide smallholder farmers with access to fertilizer (with training and other complementary inputs) on credit during the planting season and then subsequently purchase farmers' outputs or link them to output markets at harvest.

While such arrangements have existed in Asia for more than a decade (Reardon & Minten, 2011), their growth is more recent in Africa. In addition, they are increasingly being led by domestic private sector companies joining or replacing efforts financed by donors (such as "One Acre Fund" and "FarmCrowdy"). One example of a purely private sector FAS is Intrio Synergy Limited (ISL) Nigeria (see www.intriosynergy.com), which works with thousands of smallholder soybean and sorghum farmers. ISL serves as a one-stop-shop providing numerous services that bridge the gap between smallholder farmers, providers of various inputs and agroprocessors. For smallholder farmers, the company provides a range of services—land mapping, weather information, input provision on credit, mechanization, training on good agronomic practices, extension support (at a cost) throughout the season and post-harvest handling. At the same time, ISL provides input providers a sizeable market for their goods and/or services. They serve as a credible guarantor for any sales made on credit. This arrangement (adopted in other regions such as Eastern Europe) works well for financial institutions that are more comfortable extending finance to the smallholders belonging to the consortium using the platform or contracting

mechanism created by the company (Reardon & Swinnen, 2004). It enables them to more easily manage the credit provided. The system offers potential benefits to agroprocessors/commodity exchanges which are able to procure significantly higher quantities of their requirements from smallholders (at the desired level of quality) already aggregated under the ISL platform.

The Role of Government policy and regulation in promoting private sector participation in Africa's fertilizer sector

Promoting fertilizer (and other input use), particularly through subsidies has been an integral component of agricultural policies in many African countries since the 1960s. In the 1980s, it was strongly argued by development agencies and academics that subsidies should be cut because they add to fiscal deficit and "crowd out" the private sector in input markets, contributing to market distortions and undercutting the existing or newly developing private sector actors in the 1980s. Then, when fertilizer subsidies were cut in several countries (as part of structural adjustment in the 1990s), several studies found that fertilizer use declined in some countries. This was because "fundamental conditions" were not in place to facilitate private sector response (such as because of high transaction costs and risk) and farmer demand (due to lack of purchasing power or local risk or lack of extension) (Reardon, Barrett, Kelly, & Savadogo, 1999; Yanggen, Kelly, Reardon, & Naseem, 1998).

Furthermore, in most countries in the 2000s and 2010s subsidies were still a smaller share of the total fertilizer market compared to the private market. For example, in Zambia, Mason and Tembo (2015) show that during

the 2000 farming season, only about 10% of maize farmers acquired fertilizer through the government subsidy program.¹⁰ In Kenya, Mather and Jayne (2018) find that about 13% of households in their sample received subsidized fertilizer. In Nigeria (accounting for the highest amount of fertilizer consumption in Africa), nationally representative data across multiple years consistently show that less than 5% of farmers typically receive subsidized fertilizer (Akinlembola, 2019). This means that most of the fertilizer used across Africa comes from purchases from the private market. However, the debates on fertilizer use by smallholder farmers in Africa often tend to focus more on the government subsidy programs (not the private markets).¹¹

In the last five years, several African governments (e.g., Kenya and Zambia) have tried to improve on the documented challenges of “smart subsidies”. Smart subsidies is the term used to describe many of the revitalized fertilizer subsidy programs of the early 2000s (across Africa) that were said to be designed to address shortcomings of the past (from programs implemented before the structural adjustment era) by being targeted, temporary, and involving the private sector (Morris, Kelly, Kopicki, & Byerlee, 2007).¹² However, these newer programs generally still face challenges such as timeliness of the availability of the product and policy inconsistency, which were associated with previous subsidy programs (Kuteya et al., 2019).

Other governments, such as Nigeria, have moved away from direct farmer price support to a program directly focused on the private sector. This program, the Presidential Fertilizer Initiative (PFI), was established in 2016 to provide discounted phosphate from OCP (a major player in the fertilizer industry) to domestic blenders. The government supports the direct bulk purchasing of blending inputs (urea, diammonium phosphate (DAP), muriate of potash (MOP), and limestone) from major providers/primary manufacturers from within and outside of the country; getting discounted prices for bulk purchase. The urea and limestone were sourced locally, the DAP was sourced from Morocco, and MOP was imported from Europe. These materials are provided to blending facilities, which blend and bag the product for a fee. The government in conjunction with the Fertilizer suppliers association of Nigeria (FEPSAN) then established a price at which the product is sold to accredited agrodealers who in-turn are mandated to sell to farmers at an agreed fixed price (₦5,500 or US\$15.30 per bag). Though designed to encourage private sector participation by channeling the subsidy to fertilizer blending plants in form of lower input prices, challenges in implementation of the PFI include insufficient volumes supplied, logistical delays, and a pricing structure (prescribed by government) that did not adequately cater for the interests of the actors in the distribution channel. Specifically, a margin of ₦500 per bag (about US\$1.50) was provided (in the program design) to cover costs of distribution and profits for the retail channel. However, in most cases the fertilizers are first procured by hub agrodealers who in turn sell to the last mile small-scale retailers who sell to farmers. The cost of delivery of the fertilizers from the blending sites to last mile points commonly exceeded ₦200 per bag (US\$0.55); the cost of loading and offloading from trucks was often around ₦100/bag (US\$0.36). Thus, for every bag

¹⁰ Even with the expansion of the government program, the 2015 Rural Agricultural Livelihoods Survey data (collected by the Central Statistical Office, Ministry of Agriculture and Livestock, and Indaba Agricultural Policy Research Institute), just about 40% of the total fertilizer used in the 2013/2014 planting season were acquired by households through the government subsidy program while the private sector accounted for almost 60% of total fertilizer used.

¹¹ One exception is Malawi where Ricker-Gilbert, Jayne and Chirwa (2011) showed that 57% of the respondents in their study participated in the government subsidy program.

¹² The programs had heterogeneous levels of success due to numerous factors including: their focus on inorganic fertilizer without adequate attention paid to other complementary inputs and management practices; the tendency for many of the subsidy programs to still crowd out the private sector; and poor targeting and the inability to provide the fertilizer on time which resulted in lower than expected crop yield response (Jayne, Mason, Burke, & Ariga, 2018; Jayne & Rashid, 2013; Liverpool-Tasie, Jayne, et al., 2017; Stein, 2019).

that went through these channels, the landing cost at the retailers' point was often in excess of the fixed price of ₦5,500 per bag (US\$15.30/bag). The implication was that only retailers in locations very close to the blending facilities could sell the product at the government-approved price. It was very common to find the same product labeled by PFI for sale at ₦5,500 (US\$15.30/bag) per bag being retailed at ₦6,500 (US\$18.10/bag) per bag and more in the open market.

Africa's historical experience with government programs, particularly fertilizer subsidies, indicates that they are not sufficient to address Africa's smallholder productivity challenge. Besides their design and implementation challenges, the size of these subsidies in the true scheme of things is not large enough to transform smallholder productivity on the continent. Improving smallholder productivity via improved fertilizer use requires adequate attention to be paid to the private fertilizer market that accounts for most fertilizer purchases on the continent.

The role of Government laws and regulations

Laws and regulations affect the fertilizer market in Africa and the incentives for private sector participation. Laws (or acts) create the framework for guiding activities related to fertilizer production, trade, storage, distribution, and use within countries. They prescribe how particular activities related to fertilizer will be regulated and create enforcement procedures with penalties where the provisions of the law are not adhered to (Ariga et al., 2018). However, regulations are the primary way that laws are implemented while policies have goals that laws and regulations should aim to accomplish to guide stakeholders and government officials and are not typically independently legally binding (Kuhlmann, 2015). While there is significant heterogeneity in terms of the existence of

fertilizer laws and regulations, most countries in sub-Saharan Africa do not have standalone fertilizer acts/legislation and accompanying regulations.¹³ Rather, most countries have numerous policies and programs which change frequently and are not legally binding. This inconsistency and frequent policy change itself is often a constraint to the development of the private sector for which stability in programs and policies is critical for investment and ability to reap the returns on such investments. For those countries that do have fertilizer acts, most either require updating (e.g., as in Zambia and Zimbabwe) or fail to appropriately accommodate changes in the fertilizer industry, including types of fertilizers and fertilizer production technologies (NML & AFAP, 2017; Sanabria, Dimithe, & Alognikou, 2013).

Many national policies and regulations affect the ability (and profitability) of the private sector to engage in fertilizer production, importation, storage, and distribution. They range from specific input policies such as fertilizer subsidies to broader macroeconomic policies related to interest rates, controls on foreign exchange, and inflation. The business environment is also affected by a variety of tariff and non-tariff trade policies and the regulatory requirements. Of particular relevance are regulations for registration of new businesses and new products are alongside regulations related to input quality control (Ariga et al., 2018). The multiplicity of the instruments and their interrelations make creating an enabling environment for private sector participation a complex issue.¹⁴

¹³ Some countries such as Tanzania and Mozambique have recently either updated or rewritten their fertilizer acts or regulations while others are in the process of doing so (such as Malawi and Nigeria).

¹⁴ We adopt the definitions of Ariga et al. (2018, p. 3) within the context of private sector enabling environments where "...Laws (or acts) are frequently established through a parliamentary process and create a framework for governing the market. They typically focus on a particular sector or activity along the value chain. In order to implement laws, regulations are developed, usually through administrative action. They often provide additional detail on how to apply the law. The broadest category of measures within the enabling environment is policy, which creates goals and objectives that laws and regulations should aim to accomplish in order to guide stakeholders and government officials. Unlike laws and regulations, policy ordinarily is not legally binding on its own."

Furthermore, few rigorous empirical studies exist on the effect of laws and regulations on private sector participation in the fertilizer subsector in Africa.

The bureaucracy involved in registering new fertilizer products and businesses is a longstanding challenge to private sector participation in Africa (Ariga et al., 2018; Bumb, Lal, & Douglas, 2006). Most countries in sub-Saharan Africa require the registration of new fertilizers. The registration process typically includes testing for three years on trial plots at a prescribed number of trial sites. In Tanzania this requirement was recently reduced to one year (Ariga et al., 2018). Further, any alteration in fertilizer composition, formulation, type, quantity, or quality triggers a new registration process. This means that even small changes in the formulation of a registered fertilizer can require a completely new registration. (NML & AFAP, 2017) This significantly dampens the incentives for private sector investment in an already capital-intensive industry (Ariga et al., 2018; Torero, 2015). Furthermore, excessive registration processes reduce competition and naturally lead to higher prices faced by farmers.

The World Bank has developed an Enabling the Business of Agriculture (EBA) index that indicates the extent to which national laws and regulations create an enabling environment, which has been implemented in 100 countries since 2012/2013 (World Bank, 2017). For fertilizer, EBA has indicators based on prescriptions for the regulation of businesses registration and operation, the distribution of fertilizers and fertilizer quality control. EBA maintains that with good regulatory practices for registration of fertilizer companies, registration should not be expensive, should not be subject to periodic fees, and should not expire. It also prescribes that an official fertilizer catalogue should be made available online, and that registration of a fertilizer product should not be required if it is registered in another country that is part of

a regional agreement or if it is approved in the regional catalogue (Ariga et al., 2018; World Bank, 2017). For distribution, EBA maintains that good practice would allow all entities (private, public, NGOs, and producer groups) to be able to register to be an importer at an affordable rate and that registration should not expire with limited requirements about import. For fertilizer quality control, the EBA indicators call for fertilizers to be packaged in sealed bags and labeled in at least one of the country's official languages, including details such as brand name, content, origin, manufacturing and expiry dates, and safety instructions. Countries should have regulations that prohibit the sale of mislabeled and open fertilizer bags and impose penalties on those who fail to comply with set standards (World Bank, 2017).

In a 2017 study on the EBA, most of the countries with the worst performance on the fertilizer indicators were located in sub-Saharan Africa (World Bank, 2017).¹⁵ The persistently low ranking of African countries spans the three areas: regulation of businesses registration and operation, the distribution of fertilizer, and fertilizer quality control. Ethiopia received the lowest score of all countries in the 2017 study for importing and distributing fertilizer because the private sector is prohibited from engaging in fertilizer importation and distribution.

Specifically related to fertilizer quality, although many countries do not have a fertilizer act, the need for the regulation of fertilizer standards is well recognized. The responsibility for fertilizer standards is often housed in some national standards agency or multiple agencies often leading to limited enforcement due to confusion among agencies due to duplicity of mandates (Ariga et al., 2018; Liverpool-Tasie, Abba, & Banful, 2010) Thus most African countries (77% of the respondents in a 2011 Status Report on

¹⁵ They include Benin, Burkina Faso, Liberia, Senegal, Ethiopia, and Sudan.

the implementation of the Abuja Declaration conduct fertilizer inspection at the point of sale (Ariga et al., 2018; World Bank, 2017). However, the number of inspectors is extremely low relative to the need: for example, Burundi reportedly only had 4 inspectors, Lesotho had 2, Ghana 30, Côte d'Ivoire 40, and Kenya 80 (Ariga et al., 2018; World Bank, 2017). While poor quality control can support unscrupulous private sector activity, the importation/production and distribution of substandard problems potentially reduces the benefit of fertilizer use by smallholder farmers, and subsequently affects the fertilizer market by eroding farmers' trust and value for the product.

Thus, although many countries allow for private sector involvement in the fertilizer subsector, the incentives for private sector investment could still be significantly improved. Currently, incentives are dampened in many cases due to heavy state control, limited legal frameworks, poor regulation, enforcement, and ad hoc policy environments.

Conclusion and the way forward

Recent trends in fertilizer demand and supply across Africa reveal that fertilizer use on the continent is on the rise (and projected to continue at significant levels) with a dynamic supply response. Significant private sector activity in the fertilizer subsector already exists and has rapidly expanded with increased production and processing taking place in Africa over the last decade. Private sector activities in the midstream and downstream are increasingly playing important roles in expanding timely access of smallholders to affordable and appropriate fertilizer¹⁶. These efforts, where

supported and expanded could transform smallholder fertilizer use and productivity on the continent, which is the ultimate goal. To support continued and more rapid growth of the fertilizer subsector in Africa, there is a need for active engagement by stakeholders, including governments, donors, and the private sector to support the current trend and ensure that its upward trajectory is maintained.

African governments need to support the private sector to be an instrumental part of the process that enables African farmers to increase their use of appropriate fertilizers. This requires true commitment to improving the enabling environment for private sector activity. The “enabling environment” here includes an appropriate mix of policies, laws, and regulations to guide the activities of the private sector actors along the fertilizer supply chain. This includes farmers, fertilizer producers, and a broad range of distributors (including different scales of retailers that extend from secondary towns to rural communities). Because of numerous market failures caused by limited and imperfect information, the inability to visually determine the quality of fertilizer and the difficulty in ascribing poor agronomic performance to bad fertilizer, quality regulation of fertilizer is an important state function justified by economic theory. With limited budgets and a private sector that is taking a stronger role in the provision of inputs, African governments can focus support on other bottlenecks such as roads, research, farmer extension services, and reducing the bureaucracy in registering new fertilizer products and businesses. As the private sector across Africa takes on a greater role in the fertilizer subsector, a redirection of government effort will be very important. For example, in Nigeria, as the market changes from approximately 70% imports to 100% domestically blended products (though with some imported inputs), there is a dire need to ensure proper quality control checks are put in place.

¹⁶ There is increasing empirical evidence across Africa demonstrating that more attention needs to be paid to soil chemical and physical properties if the current low yield response to inorganic fertilizer across Africa is to be improved. (Liverpool-Tasie, 2019; Jayne et al. 2018; Liverpool-Tasie, Jayne, Muyanga, & Sanou, 2017). This is critical to the success of any effort geared to improve farmer productivity in Africa through increased fertilizer use, and the private sector can be instrumental in the solution.

While the use of smart subsidies is an improvement over traditional subsidies (which had little to no targeting and limited private sector involvement in the procurement and distribution), the costs of these programs and some inherent challenges still raise questions about the value of such use of limited government resources. Furthermore, available data reveal that most of the fertilizer consumed in many African countries is purchased from the private sector and subsidized fertilizer plays a small role compared to the private sector. Thus, government and donor efforts should increase the attention and resources allocated to improving the operations of the private sector.

The efforts of numerous donors and development partners in promoting fertilizer use have mainly been geared towards supporting government interventions. The implication is that these investments are mostly applied in interventions such as direct fertilizer subsidies that have limited impact on the growth of the private sector-led market. Going forward, more consideration for areas that promote more efficient private

sector-led fertilizer production and distribution to improve access and better use of fertilizers amongst smallholders on the continent is necessary. These include support for the development of distribution networks to the farm gate, support for innovative solutions being developed by the private sector to solve the many challenges faced within the subsector, and support to help better exploration of the many fertilizer raw material deposits in Africa to increase local production.

Finally, further research is needed on the various innovative strategies being adopted by the private sector. Evidence-based decision making is necessary for all stakeholders including the private sector. Rather than focusing largely on the effects of government programs, governments, donors, and the private sector should pay adequate attention to better understanding the innovations and programs developed by the private sector to assess their effectiveness, and potentially improve on their design and implementation.

References

- Adjognon, S.G., Liverpool-Tasie, L.S.O., & Reardon, T. (2017). Agricultural input credit in Sub-Saharan Africa: Telling myth from facts. *Food Policy*, 67, 93–105.
- AFAP. (2018.) Reaching Africa's Agribusiness Potential. Presentation delivered at the Africa Fertilizer Agribusiness Conference, 24 – 26 September at the Century City Hotel and Conference Centre, Cape Town, South Africa.
- AFO. (2019). *Register of Fertilizer Manufacturing and Processing Facilities across Sub-Saharan Africa*. Report of the Africa Fertilizer Organization. Africa Fertilizer.org (AFO).
- Akinlembola, A. (2019). *The effect of inorganic fertilizer use on the adoption of soil fertility management practices: Evidence from maize farmers in Nigeria* (master's thesis). East Lansing, Michigan: Michigan State University.
- Ariga, J., Shannon B., Keating, K., Mason, N., & Wanzala-Mlobela, M. (2018). *Creating an Enabling Environment for Private Sector Investment in Fertilizer Value Chains in Sub-Saharan Africa: Empirical Evidence and Knowledge Gaps*. Report prepared for the Alliance for African Partnership. East Lansing, Michigan: Michigan State University.

- Ariga, J., & Jayne, T.S. (2009). Private-sector responses to public investments and policy reforms: The case of fertilizer and maize market development in Kenya. IFPRI Discussion Paper No. 00921. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Asfaw, A., & Admassie, A. (2004). The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural Economics*, 30(3), 215–228.
- Banful, A., Nkonya, E., & Oboh, V. (2010). *Constraints to fertilizer use in Nigeria*. IFPRI Discussion Paper No.1010. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Bumb, B., Lal, G., & Douglas, I. (2006). *Factors affecting supply for fertilizer in sub-Saharan Africa* (English). Agriculture and Rural Development Discussion Paper No. 24. Washington, D.C.: The World Bank.
- FAOSTAT (FAO Statistical Data Base). Retrieved on July 1, 2019 from <http://faostat3.fao.org/home/E>
- Fuentes, F., Bumb, B., & Johnson, M. (2012). *Improving Fertilizer Markets in West Africa: The Fertilizer Supply Chain in Senegal*. International Fertilizer Development Center (IFDC) and International Food Policy Research Institute (IFPRI).
- IFDC. (2018). *Ghana Fertilizer Value Chain Optimization Study*. A report produced by the International Fertilizer Development Center.
- IFDC (International Fertilizer Development Center), & AFAP (Africa Fertilizer Agribusiness Partnership). (2018). *Assessment of fertilizer distribution and opportunities for developing fertilizer blends*. A report. Nairobi, Kenya: Alliance for a Green Revolution in Africa.
- Harawa, R., Jama, B., Kiwia, A., Kimani, D., Zida Z., Noordin, Q., & Diallo, A. (2015, November). *Innovative Farm Input Financing: Taking Farmers Beyond the Demonstration Plot*. Paper presented at ASA, CSSA, and SSSA Annual Meeting, Minneapolis, Minnesota.
- Heffer, P. (2019, February). *Sub-Saharan Africa Fertilizer Consumption Trends and Outlook*. Presentation given at the International Fertilizer Association, Paris, France.
- Jayne, T.S., & Rashid, S. (2013). Input subsidy programs in sub-Saharan Africa: A synthesis of recent evidence. *Agricultural Economics*, 44(6), 547–562.
- Jayne, T.S., Mason, N.M., Burke, W.J., & Ariga, J. (2018). Taking stock of Africa's second-generation agricultural input subsidy programs. *Food Policy*, 75, 1–14.
- Kuhlmann, K. (2015). *Reframing trade and development: Building markets through legal and regulatory reform*. E15 Initiative. Geneva, Switzerland: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum.
- Kuteya, A., Chapoto, A., & Lukama, C. (2019). *Busting the myth: The direct input supply system is not synonymous to E-FISP* (Policy Brief No. 99). Lusaka, Zambia: Indaba Agricultural Policy Research Institute (IAPRI).
- Liverpool-Tasie, L.S.O. (2014). Fertilizer subsidies and private market participation: The case of Kano State, Nigeria. *Agricultural Economics*, 45(6), 663–678.
- Liverpool-Tasie, L.S.O (2019). Fertilizer use in Africa: Taking the conversation further. Feature Article. Fertilizer Focus Magazine. Argus. UK, March 2019 Edition
- Liverpool-Tasie, L.S.O., Abba, A., & Banful, A. (2010). *An Assessment of Fertilizer Regulatory Framework in Nigeria* (#28). East Lansing, Michigan: Michigan State University.

- Liverpool-Tasie, L.S.O., Jayne, T., Milu Muyanga, M., & Sanou, A. (2017). *Are African Farmers Experiencing Improved Incentives to Use Fertilizer?* (Feed the Future Innovation Lab for Food Security Policy Research Paper 78). East Lansing, Michigan: Michigan State University.
- Liverpool-Tasie, L.S., Omonona, B., Sanou, A., & Ogunleye, W. (2016). *Fertilizer Use and Farmer Productivity in Nigeria: The Way Forward—A Reflection Piece*. Synthesis Paper. Guiding Investments in Sustainable Agricultural Intensification in Africa (GISAIA). East Lansing, Michigan: Michigan State University.
- Liverpool-Tasie, L.S.O., Omonona, B.T., Sanou, A., & Ogunleye, W. (2017). Is increasing inorganic fertilizer use in sub-Saharan Africa a profitable proposition? Evidence from Nigeria. *Food Policy*, 67, 41–51.
- Liverpool-Tasie, L.S., & Takeshima, H. (2013). Moving forward with fertilizer in Nigeria: Fertilizer promotion strategies within a complex fertilizer subsector. *Agricultural Economics*, 44(6), 581–594.
- Ma'aden, (2018, July). Ma'aden continue its commitments to serve the growing East African markets (Press Release). Ma'aden, Riyadh, Saudi Arabia. Retrieved from https://www.maaden.com.sa/en/news_details/401
- Mason, N., & Tembo, S. (2015, July). *Do Input Subsidy Programs Raise Incomes and Reduce Poverty among Smallholder Farm Households? Evidence from Zambia*. Working Paper presented at the International Agricultural Economists meeting in Milan, Italy.
- Mason-Wardell, N., Kuteya, A., & Ngoma, H. (2018). *Recent innovations to Zambia's Farmer Input Support Program & insights on short-run effects*. Presented at 2018 meetings of the Agriculture and Applied Economics Association (AAEA), Boston, Massachusetts, USA.
- Mather, D., & Jayne, T. (2018). Fertilizer subsidies and the role of targeting in crowding out: evidence from Kenya. *Food Security Journal*, 10(2), 397–417.
- Morris, M., Kelly, V., Kopicki, R., Byerlee, D. (2007). *Fertilizer Use in African Agriculture: Lessons Learned and Good Practice Guidelines*. Washington, D.C.: The World Bank.
- NML (New Markets Lab), & AFAP (African Fertilizer and Agribusiness Partnership). (2017). *Guidelines for regional harmonization of fertilizer regulations in COMESA*. Report for the AGRA Scaling Seeds and Technologies Partnership. Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).
- Notore Chemicals. (2019, June). *Notore Village Promoter Program*. Retrieved from <http://www.notore.com/notore-revolution/village-promoter-program>
- PPRSD, 2018 “Fertilizer Companies and Products Registered in Ghana”. Reported in Ministry of Food and Agriculture - Ghana Fertilizer Expansion Programme (GFEP) 5-Year (2019-2023) Strategic Plan (draft; February 2019)
- Reardon, T., Barrett, C., Kelly, V., & Savadogo, K. (1999). Policy reforms and sustainable agricultural intensification in Africa. *Development Policy Review*, 17(4), 375–395.
- Reardon, T., Kelly, V., Crawford, E., Diagana, D.J., Savadogo, K., & Boughton, D. (1997). Promoting sustainable intensification and productivity growth in Sahel agriculture after macroeconomic policy reform. *Food Policy*, 22(4), 317–328.
- Reardon, T., & Minten, B. (2011). Surprised by Supermarkets: Diffusion of Modern Food Retail in India. *Journal of Agribusiness in Developing and Emerging Economies*, 1(2) 134–161.

- Reardon, T., & Swinnen, J.F.M. (2004). Agrifood sector liberalization and the rise of supermarkets in former state-controlled economies: A comparative overview. *Development Policy Review*, 22(5), 515–523.
- Ricker-Gilbert, J., Jayne, T., & Chirwa, E. (2011). Subsidies and Crowding Out: A Double- Hurdle Model of Fertilizer Demand in Malawi. *American Journal of Agricultural Economics*, 93,(1), 26–42. <https://doi.org/10.1093/ajae/aaq122>
- Sanabria, J., Dimithe, J., & Alognikou, E.K.M. (2013). *The quality of fertilizer traded in West Africa: Evidence for stronger control* (A Joint ECOWAS, UEMOA and IFDC Report). Muscle Shoals, Alabama: International Fertilizer Development Center.
- Shaba, A. K. Edriss, A, Mangisoni, J.H., & Phiri, M.A.R. (2017). *Tobacco contractual arrangements in Malawi and their impact on smallholder farmers: Evidence from Burley Tobacco contracts* (MaSSP Working Paper 18). Washington, D.C.: International Food Policy Research Institute (IFPRI). Retrieved from <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/131344>
- Sheahan, M., & Barrett, C.B., (2017). Ten striking facts about agricultural input use in Sub-Saharan Africa. *Food Policy*, 67, 12–25.
- Sheahan, M., Ariga, J., & Jayne, T.S. (2016). Modeling the effects of input market reforms on fertiliser demand and maize production: A case study from Kenya. *Journal of Agricultural Economics*, 67(2), 420–447.
- Singh, B. (2017, April). *Indorama's Agricultural Transformation Strategy*. A presentation made at West Africa Fertilizer Forum, Dakar, Senegal.
- Stein, H. (2019). Economics of Farm Input Subsidies in Africa. *Annual Review of Resource Economics*, 11, 1.
- Torero, M. (2015, April). *The Fertilizer Market at the Global Level*. Presentation delivered at the IFA International Fertilizer Conference 2015 on Restoring Competition to the EU Fertilizer Market.
- Tschirley, D.L., & Kabwe, S. (2007). *Cotton in Zambia: 2007 assessment of its organization, performance, current policy initiatives, and challenges for the future* (Working Paper No. 26). Lusaka, Zambia: Food Security Research Project.
- Wallace, S. (2017). *Fertilizer Scoping Study*. Report submitted to the Bill and Melinda Gates Foundation.
- World Bank. (2006). *Well Being and Poverty in Ethiopia: The Role of Agriculture and Agency* (Report No. 29468-ET). World Bank, Washington D.C.
- World Bank. (2016). *Factors Affecting Demand for Fertilizer in Sub-Saharan Africa*. Discussion paper 23. Word Bank, Washington D.C.
- World Bank. (2017). *Enabling the Business of Agriculture 2017*. Washington, D.C.: The World Bank. Retrieved from <http://eba.worldbank.org/~media/WBG/AgriBusiness/Documents/Reports/2017/EBA2017-Report17.pdf>
- Yanggen, D., Kelly, V., Reardon, T. & Naseem, A. (1998). *Incentives for Fertilizer Use in Sub-Saharan Africa: A Review of Empirical Evidence on Fertilizer Response and Profitability* (MSU International Development Working Paper No. 70). East Lansing, Michigan: Department of Agricultural Economics, Michigan State University.

10 Development of Small and Medium-Sized Seed Companies in Africa: The AGRA Experience

Joseph D. DeVries¹

Key Messages

- 1** The supply and uptake of seed of improved crop varieties is now firmly established as key to increased productivity and food security in African agriculture.
- 2** Private seed companies and private agrodealers have emerged as a viable channel for supply of seed to farmers, who have shown their willingness to purchase new seed.
- 3** The African small and medium-sized seed company has proven its viability in a range of different working environments.
- 4** Whereas the progress in parts of Africa has been promising, many countries have not had the opportunity to benefit from the regular supply of improved seed; that should now represent a priority for governments and development agencies.

Introduction

Perhaps one of the most significant developments in African agriculture of the past decade has been the emergence of improved seed supply for smallholder farmers as a major priority of governments, the private sector, and development agencies seeking to help Africa's farmers increase their productivity, income, and nutritional status. Previously viewed as a relatively minor factor in the lives and livelihoods of Africa's smallholder farmers or as "one among many" factors that influence farmer productivity, today the supply of quality seed of high-yielding resilient crop varieties is viewed as virtually a sine qua non of increasing yields on a broad scale in Africa.

The evidence for improved seed being a major catalyst in increasing farmer productivity in Afri-

ca is strong. Firstly, there is the strong precedent for the role of seed in modernizing agriculture. Throughout history and around the world, sustained increases in agricultural productivity and rural economic growth have been catalyzed by the introduction and broad adoption of seed of improved, locally-adapted crop varieties which make more efficient use of sunlight, water, and soil nutrients, resist pests and diseases, and mature more quickly (Pingali, 2012). Secondly, there is the intense interest being expressed by Africa's farmers in new, higher-yielding, earlier-maturing varieties—and being willing to pay for the seed. Increasing farmer demand for improved seed has contributed to the emergence of a growing number of private seed companies, which have increased the supply of certified seed in several countries (Access to Seeds Foundation, 2019).

Numerous countries in Africa have now undergone a transformation of their seed supply

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system which has allowed farmers to adopt and cultivate high-yielding varieties (Das et al., 2019; Kamoga, 2019). The uptake of hybrid maize technology in Uganda, where supply of seed of new, disease-resistant, drought-tolerant, hybrid varieties closely paralleled the increase in yields, is shown in Figures 10.1 and 8.2. Similar scenarios are currently playing out in other countries, including Ethiopia, Rwanda, Tanzania, Zambia, and Ghana (Sanchez, 2015; *The Economist*, 2016).

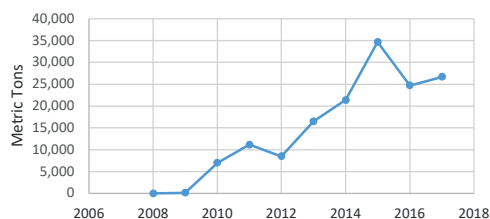


Figure 10.1. Supply of improved seed by private, national seed companies in Uganda, 2006–2018

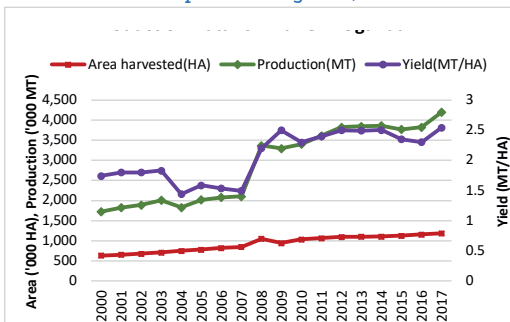


Figure 10.2. Maize cultivation data for Uganda, 2001–2017

It is probably no coincidence that the countries which have consistently registered increases in average crop yields have been the focus of ample investment by governments and donor institutions in the development of their seed value chains, from the education of crop breeders and seed professionals to seed production, and commercial seed supply networks. The comparison of cereal crop yield levels between African countries which have received significant international support for the development of public–private seed supply systems and those which have received little or no support is likewise quite striking, as shown in Figure 10.3.

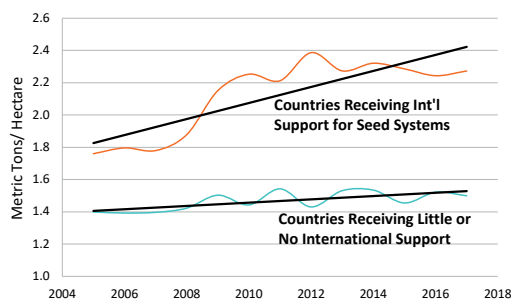


Figure 10.3. Maize and rice crop yield trends in various African countries, 2005–2017

Note: Trendlines for PASS countries including Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, and Zambia. Proposed countries include Angola, Benin, Botswana, Burundi, Chad, Cote d'Ivoire, Democratic Rep. of Congo, Eritrea, Guinea, Madagascar, and Togo.

Source: FAOSTAT.

Emerging models for production, distribution, and uptake of improved seed in Africa

Arriving at this juncture has come as a result of considerable effort, trial, and error. Developing professional seed supply systems for the African continent—with its wide range of food crops, diverse array of agro-ecologies, and large number of countries, each with its own set of policies and institutions which influence seed supply among farmers—was never going to be a simple matter. It has required a massive push on crop breeding by national agricultural research institutes, the CGIAR, and several major seed companies to develop and release the catalogue of improved crop varieties that are now available for commercialization. This effort has been matched by private sector investment in the production, packaging, distribution, and sale of seed of the new varieties through decentralized, demand-driven supply systems. Keys to success in the development of sustainable seed supply systems include:

- Degree-based training of a critical number of plant breeders and seed scientists to the level of MSc and PhD.
- Active support to public crop breeding teams to identify and release a series of improved crop varieties that are well suited to local crop environments.
- The establishment of a critical number of private independent seed companies which produce, process, package, and market improved, adapted seed of staple food crops.
- The broad popularization of seed of the new varieties among local farmers through private sector-led extension activities.
- The building of a network of private, village-based agrodealers to supply seed at village level.
- Active review and reform of national seed policies which constrain public and private entities engaged in supply of improved seed.

But perhaps the most critical factor of all these keys to success is that they must all be conducted together, at the same time, in a true value chain fashion. Implementing only one or two of these activities in isolation, as was often the case in the past, will produce very limited and short-lived results. The sustainability of a seed system relies on all the areas of work being set in motion in one package.

Viewed from this perspective, the progress registered over the past 15 years or so has been very encouraging. Farmers in many countries are now aware of the benefits of planting quality seed of improved, adapted varieties, and are increasingly buying them at private agrodealer shops selling a range of seed, fertilizers, and other production technologies. Equally important, farmers are increasingly using the new

seed within a package of improved production practices to achieve double and triple the harvests they were previously producing on their farms.

Nevertheless, high rates of population growth, climate change, and the sheer vastness of the African agricultural landscape mean that the task is far from complete. Tens of millions of African farmers still do not have dependable access to seed of improved crop varieties, and most of these farmers live in the most vulnerable countries with respect to food security and climate change. Some African countries still do not have a single private seed company operating within their borders. In others, seed companies operate under the burden of policies put in place when the State was the sole supplier of improved seed. And despite the good progress being made by crop breeders, a full range of improved varieties adapted to African conditions have still not been developed for several of the continent's critical food crops.

Looking back on the developments of the past several decades in the field of seed systems development, several important innovations stand out as key to the progress made. This chapter will attempt to identify some of these key innovations as a means of documenting progress, and also as a means of identifying weaknesses and gaps in the current set of investments, actors, and institutions which drive seed supply among Africa's farmers. The views expressed here are based on the author's experience with seed supply systems across approximately 17 African countries through his work with the seed initiative of the Alliance for a Green Revolution in Africa (AGRA), known as the Program for Africa's Seed Systems (PASS).

Breakthroughs in crop breeding; innovations in seed supply

The PASS initiative was implemented over a 10-year period between 2007 and 2017, and was funded by several major donors, including The Rockefeller Foundation, the Bill and Melinda Gates Foundation, the United States Agency for International Development (USAID), the Dutch Government, and the Howard G. Buffett Foundation. In all, PASS invested approximately US\$285 million dollars in 4 major areas: the education of plant breeders, crop breeding and variety release, seed production and seed company development, and agrodealer training and development.

A key under-reported area of innovation in the development of African seed systems has been the collective advancement made by many crop breeders employed within the CGIAR system, the national agricultural research systems (NARS), and the private sector in breeding high-yielding, stress-tolerant, earlier-maturing, and nutritionally-enhanced varieties of critical African food crops. Their breakthroughs in introgressing unique genes for traits of importance to African smallholder farmer production systems into modernized genetic backgrounds that are adapted to African conditions has undoubtedly been a major step forward for African agriculture.

Examples of how crop breeding has improved the resilience and productivity of African crop species are now too numerous to mention. Several that represent major breakthroughs include:

- Resistance to maize streak virus, *Turicum* leaf blight, and other foliar diseases of maize.
- Tolerance of drought in maize.
- Resistance to angular leaf spot, anthracnose, and other foliar diseases in beans.
- Development of high beta-carotene levels in sweet potato.
- Resistance to the parasitic weed *Striga* in sorghum and cowpea.
- Hybridization of maize, sorghum, and millet adapted to African agro-ecologies.
- Resistance to rust in soybean.
- Resistance to *Cercospora* leaf spot and rosette virus in groundnut.
- Resistance to the viral pathogens which cause mosaic and brown streak disease in cassava.
- Resistance to black Sigatoka disease in East African highland banana.
- Earlier maturity in maize, sorghum, rice, millet, bean, cassava, and cowpea varieties adapted to African agro-ecologies.

Africa's crop breeders have achieved these results by using new farmer-participatory methods of breeding which treat farmers as genuine partners in the enterprise of crop genetic improvement, and by screening new candidate varieties in more stress-prone environments. Moreover, their willingness to venture outside the realm of research and work hand-in-hand with private seed companies has meant that this time around, the varieties have not remained trapped on the shelves of research institutions. Involving farmers in breeding activities and interacting regularly with the private sector has required breeders to take a different approach to their vocation than was previously the norm, and is likewise still a work-in-progress. But more and more, African farmers are gaining access to seed varieties with truly unique and valuable traits that help them reap greater economic value from their labor.

First and foremost, among the innovations that have driven seed supply forward in Africa in recent years is the advent of the private small or medium-sized African seed company as a viable actor in the seed supply chain. Coming in a wide range of origins, ownership structure, and product ranges, the private for-profit seed company has been of inarguable importance in establishing greater volumes of seed supplied to African farmers on a regular, dependable basis, as well as a means of updating the pool of genetic products available on the market—of “getting seed off the shelves” of researchers in many countries. Their continual need for better products in order to survive in an increasingly competitive market has driven these newly-formed and newly-expanded seed companies to work closely with public crop breeders. This in turn has driven the introduction of many new varieties into testing and release processes which otherwise would never have been introduced. Juxtaposed against a long history of monopoly control by public seed agencies, centrally-planned seed schemes, and sporadic seed supply initiatives from non-governmental organizations (NGOs), the private seed company has served as a classic example of positive disruption within agricultural systems across much of the continent.

If today the private seed sector in Africa is widely considered to be an important factor in farmers’ hopes for increasing their productivity, it is important to recall that this is still a very recent innovation, and that the sector is still in a phase of rapid evolution. Tracing the current status of private investment in seed supply back to its roots is perhaps a useful exercise in considering what the next steps should be, and how similar processes might be promoted in other countries.

In April 2006, as AGRA was opening its doors at its headquarters in Nairobi, Kenya, it faced a major dilemma. Central to its theory of change

for achieving an African Green Revolution was the assumption that thousands, and eventually millions, of smallholder farmers within its 13-country program area would gain access to quality seed of higher-yielding, resilient crop varieties, allowing them to increase their crop yields and lead to widespread intensification of cropping systems. Proof of concept for this approach was readily available from the history of agricultural development in other developing regions of the world, including North America, Latin America, and Asia (Vietmeyer, 2011). Moreover, several new, higher-yielding crop varieties had recently been released, with more on the way (The Rockefeller Foundation, 2006). Yet regular, dependable supply of seed of improved varieties was still a major challenge in most countries.

Whereas seed markets had been established for some time in Kenya, Zambia, and Malawi, supply was mostly limited to maize seed of varieties developed for the high-potential agro-ecologies of those countries. This left out millions of farmers in marginal production zones, some of whom depended on crops other than maize as their primary source of energy, and required on a range of more drought-tolerant crops. The situation in the other countries was even less promising. Supply of certified seed to smallholder farmers depended on sporadic funding from governments and donors working through public agencies, NGOs, and farmer groups. Farmers were unsure from year to year whether seed would be available, and had no control over which variety would be supplied, or even which crop species would be targeted (Joughin, 2014). Seed supplied through centralized distribution schemes often arrived too late to be planted, and was of undetermined origin, variety, and purity. In many cases farmers did not even plant it, and instead consumed it as food. In some countries, these seed supply schemes are still in operation.

The rise of African small and medium-sized seed companies as a viable option

AGRA took its signal for how to resolve the seed supply dilemma from a small group of private seed entities operating in several countries. In the beginning, these were mostly weakly-organized, ad hoc businesses or groups which initially lacked full documentation and legal status to be recognized as seed companies, but which likewise were not cooperatives or associations of farmers. What they had in common was: 1) a central decision-maker and manager; 2) a rudimentary knowledge of how to produce and handle seed; and 3) a belief that they could respond to farmer demand for better seed as a profit-making business. Surprisingly, these groups were beginning to emerge in all countries and regions of Africa where AGRA operated, from Mozambique and Uganda and in Mali, Burkina Faso, and Ghana. From these original “grassroots” entrepreneurs, AGRA took its signal to invest strongly in the business opportunity of small and medium-sized seed companies across its full program area. To ensure the ability of the emerging companies to market seed at farmer level, it likewise set out to develop networks of agrodealers in every country.

AGRA's approach was thus firmly oriented toward development of the private, agribusiness sector as the main supplier of improved seed. Given the unconvincing history of seed supply in most countries, AGRA decided to avoid most of the prior approaches, and instead invest in a new system, one which would be based on local entrepreneurship combined with a belief in smallholder farmers' ability to choose—and willingness to purchase—better seed, provided they are aware of the benefits of the new varieties. Most of the emerging local seed companies were small but had the advantage of being able to operate profitably on very small volumes of seed sold. Equally important, they had a very

good understanding of the farmers who bought their seed, and were using innovative ways of marketing seed, including rural radio advertisements, sponsoring radio quiz shows where the prizes were packages of seed, building and deploying mobile seed kiosks, using sales agents on motorcycles to circulate among shoppers during village market days, and deploying vans with loudspeakers to drive through rural towns.

In summary, the advantages of small and medium-sized seed companies, observed across 17 African countries over the course of 10 years, include:

- Their legitimacy and their voice, contributing to policy reform: The voices of the owners of these private, tax-paying companies, led by local citizens, has been heard in their respective countries, resulting in policy changes that would have taken many more years to achieve by project leaders and international advocacy specialists.
- Their built-in dissatisfaction with old varieties: Young, emerging seed companies seeking to distinguish themselves from the old seed supply system are not motivated by producing and selling seed of outdated, standard crop varieties. Their individual and collective clamoring for newer, better varieties which allow them to compete more strongly for farmer demand has helped to refresh the crop genetic base in the countries where they operate.
- Their longevity: The average lifetime of a small and medium-sized seed company stands in sharp contrast with the lifespan of most donor-funded projects. Even the relatively long-lived PASS initiative, which received funding over a period of 10 years, has now faded into history while over 80% of the seed companies it helped bring to life are still operating, planting seed, and looking forward to the next sales season.
- Their knowledge of smallholders' needs: Small and medium-sized seed companies

operate in close proximity to smallholder farmers, and hence are able to anticipate emerging crop production trends and respond by supplying the seed of the trending crops. Recent examples of seed supply by small and medium-sized companies which could not have been supplied by larger entities or public agencies include sesame, pigeon pea, groundnut, and indigenous vegetables.

- Their efficiency: Small and medium-sized seed companies have lower cost structure, and are able to offer quality seed to farmers at a lower cost than other seed producers. They are well-positioned to understand how much farmers will pay for seed, and how much seed they want to buy. This has sparked a flurry of innovation in seed package size, price, availability, and positioning. In short, local seed companies create “buzz” of the type local farmers respond to.

Establishing a small and medium-sized incubator for seed supply

The scenario on the ground in these countries was, nevertheless, challenging. As AGRA continued to search for private sector partners capable of future growth it was often observed that, “The people who have money don’t understand the market for seed among smallholder farmers, and the people who do understand it don’t have the money to act on it.”

AGRA took out advertisements in national newspapers, inviting applications from private groups to compete for “start-up grants” of up to US\$150,000 over a period of 2 years. From hundreds of applications received in each country, it sifted out those which were most promising, based on reputation, understanding of farmers’ seed needs, and a common vision for how the future of seed supply should look.

Seed company investment funds were aimed at allowing organized seed production companies to travel to research stations to learn about new crop varieties, to plant larger seed production farms, rent warehouse space, develop their seed brand, process, treat, and package their seed, and finally to engage in marketing activities, including supplying seed for sale by village-based agrodealers. Grant funds were not allowed to cover capital expenditure.

Meanwhile, each emerging seed company was enrolled in a series of intensive training modules given at two central locations—the University of Nairobi for seed companies from English-speaking countries and the University of Thies, Senegal, for those from French-speaking countries. Over a period of approximately 10 years over 1,000 trainees from private seed companies in 22 countries earned certificates in seed business management. In addition, each company received regular visits from international seed industry experts, plus AGRA’s own seed program officers, to provide them with real-time advice and coaching. And, as the network of agrodealers was grown through a separate series of investments, seed companies were given information about their location, interests, management, etc. Finally, AGRA sponsored periodic national meetings of its grantees in crop breeding, seed production, and agrodealer development together with the seed regulatory body and farmers to discuss progress made toward meeting farmer demand in each country. These gatherings allowed seed company staff to interact freely with key upstream (breeders, heads of research, and regulators) and downstream (agrodealers and farmers) actors to discuss issues relevant to their prospects for growth and profitability. Such gatherings also helped public sector actors gain an appreciation for the risks and difficulties faced by private seed companies, and helped reduce the tensions between the two groups.

As companies began to outgrow the limitations of hand-sorting and hand-packaging of seed, AGRA commissioned a study aimed at identifying the world's lowest-cost seed processing equipment manufacturers. A Chinese firm, Shijiazhuang Sanli, was the clear winner on a cost basis, offering a full set of seed cleaning, sorting, treating, and packaging machines capable of processing up to 6,000 MT of seed per year at a cost of approximately US\$50,000, delivered. The machinery from Sanli carried the added advantage of being able to run on a modest-sized generator when electricity supply failed. Many emerging companies which were given the contacts of Sanli eventually purchased the machinery, and continued to use it during their early growth stages.

In essence, AGRA's intervention was aimed at establishing a series of vertically-integrated seed companies capable of planning, producing certified seed (and, eventually, foundation seed as well), processing, storing, and packaging the seed, and delivering it for sale to farmers via agrodealers. This effectively replaced the previous, public supply system with one which was more driven by farmer demand, and which could grow to meet increasing demand. Interestingly, many of the newly-minted seed companies were owned by people who had previously served as government-contracted seed growers but who had seen the limitations of the previous system, and believed they could do it better. As such, AGRA did not introduce new concepts as much as simply enable and bring to fruition ones that had already taken root in the minds of local individuals.

To ensure it respected its US IRS requirements for operation as a public charity, AGRA insisted that each company which received its support would preferentially target poor, smallholder farmers living in areas where seed supply was lacking, that it would sell its seed at a 10% discount off prevailing seed prices, and that it

would re-invest the proceeds from the sale of seed in the growth of the company. Program officers charged with sponsoring the seed company grants were also charged with ensuring compliance to these requirements. In practice, however, these measures were strongly in the interest of the companies' growth plans, and the companies saw the wisdom in presenting a sympathetic human face to the needs of poor farmers. One chief executive officer of an emerging seed company in Mali was quoted as saying, "No farmer who enters my shop will leave without some seed, even if they can't afford to buy any." This kind of solidarity was seen in practice across many of the new, private seed operations, and helped earn the respect of smallholder farmers who were often encountering packaged seed of field crops for sale in shops for the first time.

Over the course of 10 years, PASS directed funds provided by its donors into the establishment and growth of a total of 114 seed companies in 17 countries. A survey of these companies conducted in 2018 revealed that 82% of those which had received some level of start-up funding were still in operation at least 3 years after the end of the grant support. In 2018 these companies produced, in aggregate, approximately 142,000 MT of certified seed. Based on AGRA's estimate of average seed demand per smallholder farmer of 8 kg, these companies can now supply the seed needs of approximately 18 million farmers.

A common complaint among seed companies as their grant funding ended was the lack of access to loan capital for growth. Very few banks were willing to provide loans to local seed companies, and even when they were, the interest rates charged on such loans were too high for small seed companies to pay. In response, AGRA funded private fund managers operating in Uganda and Ghana to make commercial or semi-commercial loans and equity investments

in private emerging seed companies in East and West African countries respectively. From these negotiations, AGRA eventually placed a total of US\$17 million with the regional fund managers Pearl Capital, Ltd, of Uganda and Injaro Agricultural Holdings of Ghana. These funds were subsequently disbursed as loans to 19 private seed companies. Loan sizes ranged from US\$350,000 to US\$2 million. More recently, AGRA contributed US\$3 million toward the creation of a third small and medium-sized seed company investment fund, the Seeds for Impact fund managed by the African Enterprise Challenge Fund, which makes concessional loans and grants valued at US\$350,000 to US\$1.5 million to seed companies with less than US\$10 million in annual turnover operating in 12 countries in Africa.

Nevertheless, the size to which the seed companies grew was sometimes sobering. A rapid analysis of the levels of production and supply of 44 of the companies which had received AGRA's assistance conducted in 2018 revealed that 63% of them were still marketing less than 1,000 MT of certified seed annually, and only 10 (23%) were producing over 2,000 MT every year. Four companies, however, managed to grow to over 10,000 MT of seed sold per year, including two private, independent companies operating in Nigeria and Uganda and two companies owned by regional governments in Ethiopia.

Anecdotal evidence of how seed systems are progressing in these countries include several unplanned outcomes, including:

- The emergence of non-AGRA-supported seed companies based on the observed success of the AGRA grantees.
- The entry of regional and multi-national seed companies into African seed markets where they were not present or had been previously and were abandoned.
- Increased cross-border seed trade.

Taking stock of progress in seed supply in Africa

In the face of such great need, real world results seem to always fall into a category of, “could do better”. Sub-Saharan Africa's annual seed requirements easily top 2 million MT, and it is unlikely that even 500,000 MT are currently being produced and sold each year. Yet the progress made by Africa's small and medium-sized seed companies, likewise, cannot be ignored. In fact, viewed against the history of previous attempts at getting seed supply moving in Africa, the results are startlingly good.

As such, it is worthwhile to take stock of what worked, what went well, and what, in retrospect, could have been done better.

In the category of what worked, the results broadly accrued to three areas of investment: 1) financing; 2) training; and 3) policy changes. These are considered separately.

1) One-time cash transfers to start-up private seed companies. The proposal to grant funding to private companies of any kind, including start-up seed companies in Africa, proved controversial in some circles at the time it was introduced. Among field staff, however, the resistance was minimal. They were keenly aware of the challenges these companies were up against. These included the long history of public seed supply, which meant that farmers were unaccustomed to buying their own seed, unaccustomed to having to make choices among several seed products, and, in the beginning, found the prices charged by private seed companies to be more than what they were thought to be worth.

The novelty of private seed supply likewise meant that many hidden barriers also existed within the seed policies and procedures, such as the restrictions on the production and sale of early generation

seed, and the high fees and highly formalized systems for certifying seed. This also meant that nearly all the expertise in seed production, and nearly all the existing infrastructure and equipment for seed production and processing were held by public sector. The lack of experience and expertise among the first generation of private seed operations meant they were destined to make many errors of both a technical nature and of business judgment. A frequent trend among the first entrepreneurs was to focus preferentially on seed production and processing, while devoting a minimum of attention to seed marketing. Many of the first companies likewise over-emphasized producing their own seed on owned or rented land instead of setting up production contracts through out-growers. Few companies or producers owned irrigation systems, warehouses, or processing machines. Many were producing seed of recently released crop varieties which were poorly known or unknown by farmers. Even the retail points of sale needed to market the seed produced by private companies was in most countries nonexistent, and had to be developed through separate investments in agrodealers.

2) **Training seed company professionals.**

All seed company chief executive officers were vetted carefully by AGRA through routine grant-making procedures. Nevertheless, many lacked long-term experience in seed production or marketing, and most of their staff likewise lacked strong experience in the sector. AGRA's investment in training came in two main categories: on-site visits from internationally-qualified specialists in seed production and seed business, and more formal training sessions in Kenya (for English-speaking trainees) and Senegal (for French-speaking trainees). Week-long module courses were organized and given

to cohorts of approximately 25 students in the areas of production, processing, seed business management, seed marketing, and quality control. The composition of each cohort included seed company staff from up to 10 or more countries, who were often eager to share their experience and learning with fellow students. Students often learned as much from each other as they did from the lecturers.

- 3) **Changes in seed policy.** It was not surprising that seed policies put in place when seed supply was mostly carried out by state institutions were not conducive to growth of the private sector. What came as something of a surprise was the rapidity with which many governments amended their policies and practices when AGRA and its partners presented them with evidence for the need for reforms. In fact, although much remains to be done in the area of seed policies in Africa, governments deserve credit for the many ways they have listened, and taken action.

Perhaps no single policy was more debilitating for private seed companies than the insistence that all early generation seed be produced by public sources. As seed markets grew and additional seed companies entered the market, foundation seed supply became a serious bottleneck in all countries. Ethiopia's fast-growing seed sector was the first to experience this issue, and among the first to permit private seed companies to produce foundation seed for their own needs and even sell foundation seed of public crop varieties to other seed companies. Mali likewise did not hesitate to liberalize the production of foundation seed when supplies began to run short. Ghana's revised seed law, which went into effect in 2011, likewise freed up foundation seed production for private seed companies and also relaxed the condition which

previously required that all certified seed be packaged in bags produced and sold by the seed regulatory body.

What went well

Perhaps the most important outcome is the way farmers came forward and purchased the new seed, thus dispelling once and for all the myth that Africa's smallholder farmers are too poor to buy certified seed. Seed company managers have many stories to tell about the intense demand for their seed among farmers. This anecdotal evidence was backed up by a large survey carried out in 2015 in six African countries which showed that even in areas affected by long-term stress farmers were paying cash for their seed from local sources (McGuire & Sperling, 2016). In many cases, the key to convincing the poorest farmers has been to reduce the package size, from standardized packages of 15 kg or more to 2 kg, or even 1 kg packages. Wide distribution to farmers of 50 g sample packs which they could plant on a small area on their farm at little risk helped convince farmers to return the following season and purchase larger quantities.

Hybrid maize seed has been the most prominent seed product sold by such companies. Less well known, but equally important has been the uptake of improved seed of beans, millet, cowpea, sorghum, pigeon pea, groundnut, and other so-called orphan crops. In a survey of 46 small and medium-sized seed companies from 13 countries conducted in 2018, a total of 32 companies reported selling seed of 4 or more crop species (Agri-Experience, 2019). These companies sold 48% of their seed through agrodealers or via direct sales to farmers. Moreover, the bulk of their seed was from varieties that were less than eight years old. While meeting the full demand among farmers has proven difficult for small and medium-sized companies, the fact that farmers have shown high levels of demand for seed of these crops has exploded the myth that

private sector will never focus on seed of orphan crops, and greatly increases the likelihood that measures will be taken to alleviate the shortages.

Lessons learned

Without a doubt, the greatest oversight by the AGRA program was underestimating the need for increasing farmer awareness of the advantages of the new seed. While the program contributed funds to seed companies, breeders, and agrodealers to carry out on-farm trials and demonstrations, the level at which these groups were able to carry out extension activities was always limited, and far less than what was needed to ensure that all farmers learned about the benefits of the new varieties. Raising farmer awareness around improved seed is a critical, stand-alone activity. Moreover, new methods for promoting improved seed, such as the distribution of tiny, 50 gram packages for free to farmers attending field days or market promotion events, together with SMS messaging, recruitment of village-based advisors, and radio programs are deserving of their own source of support. African agriculture has many hundreds of new crop varieties and seed products that urgently need to be brought to the attention of smallholder farmers using these new, private sector-friendly methods.

A second error made was in under-estimating the effort required to broker transactions between public breeding programs and private seed companies. Although the opportunities for mutual benefit from collaboration between the groups were self-evident, historical divisions between the public and the private sector constrained the delivery of new varieties to farmers. As the number of newly-released varieties began to climb into the hundreds, AGRA employed two full-time officers as "product managers", whose role was to focus on this gap between breeder and seed company. The officers often had to go to great lengths to ensure transactions were made, and the new varieties

were put into production at-scale, in some cases, even helping to draft licensing agreements to negotiate the terms of royalty agreements.

Lingering threats to Africa's small and medium-sized seed companies

Seed subsidies

Given the proven willingness of farmers to buy their own seed, the persistence of public seed subsidy programs, implemented at high cost to taxpayers and donors, is puzzling. Subsidy programs which supply seed via public outlets undercut agrodealers on which seed companies depend on for their sales networks, often leading to the demise of many agrodealers. Subsidy programs which buy and distribute seed from unscrupulous “briefcase” seed companies directly undermine the business of small and medium-sized seed companies (O'Connor, 2017). When seed subsidy programs source their seed from these seed companies they often drag down the quality of seed being offered by otherwise competitive players. While large subsidy programs may succeed in providing access to better seed among very poor farmers more quickly than those farmers would be converted to customers of seed companies, they also tend to supply lower-quality seed of older, lower-yielding, and less-resilient varieties. This fact seriously reduces the net public value of the initiative. Therefore, on balance, while the impetus for governments to intervene in supplying farmers with better seed may be laudable, the net impact of such programs is nearly always negative.

Climate change

There is no doubt that climate change is occurring rapidly in most African countries, increasing the urgency of supplying all the continent's farmers with more resilient,

higher-yielding seed. As farmers try to adjust their cropping patterns as a means of adapting to climate change, they often need a wider range of varieties of their principal crops. They also need access to seed of a wider range of crop species. Small and medium-sized seed companies are ideally placed to supply this need, but are themselves at risk of being wiped out by climate change. They and their larger out-growers need to install irrigation systems, but can rarely afford to do this on a large scale. Given the value of these seed companies cited, this scenario should not be dealt with through a “survival-of-the-fittest” approach, but by creative initiatives aimed at permitting small and medium-sized companies to acquire irrigation facilities to secure their—and their countries’—supply of a wide range of seed.

Lack of adequate financing

Like all growing young private enterprises, small and medium-sized seed companies require capital for growth. Sadly, the African banking system has proven unwilling in most cases to extend loans to these companies. In other cases, the banks require loan guarantees which are unacceptable to seed company operators. Meanwhile, impact investment funds tend to set lower limits to deal-size well above what young seed companies can absorb, and often impose terms which seed companies consider exorbitant. Hence, the lack of access to capital for growth is probably the single biggest constraint to expansion of many well-managed small and medium-sized seed companies.

This has broader implications at a national and even continental level. As seed companies starved for capital struggle to respond to farmer demand for sufficient certified seed, governments and NGOs step up free seed distribution schemes, often funded by international donors. This has a dampening effect

on effective demand for seed by farmers, who, instead of purchasing seed available from seed companies, wait for the free “handout” seed, which is rarely of the same quality. This trend, currently spreading across much of West Africa through funding from several international donors, threatens to undo much of the progress made over the past decade, and could even lead to a reversion to previous eras of monopoly control by governments.

Lack of funding for breeding African crops

While several donor agencies have shown remarkable generosity and fortitude in supporting crop breeding in Africa, the availability and reliability of funding remains a major concern for both national and international crop breeding initiatives. Africa's seed companies are not yet capable of funding their own breeding research, and rely almost entirely on public breeding initiatives for new varieties. Therefore support for crop breeding is critical at both international and national levels. International crop breeding teams of the CGIAR system are needed for developing and deploying novel traits which contribute to the resilience of crop varieties needed to confront an increasingly erratic climate. National crop breeding teams are needed to address local adaptation and farmer preferences in high-yielding varieties. Many of them have developed and released original, high-performing varieties of their own creation (AGRA, 2018). But if funds are unavailable at the national level, very good varieties often fail to reach the farmers. African governments must be urged through policy and advocacy campaigns to support their national crop breeding activities as a priority intervention for achieving food security and economic development.

Concluding remarks

Given that it is critical to maintain a steady supply of quality seed of improved crop varieties, it is important to ask what governments and development partners can do to encourage the survival of professional seed suppliers outside of the public realm. In considering this challenge, several elements emerge which come at little or no cost, but which could go far in ensuring the continued viability of private seed enterprise, both within the context of input supply programs and within the broader, demand-driven seed market:

- 1) Governments must avoid competing with the private seed sector. Many governments continue to maintain public seed agencies, parastatals, and seed supply units within universities, research stations, and other public facilities which make use of public funding and access to public germplasm to compete with the private sector.
- 2) In a more general sense, governments must do everything possible to make seed markets as friendly as possible to the private sector, notwithstanding the role of ensuring seed quality, including stamping out the supply of fake seed.
- 3) Farmer awareness of the value of improved seed must be increased through the distribution of small packs, planting large numbers of small on-farm demonstration plots, holding of farmer field days, and several other interventions which have proven effective in informing farmers and allowing them to make smart choices. As public extension systems continue to face serious challenges with these tasks, governments should encourage the private sector and NGOs to take up this set of tasks alongside public efforts.

- 4) Early generation seed supply must be ensured by liberalizing the policies that govern who can produce and sell breeder seed and foundation seed. As certified seed markets have grown, the scarcity of early generation seed on-hand to produce certified seed has grown more acute. Private foundation seed companies should be encouraged, along with increased public funding for the production and supply of breeder seed.

The way forward

Clearly, much remains to be done to consolidate the progress made over the past couple of decades in seed supply for Africa's farmers, but in practical terms four major tracks hold great promise for impact. Firstly, additional resilient, higher-yielding varieties must be developed, especially those targeting the needs of women farmers (often the cultivation of legumes and traditional vegetables, and farmers living in marginal agro-ecologies). Secondly, more seed companies are needed to join the fold of those already in action in the countries where modernized seed systems have been initiated and are under development. Thirdly, with a base of vibrant, competitive seed companies established in many countries more funding is needed to inform farmers of their benefits and open large numbers of agrodealers at village level. Fourthly, more private sector-friendly seed policies are also still required, especially in the critical areas of variety release and seed certification.

Final note: Addressing the imbalance in access to improved seed

Finally, no description of the challenges and opportunities for seed systems development in Africa would be complete without recognizing that the geography of improved seed supply in Africa remains very exclusive, with some countries benefiting from significant levels of assistance to develop their seed systems, while others are receiving almost none at all.

Counting only those countries with a population of 5 million people or more, there remain 15 countries with a total population of over 320 million people and home to 40 million farmers where access to improved seed is minimal or non-existent. Farmers in these countries continue to plant seed of crop varieties developed over 40 years ago, and are achieving very low yields. Extending the benefits of improved seed supply into those countries—which have so far been left behind in the movement toward better-performing seed supply systems—represents an achievable goal.

With a proven model for seed delivery now in place and many high-yielding, climate-resilient crop varieties now available, getting seed systems development going in these countries is a genuine priority for the continent. Moreover, the leaders of these countries are asking for assistance in this area.

All farmers who cultivate the land to bring home harvests which feed their families and growing populations deserve good seed. Yet, in far too many African countries, farmers still have no better choice with respect to the seed they plant than did their forefathers and foremothers. The advances made in getting seed to farmers in some African countries provide ample evidence that these advances can be achieved in every country of the continent.

References

- Access to Seeds Foundation. (2019). *Access to Seeds Index 2019: Synthesis Report*. Amsterdam, The Netherlands: The Access to Seeds Foundation.
- AGRA. (2018). *Seeding an African Green Revolution: The PASS Journey*. Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).
- Agri-Experience Ltd. (2019). *Seed Company Survey and Analysis*. Nairobi, Kenya: Agri-Experience, Ltd.
- Das, B., Van Deventer, F., Wessels, A., Mudenda, G., Key, J., & Ristanovic, D. (2019). Role and challenges of the private seed sector in developing and disseminating climate-smart crop varieties in Eastern and Southern Africa. In T.S. Rosenstock, A. Nowak & E. Girvetz (Eds.), *The Climate-Smart Agriculture Papers*. Springer Open.
- Joughin, J. (2014). *The Political Economy of Seed Reform in Uganda: Promoting a Regional Seed Trade Market*. Africa Trade Practice Working Paper Series Number 3. Washington, D.C.: The World Bank.
- Kamoga, J. (2019, 1 June). Uganda defies odds, crop volumes rise. *The East African*. Retrieved from <https://www.theeastafrican.co.ke/business/Uganda-defies-odds-crop-volumes-rise/2560-5140956-14xk3ohz/index.html>
- Mcguire, S., & Sperling, L. (2016). Seed systems smallholder farmers use. *Food Security* 8, 179–195.
- O'Connor, A. (2017). Voices from small and medium-sized private enterprises in the seed sector. Draft of chapter to be included in the forthcoming International Finance Corporation publication, *Seeds for All Toolkit* (unpublished).
- Pingali, P. (2012). Green Revolution: Impacts, limits, and the path ahead. *PNAS* 109(31), 12302–12308.
- Sanchez, P. (2015). En route to plentiful food production in Africa. *Nature Plants*, 1, 14014. doi: 10.1038/nplants.2014.14
- The Economist*. (2016, 12 March). A green revolution. African Agriculture. *The Economist*.
- The Rockefeller Foundation. (2006). *Africa's Turn. A New Green Revolution for the 21st Century*. New York, NY: The Rockefeller Foundation.
- Vietmeyer, N. (2011). *Our Daily Bread. The Essential Norman Borlaug*. Bracing Books.

11 Conclusions and Way Forward

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Introduction

The Africa Agriculture Status Report (AASR) 2019 is entitled *The Hidden Middle: A Quiet Revolution in the Private Sector driving Agricultural Transformation* because the chapters in this volume found that the private sector—at small, medium, and large scales—is a dominant and dynamic force in Africa's food economy today. The volume found that it is especially the output and input processors, traders of crops and inputs, and logistics firms that are the life blood and driving force of agricultural transformation. This is because these millions of small and medium enterprises (SMEs) and emerging swath of large enterprises are the “support system sandwich” enveloping small-scale farmers, and the agents linking farmers to downstream markets and to upstream input suppliers. These linkages in turn set the conditions for—and the incentives to—farmers to invest in farm productivity and crop and animal product diversification.

In this brief overview of findings and policy recommendations of the volume, we follow the order of the chapters. The chapters broadly formed two sets or parts. The first part, Chapters 1–6, focuses on the patterns of development of the private sector in the output value chains and their interaction with and impacts on small-scale farmers and agricultural and rural transformation. The second part, Chapters 7–10, focuses on labor markets, information and communication

technology (ICT) supply, and input value chains. In what follows we summarize the findings and policy recommendations of the chapters and then conclude.

Chapter 1: Private sector's role in agricultural transformation in Africa: Overview

This chapter laid out the broad patterns of transformation and the importance of the private sector in both output and input value chains, and the drivers of change. The following were the key findings and policy recommendations.

First, dynamic and inclusive agricultural transformation depends on whether farms, especially small-scale farms, are “sandwiched” between small-scale enterprise driven output and input value chains. The performance of those value chains determines the profitability and therefore the investment incentives and productive capacity of small farms. Farm investments affect rural jobs, as 40% of rural employment time is in self-employed farming. Food system employment in the midstream (processing, wholesale, and logistics) and downstream (farming) generates another 25% of rural employment. These two sources of job creation are inter-dependent.

Second, the output value chain post-farmgate is composed nearly entirely of private sector enterprises—from SMEs to emerging large enterprises in the midstream (wholesale, logistics, and processing) and the downstream (retail and food service).

¹ Belvedere SL, Sierra Leone

² Formerly United Nations Industrial Development Organization, UNIDO

³ Alliance for a Green Revolution in Africa, AGRA

⁴ Michigan State University, MSU, and University of Pretoria

Third, around 80% of food consumption in Africa is from purchases by urban and rural consumers. Only 20% of food production is for self-consumption. Thus, 80% of Africa's food consumption is marketed and handled mostly through private operators. The private sector is thus crucial for food security.

Fourth, an estimated 96% of marketed farm output in Africa is supplied through domestic markets, leaving only 4% for export markets. Domestic supply chains are crucial currently to farmers. Over time, export markets are expected to rise in importance.

Fifth, there has been rapid growth and proliferation of SMEs in the midstream of the output value chains, constituting a “Quiet Revolution” in the “Hidden Middle”. Wholesale, logistics, and processing SMEs in the aggregate are the biggest investors (and the lion's share of the private sector's volume) in creating markets for farmers in Africa today. We think SMEs will continue playing a key role over the next 10–20 years. It is a Hidden Middle because it is typically ignored in prevailing policy debates related to food and agriculture. However, it exists and is dynamic, hence, not missing.

Sixth, input value chains, such as for improved seeds and fertilizers, have moved from being largely controlled by the public sector (and with private sector agents mainly involved in the “last mile” of input delivery) to a supply system consisting of a mix of few government and private sector providers. The emerging private sector includes SME agrodealers. Some are assisted by donor funding and government policies that facilitate their entrance into input markets. SME actors appear to be proliferating and, with continued support, this is likely to expand further. At the same time, however, this trend has also given rise to substantial problems with supplies of sub-standard and fraudulent seeds, fertilizers, and pesticides.

Seventh, there are powerful drivers of the expansion of agri-food processing, wholesale/ logistics, and distribution in sub-Saharan Africa. Downstream factors include: (1) rapid urbanization and road building, leading to longer supply chains; (2) dietary change in urban and rural areas, including soaring demand for processed foods, non-food grain products, like meats, fish products, fruits, and vegetables. Shares of purchased food are also increasing rapidly in rural areas. Upstream factors include intensification with more external input use by farms, commercialization, and diversification beyond basic food grains. Policy factors include the liberalization and privatization with progressive withdrawal of governments from direct provision of supply chain services, which have unleashed massive investments by SMEs and large enterprises in the supply chains.

Eighth, the chapter's main policy recommendations were:

- Agriculture, food and broader development policies should recognize the Quiet Revolution of the proliferation of private sector SMEs in output and input value chains in Africa. There is no missing middle, but only a middle that has thus far been hidden from the policy debate and now needs to be brought to the fore.
- Governments and donors should not be “reinventing the wheel” by trying to provide supply-chain services themselves. Rather, they should support and stimulate private sector investments in the middle of food supply chains.
- Key support measures include public investment in infrastructure and policies and regulations aiming to reduce transaction costs and increase capacity to manage supply-chain risks.
- Government and donor efforts should further focus on enabling agri-food SMEs

to connect small-scale farmers to markets. Over time and gradually, they may also encourage strengthened links between smallholders and emerging modern, large-scale agri-food businesses.

Chapter 2: The Quiet Revolution in agri-food distribution (wholesale, logistics, retail) in sub-Saharan Africa

This chapter focused on the distribution segments of the output value chain, and did a “deep dive” on wholesaling, logistics, and retail, and their links to the small farm sector. The following findings and policy recommendations emerged from the chapter.

First, traders, truckers, and retailers are the life blood, the circulatory system, of food value chains in Africa. They constitute about 40% of the total gross value of the value chains in sub-Saharan Africa. This is the same as the share from farms in African food value chains. Trader and logistic firm performance—and enabling conditions—are extremely important to the food security of Africans.

Second, the myths that there is a missing middle in food trade and logistics supply, that traders are not investing and are only exploitative, and that governments and donors need to step in to “fill the gap”, are undermining the policy debate.

Third, there is a Quiet Revolution in SME trader and logistics segments in sub-Saharan Africa. The SMEs are proliferating and making large investments, in the aggregate and individually, in vehicles and equipment. We found third party logistics services in trucking and warehousing to abound.

Fourth, governments and donors need not and should not reinvent the wheel and step in directly to provide warehouses, transport, or

aggregation facilities. The SME private sector is largely already providing these services, but is constrained in many ways. The need is to relieve the constraints facing them and let the Quiet Revolution proceed further and faster.

Fifth, traders and logistics firms note that they are constrained by the condition of wholesale markets and roads, corruption on the roads, electricity and fuel costs, and vehicle import ease and cost. These should be public policy and investment priorities.

Chapter 3: The Quiet Revolution and Emerging Modern Revolution in agri-food processing in sub-Saharan Africa

This chapter did the same as Chapter 2 did with distribution, but with respect to the processing segment, analyzing the Quiet Revolution and its associated “spontaneous clusters” of SMEs of processing and wholesale, as well as the emerging “Modern Revolution” in processing. The following findings and policy recommendations emerged.

First, the private sector in agri-food processing has been highly responsive and made a huge aggregate investment to meet the soaring demand for processed food by African urban and rural consumers. There has been a Quiet Revolution with the rapid proliferation of SMEs, and an emerging Modern Revolution with domestic and foreign direct investment (FDI) large processors.

Second, processors are part of what we call the Hidden Middle. It is massive and dynamic, but tends to be largely “hidden” from policy debates except to wrongly think it is a “missing middle”.

Three, governments have made several good moves that helped the revolutions in processing. Processing has “taken off” because demand is soaring, local farm production is increasing;

small and large private processing investment is responding; and governments have liberalized and privatized markets, and built an initial base of the most critical factors—wholesale markets, roads, and some electrification.

Four, however, there is still much to be done: the take-off could fly faster and higher and be more efficient and inclusive; it is constrained by inadequate infrastructure and policies, and prevalent risk, uncertainty, and corruption.

Five, governments and donors need not and should not “reinvent the wheel”. When conditions are ripe, small and large-scale processors proliferate quickly and intensely invest, meeting demand. Governments and donors (nor their non-governmental organizations (NGOs) or other partners) do not need to set up “value added” initiatives or return to the days where government enterprises undertook processing, which crowds out the private sector.

Six, instead, governments and donors need to focus on enabling the Quiet Revolution and the Modern Revolutions already launched by the private sector. They need to leverage it, to identify constraints to it and relieve them.

Seven, as the processing sector grows, it will create value added and markets, but it will need and seek more raw material supply. The farm sector must be enabled to this need with the requisite quality, varieties, volumes, consistency, and timing, so that African farmers, rather than imports from outside Africa, supply the raw materials and gain from the markets developed.

Eight, a total of 95% of small-scale farmers supply to the processing sector direct to SME processors or via SME wholesalers. Enabling conditions for spontaneous clusters of SMEs and traders in wholesale markets is by far the main action needed to leverage value chain investment and support inclusive agricultural transformation. The remaining 5% of small-scale

farmers are in “contract farming” with large processors. That is as yet a tiny but emerging opportunity to link small-scale farmers to the soaring processor market.

Chapter 4: Avoid hitting the wall by leveraging investments of midstream heroes in African food value chains

Chapter 4 focused on supply chain services firms related to international trade and which vertically integrate processing, logistics, and wholesale activities. The chapter emphasized the need for domestic and FDI that help these segments to become efficient and competitive. The following were the key findings and policy recommendations.

First, since 2007 Africa has seen rapid increases in net exports of several basic commodities. In some markets the rapid increase in production has resulted in local gluts driving down local prices far below import parity levels and consequently eroding farm profits. Growth has already stagnated, hitting a wall of local surpluses with low margins and high transaction costs that at best allow for temporary forays into exports to neighbors who themselves are working up to local gluts.

Second, Zambia illustrates “hitting the wall” of local surpluses combined with high transaction costs constraining the country’s ability to export these surpluses beyond the region. Since 2000 the area under main field crops (maize, grown by small and medium-scale farmers, and wheat and soybeans, grown by large-scale farmers) has expanded rapidly and average yields have increased consistently. This has moved Zambia from a net importing to a net exporting country for these three crops. Despite more consistent surpluses, Zambia is only exporting into the region and surplus exports have not found their way into international (deep sea) markets.

The ability to export these surpluses and grow output further is constrained by Zambia's competitiveness in global markets.

Third, to increase export competitiveness, countries can be helped by supply chain services firms. These firms undertake wholesale, and logistics and processing, the midstream of the supply chain. They range from SMEs and large domestic firms mainly focused on domestic markets, to African and Asian-based multinational firms, to global firms. The condition for these firms to invest in building supply chain capacity is consistent trade and investment policies, and sufficient public infrastructure.

Fourth, again Zambia illustrates where such firms made major investments, such as in feed mills, crushing plants, feedlots, and intensive chicken operations. The country has met local demand for meat and is exporting soybean meal into the subregion. But Zambia also illustrates reversals, as policy conditions and transaction costs were felt to be constraints by a major enterprise which then shut down its operations.

Chapter 5: Private Sector and clusters development for agricultural transformation in Africa

Chapter 5 treats “managed clusters” of processors and farmers in initiatives such as agro-industrial parks. The chapter treats the interest and promise of these initiatives, and the challenges manifest in the mixed record of their implementation. The following findings and policy recommendations emerged.

First, clusters are valuable organizational frameworks to support farmers and agri-enterprises development with the potential to link them to domestic and global agricultural value chains in a more efficient and sustainable manner.

Second, no universal formula exists for how clusters should be formed. However, in the context of Africa, with many smallholder farmers, limited networking, and minimal specialization, the need is great for government intervention.

Third, the nature of agriculture clusters varies from country to country depending on the government's role, national economic development policies, raw material and land availability, and comparative and resource advantage, among others.

Fourth, African clusters face major challenges, including: (a) challenges of the knowledge revolution and increasing global competition; (b) lack of a critical mass of skills and talent; (c) weak links between businesses and knowledge institutions; (d) weak governmental and institutional support; and (e) resource depletion and failure to meet international standards.

Fifth, the location of a given cluster is often crucial and should be based on grounded policy objectives with limited political interference and/or non-market driven initiatives. It is essential to consider locations near existing population centers, national/international transportation networks, provide easy access to labor, raw materials, suppliers, and distribution markets.

Chapter 6: Agricultural trade in Africa in an era of food system transformation: Policy implications

Chapter 6 focuses on cross-border output value chains, both within Africa and between Africa and the rest of the world. It discusses trade opportunities deriving from food system change in Africa, and policy and infrastructure constraints holding Africa back from fully grasping those opportunities. The following key findings and recommendations emerged.

First, Africa's food output and imports have grown rapidly over the past 40 years, at a pace similar to that of Asia. Most of the growth has been in diet diversification or non-food grain products such as fruits and vegetables, roots and tubers, meat and fish and dairy, and edible oils, and in convenience grains such as rice and wheat. At the same time Africa's food systems have transformed with increasing urbanization, changing diets, and growing food demand. All these represent massive intra-African trade opportunities, added to the well-known world trade opportunities.

Second, in the face of these opportunities, Africa is significantly lagging behind other regions around the world in its ability to leverage trade as an engine of growth. The share of its food output that is exported somewhat lags behind Asia's, its export growth rate is generally slower, and only started catching up in the past few decades; it still has a way to go.

Third, the agri-food trade policy debate in Africa needs to transform along with the increase and diversification of demand and the transformation of the food system on the continent with rapid urbanization similar to developing Asia's, and supply chain transformation afoot. In particular, insufficient attention has been paid to the opportunities inherent in the diet transformation in Africa in "beyond food grains" products and processed products. The trade literature to date has not adequately adjusted to the deep and rapid changes taking place in the food system.

Four, regional intra-African trade in agricultural and food products is very small in comparison to the rest of the world. The level of intra-Africa food trade is consistently below 18% while it is much higher in Europe (69%), Asia (59%), and North America (31%). The very low levels of intra-African food trade suggest that trade presents a great opportunity for the

creation of larger regional markets that could help boost economic growth and sustainable development in Africa.

Five, the engagement of the private sector at each level of the agri-food value chain is indispensable for the realization of the benefits of intra-regional trade and large-scale investments in food processing and services. These opportunities could be transformational if more public policies and investment initiatives target the "hidden middle" of the food value chain which has experienced significant changes in recent years.

Six, there are greater opportunities for expanding intra-African food trade through a more pervasive and consistent change in how African governments and public institutions engage food markets and the private sector. Specifically, less government intervention and control of food markets is necessary to achieve a more effective and better performing agri-food sector. This is a clear lesson learned from emerging and developed economies around the world which have developed a robust and more diversified agri-food market.

Seven, the low level of trade facilitation due to poor investment and business environment for private sector activities is a major constraint to agri-food trade in Africa. A few other constraints in need of public policy attention include: trade-distorting policies, volatile policy regimes, poor governance and weak physical and soft infrastructure; and membership in overlapping regional economic unions with sometime conflicting rules.

Eight, the way forward is now in sight. The recent signing of the African Continental Free Trade Agreement (AfCFTA) in March 2018 by 54 African countries is arguably the single most important continental trade-enhancing initiative in Africa. If the AfCFTA objectives of removal of tariffs and non-tariff barriers are aggressively supported and properly

implemented by the signatories, this trade agreement has the potential to significantly boost the volume and value of intra-African agricultural and food trade and services. To achieve its objectives for boosting intra-African trade, an effective implementation strategy should include better harmonization of activities and trade rules among the regional economic unions in Africa (e.g., the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC)).

Chapter 7: Labor markets during the “Quiet Revolution”: Implications for the private sector in the agri-food system

Chapter 7 examines the link between labor markets and the private sector in the value chains. It starts by showing the importance of agri-food value chain employment off-farm for rural households in Africa. It also assesses the empirical evidence regarding the extent to which SMEs and large enterprises in agri-food supply chains in Africa are constrained by the quantity or quality/skills of labor supply to them, and thus whether that hampers their being effective in supplying services in value chains. It ends with a discussion of the need for education and selective training programs. Several key findings and recommendations emerge.

First, while it is often noted that some 70–80% of people in rural Africa are employed in own-farming, we find that only 40% of actual employed time (FTEs) of rural youth and adults (15–64) are in own-farming. Non-farm employment occupies 60% of rural employment time. Many rural Africans work only part time in agriculture, and many work

most of their time in non-farm employment, most of it in rural areas.

Second, about 40% of non-farm employment is in “agri-food system” work, such as wholesale, logistics, processing, and retail. This means that about 25% of overall rural employment is in this work, making it crucial for rural families. It is especially important in the peri-urban area and the area just beyond the peri-urban, the intermediate rural area, to women and youth.

Third, agri-food system non-farm employment is mostly self-employment in SMEs (from tiny enterprises based in homes to medium firms in rural towns). By definition it is linked to and grows with food demand and farm output. As the Quiet Revolution in SME growth in food supply chains proceeds in Africa, this employment grows. The two are linked.

Four, a review of evidence shows that agri-food system businesses in general do not consider labor quantity and skills/quality substantial constraints (compared to other constraints like energy costs and roads). Rather, improved basic education and training in socio-emotional/organizational skills (for the workplace) are considered by firms as more important than general technical training per se.

Five, however, where there are specific skills needed, especially those that are forward looking in the light of the digital revolution such as skills related to new technologies, production, food safety, and commercial procedures enabled by ICT, there is a case for targeted but multi-dimensional training. Several institutions, including the International fund for Agricultural Development (IFAD), Food and Agriculture Organization of the United Nations (FAO), and others, have such targeted training programs that address multiple constraints including skills, financial, and institutional ones.

Chapter 8: A digital revolution without a digital divide for sub-Saharan Africa

Chapter 8 examines the supply of ICT services to farms and firms in African rural areas. It considers the performance of the ICT firms and how it is affected by policies and infrastructural conditions. Several key findings and policy recommendations emerged.

First, today, more than 1.2 million kilometers of Internet cables run across the oceans' floors, but just 20 years ago, Africa was completely disconnected. Those who did have access—using Internet provided by satellites—paid 10 times more than users in other regions. Service was also slow and unreliable. Expanding access to affordable, high-speed Internet makes it easier to do business across State borders. It is also critical for the 21st Century workforce and for economic transformation.

Second, the use of digital technologies for development in sub-Saharan Africa) is constrained in three major areas (3 Cs): connectivity, content, and capability.

Third, regarding connectivity, despite the increase in mobile phone penetration in the last decade, there is still a significant heterogeneity in access across countries, and within countries. Moreover, the market structure in the provision of digital technologies is concentrated in both access and in applications to consumers. As a result, there is a significant growing digital divide and limited and expensive broadband connectivity is slowing economic transformation in sub-Saharan Africa. The cost of 1 GB of broadband is more than double the average for Latin America and more than five times the average for Asia.

Fourth, regarding content, if the content provided is not the type of information farmers need, they may be less likely to use these technologies, thereby reducing digital technologies potential

impact. The same logic holds true in the use of digital technologies for extension. The existing evidence, suggests that currently the content is not responding directly to the demand and content quality matters if digital technologies are to be useful for development.

Fifth, regarding capabilities this is a major constraint for sub-Saharan Africa where the lowest literacy rates are observed. Adult literacy rates are below 50% in: Benin, Burkina Faso, Central African Republic, Chad, Comoros, Côte d'Ivoire, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, and South Sudan. In Burkina Faso, Niger, and South Sudan literacy rates are still below 30%. However, there are innovative ways to resolve this major constraint and technologies need to adjust to be able to resolve this structural gap, as exemplified by the large share of the population aged 15 years and above that have used mobile phone/Internet to access financial accounts despite the low level of education and no structured skill upgrading.

Sixth, there is a clear need to continue improving both access to and use of new technologies in the poorest areas. In some countries, subsidies have been implemented in response to this problem. Their goal has been to improve access to telecommunications for rural households and ensure that poor people pay no more than their wealthier urban counterparts do for this access. The economic rationale for subsidies is because digital technologies have positive spillover benefits for people's consumption and production, create network externalities, and create the potential for economies of scale. The main problem with such schemes, however, is that they can be financially unsustainable. One solution is to use a small percentage of the gross operating revenues of existing private operators to pay for subsidies. Other countries should consider this option.

Seventh, alternative technologies should be further explored. Broadband technology, for

instance, has the potential to provide access to both data and voice services, and therefore increase competition in the delivery of services. A dual broadband strategy, promoting both the deployment of wireless broadband networks and the adoption of voice telephony applications targeted to low-income users, is one approach that needs to be carefully assessed, including the appropriate roles of the public and private sectors. In addition, proper regulatory institutions at country level or potentially at regional level, as in the European Community, are urgently needed to assure competition in this sector.

Eighth, there is a clear need to continue assessing the impact of the quality of information and of innovation on the delivery of the digital technologies to reduce the capabilities constraint. Many aspects of agricultural information constitute a public good, and governments need to invest in providing the best possible information regarding not only prices for different markets, produce varieties, and produce quality, but also production technologies and other agronomic information. If these investments are not made, the potential impact of digital technologies could be limited. We need innovative ways to bring together the public and private sectors to ensure that the three Cs are addressed as a whole.

Chapter 9: Africa's changing fertilizer sector and the role of the private sector

Chapter 9 focuses on the fertilizer supply chain and the relative roles of the private and public sectors in it. It starts with an analysis of fertilizer demand and its drivers, and then turns to the structure and performance of fertilizer supply chains. It differentiates the roles of the public sector, NGOs, fertilizer multinational firms, and domestic SMEs and large enterprises engaged in the sector. Several key messages and recommendations emerged.

First, Africa, recognized (by international fertilizer exporters) as a key source of current and future demand growth for fertilizer, has experienced a significant expansion of public and private fertilizer investments in the last decade.

Second, though government subsidies are typically a smaller share of the total fertilizer consumed in many African countries, they continue to be the focus of the debate by policy makers and development partners.

Third, the private sector activities in the midstream and downstream of fertilizer supply chains are not new. They have facilitated fertilizer supply for a long time though they are increasingly playing important roles in expanding timely access by smallholders to affordable and appropriate fertilizer (for their soil and crop needs), which can transform their productivity.

Fourth, government and donor efforts should realize the important role already being played by the private sector. They should increase the attention and resources allocated to understanding and improving the operations of the private sector in the fertilizer supply chain. This includes infrastructure, policy consistency, and appropriate legislation to provide a conducive environment for the private sector.

Chapter 10: Development of sme seed companies in Africa: the AGRA experience

Chapter 10 parallels the fertilizer chapter in themes but focuses on the improved seeds supply chain in Africa. It features a case study of how the Alliance for a Green Revolution in Africa (AGRA) facilitated the emergence of some SMEs in the domain of multiplication and distribution of seeds. The following are the main messages.

First, the supply and uptake of seed of improved crop varieties is now firmly established as key

to increased productivity and food security in African agriculture.

Second, private seed companies and private agro-dealers have emerged as a viable channel for supply of seed to farmers, who have shown their willingness to purchase new seed.

Third, the African SME seed company has proven its viability in a range of different working environments.

Fourth, whereas the progress in parts of Africa has been promising, many countries have not had the opportunity to benefit from the regular supply of improved seed, and should now represent a priority for governments and development agencies.

Conclusions of the recap of the key messages

While one often hears that Africa suffers from a missing middle in supply chains and logistics, that the region is overwhelmingly constrained and suffocated by lack of entrepreneurial verve in the food system private sector, and that this is blocking the development of small-scale farmers, the volume has found largely the opposite. It has shown that there is a Quiet Revolution in SMEs along the supply chain, and a vibrant emerging large enterprise sector, domestic and foreign.

But it has also shown that in many ways the takeoff and dynamism that have surprised us and we hope have surprised and delighted readers, is itself still constrained by challenges and problems. The volume did not stint on highlighting the infrastructural and policy challenges that hold back the already taken-off private sector from achieving its true potential in Africa. But we feel Africa will grasp the

opportunity and vigorously address these challenges.

A recurrent finding in the volume is that while developing Asia is held up as a success story of food system transformation helping small-scale farmers, the Africa story we told in the volume is in many ways similar in path, in success, and even in constraints, to the Asia story.

Finally, all of the chapters emphasized that while the midstream of the output value chain especially, and increasingly in input value chains, is dynamic, it is largely ignored in policy debates. This is partly because it has been wrongly considered missing and broke. Instead it is a major motor of the food system in Africa exactly on par with the importance of farms. Rather it has been the “Hidden Middle”. That can be remedied by transforming the policy debate, which this volume hopefully has done.

But all the chapters emphasized that African policy makers are largely “flying blind” or partially so, as there is very little systematic data and information on the private sector, especially the informal SMEs which are 80% of the African food supply chains. This information gap needs urgently to be addressed—in particular because the volume showed that 80% of Africa’s food passes through private sector value chains, and 60% of the values and costs of those chains are generated by the vast army of SMEs and large enterprises in processing, wholesale, logistics, and retail. Let these sectors take on a major importance in future debates and policy actions that improve the enabling environment for their investments and service to Africa’s small-scale farmers.

Agricultural Data

Technical Notes

The following conventions are used in the Tables:

0 or 0.0 = nil or negligible ; .. or () data not available or missing

Sources of data as follows:

Population, total (millions)

Source: World Development Indicators, World Bank

Rural Population (% of total population)

Source: World Development Indicators, World Bank

Rural Population Growth (annual %)

Source: World Development Indicators, World Bank

GDP per capita growth (annual %)

Source: World Development Indicators, World Bank

GDP growth (annual %)

Source: World Development Indicators, World Bank

Employment in agriculture (% of total employment) (modeled ILO estimate)

Source: World Development Indicators, World Bank

Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)

Source: World Development Indicators, World Bank

Fertilizer consumption (kilograms per hectare of arable land)

Source: World Development Indicators, World Bank

Starting a Business – Score

Source: World Development Indicators, World Bank

Cost of Business start-up Procedures (% of GNI per capita)

Source: World Development Indicators, World Bank

Time required to start a business (days)

Source: World Development Indicators, World Bank

CPIA transparency, accountability, and corruption in the public sector

rating (1=low to 6=high)

Source: World Development Indicators, World Bank

Spending, total (as a share of AgGDP, %)

Source: ASTI (Agricultural Science and Technology Indicators). ASTI database. International Food Policy Research Institute (IFPRI) (<https://www.asti.cgiar.org/>)

Agricultural Value Added (% GDP)

Source: ReSAKSS (Regional Strategic Analysts and Knowledge Support System)

Government Agriculture Expenditure (% of agriculture value added)

Source: ReSAKSS (Regional Strategic Analysts and Knowledge Support System)

Population, total (in Millions)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	23.4	24.2	25.1	26.0	26.9	27.9	28.8	29.8	30.8
Benin	9.2	9.5	9.7	10.0	10.3	10.6	10.9	11.2	11.5
Botswana	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3
Burkina Faso	15.6	16.1	16.6	17.1	17.6	18.1	18.6	19.2	19.8
Burundi	8.7	9.0	9.2	9.5	9.8	10.2	10.5	10.8	11.2
Cabo Verde	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cameroon	20.3	20.9	21.5	22.1	22.7	23.3	23.9	24.6	25.2
Central African Rep.	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.6	4.7
Chad	12.0	12.4	12.8	13.2	13.7	14.1	14.6	15.0	15.5
Comoros	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8
Congo, Dem. Rep.	64.6	66.8	69.0	71.4	73.8	76.2	78.8	81.4	84.1
Congo, Rep.	4.3	4.4	4.5	4.6	4.7	4.9	5.0	5.1	0.8
Cote d'Ivoire	20.5	21.0	21.5	22.1	22.6	23.2	23.8	24.4	25.1
Equatorial Guinea	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3
Eritrea	3.2	3.2	..	..	..	..	..	..	..
Eswatini	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Ethiopia	87.6	90.1	92.7	95.4	98.1	100.8	103.6	106.4	109.2
Gabon	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.1	2.1
Gambia, The	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.3
Ghana	24.8	25.4	26.0	26.6	27.2	27.8	28.5	29.1	29.8
Guinea	10.2	10.4	10.7	10.9	11.2	11.4	11.7	12.1	12.4
Guinea-Bissau	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9
Kenya	42.0	43.2	44.3	45.5	46.7	47.9	49.1	50.2	51.4
Lesotho	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
Liberia	3.9	4.0	4.1	4.2	4.4	4.5	4.6	4.7	4.8
Madagascar	21.2	21.7	22.3	23.0	23.6	24.2	24.9	25.6	26.3
Malawi	14.5	15.0	15.4	15.8	16.3	16.7	17.2	17.7	18.1
Mali	15.0	15.5	16.0	16.4	16.9	17.4	18.0	18.5	19.1
Mauritania	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4
Mauritius	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Mozambique	23.5	24.2	24.9	25.6	26.3	27.0	27.8	28.6	29.5
Namibia	2.1	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4
Niger	16.5	17.1	17.8	18.5	19.2	20.0	20.8	21.6	22.4
Nigeria	158.5	162.8	167.2	171.8	26.9	181.1	186.0	190.9	195.9
Rwanda	10.0	10.3	10.5	10.8	11.1	11.4	11.7	12.0	12.3
Sao Tome and Principe	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Senegal	12.7	13.0	13.4	13.8	14.2	14.6	15.0	15.4	15.9
Seychelles	0.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sierra Leone	6.4	6.6	6.7	6.9	7.0	7.2	7.3	7.5	7.7
Somalia	12.0	12.4	12.7	13.1	26.9	13.8	14.2	14.6	15.0
South Africa	51.2	52.0	52.8	53.7	54.5	55.4	56.2	57.0	57.8
South Sudan	9.5	9.8	10.1	10.4	10.6	10.7	10.8	10.9	11.0
Sudan	34.5	35.3	36.2	37.1	38.0	38.9	39.8	40.8	41.8
Tanzania	44.3	45.7	47.1	48.5	26.9	51.5	53.1	54.7	56.3
Togo	6.4	6.6	6.8	7.0	7.1	7.3	7.5	7.7	7.9
Uganda	32.4	33.5	34.6	35.7	36.9	38.2	39.6	41.2	42.7
Zambia	13.6	14.0	14.5	14.9	15.4	15.9	16.4	16.9	17.4
Zimbabwe	12.7	12.9	13.1	13.4	26.9	13.8	14.0	14.2	14.4

Source: World Development Indicators

Rural population (% of total population)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	41	40	39	39	38	37	37	36	35	34
Benin	57	57	56	56	55	55	54	54	53	53
Botswana	39	38	36	35	34	34	33	32	31	31
Burkina Faso	76	75	75	74	74	73	72	72	71	71
Burundi	90	89	89	89	89	88	88	88	87	87
Cabo Verde	39	38	38	37	37	36	36	35	35	34
Cameroon	49	48	48	47	47	46	45	45	44	44
Central African Rep.	61	61	61	61	60	60	60	59	59	59
Chad	78	78	78	78	78	78	77	77	77	77
Comoros	72	72	72	72	72	72	72	71	71	71
Congo, Dem. Rep.	61	60	59	59	58	58	57	57	56	56
Congo, Rep.	37	37	36	36	35	35	34	34	34	33
Cote d'Ivoire	53	53	52	52	51	51	51	50	50	49
Equatorial Guinea	36	34	33	31	30	30	29	29	28	28
Eritrea	65	65	64	..	..	..	..	..	..	..
Eswatini	78	78	77	77	77	77	77	77	76	76
Ethiopia	83	83	82	82	81	81	81	80	80	79
Gabon	15	14	14	13	13	12	12	11	11	11
Gambia, The	45	44	44	43	42	41	41	40	39	39
Ghana	50	49	49	48	47	47	46	45	45	44
Guinea	67	66	66	66	65	65	65	65	64	64
Guinea-Bissau	60	60	59	59	59	58	58	57	57	57
Kenya	77	76	76	76	75	75	74	74	73	73
Lesotho	76	75	75	74	74	73	73	73	72	72
Liberia	53	52	52	51	51	51	50	50	49	49
Madagascar	69	68	67	67	66	65	65	64	63	63
Malawi	85	84	84	84	84	84	84	83	83	83
Mali	65	64	63	62	62	61	60	59	58	58
Mauritania	54	53	53	52	51	50	49	48	47	46
Mauritius	58	58	59	59	59	59	59	59	59	59
Mozambique	69	68	68	67	67	66	66	65	65	64
Namibia	59	58	57	56	55	54	53	52	51	50
Niger	84	84	84	84	84	84	84	84	84	84
Nigeria	57	57	56	55	54	53	52	51	50	50
Rwanda	83	83	83	83	83	83	83	83	83	83
Sao Tome and Principe	36	35	34	33	32	31	30	29	28	27
Senegal	57	56	56	55	55	55	54	54	53	53
Seychelles	47	47	46	46	45	45	45	44	44	43
Sierra Leone	62	61	61	60	60	60	59	59	58	58
Somalia	62	61	59	58	58	57	57	56	56	55
South Africa	38	38	37	37	36	36	35	35	34	34
South Sudan	82	82	82	82	82	81	81	81	81	80
Sudan	67	67	67	67	66	66	66	66	66	65
Tanzania	73	72	71	71	70	69	68	68	67	66
Togo	63	62	62	61	61	60	60	59	59	58
Uganda	81	81	80	80	79	78	78	77	77	76
Zambia	61	61	60	60	59	59	58	58	57	56
Zimbabwe	67	67	67	67	67	67	68	68	68	68

Source: World Development Indicators

Population growth (annual %)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	3.7	3.7	3.6	3.6	3.6	3.5	3.4	3.4	3.3	3.3
Benin	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7
Botswana	2.0	1.7	1.4	1.2	1.1	1.3	1.5	1.8	2.1	2.2
Burkina Faso	3.0	3.0	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.9
Burundi	3.3	3.3	3.2	3.2	3.1	3.1	3.2	3.2	3.2	3.2
Cabo Verde	1.2	1.2	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2
Cameroon	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6
Central African Rep.	1.5	1.1	0.7	0.4	0.3	0.4	0.6	1.0	1.3	1.5
Chad	3.3	3.3	3.4	3.4	3.4	3.3	3.2	3.1	3.1	3.0
Comoros	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2
Congo, Dem. Rep.	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.2
Congo, Rep.	3.3	3.0	2.8	2.6	2.5	2.4	2.5	2.5	2.6	2.6
Cote d'Ivoire	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.6
Equatorial Guinea	4.6	4.6	4.5	4.4	4.3	4.2	4.0	3.9	3.8	3.7
Eritrea	1.8	1.6	1.4	..	..	..	..	..	..	..
Eswatini	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.0
Ethiopia	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.6
Gabon	3.3	3.5	3.7	3.8	3.8	3.6	3.3	3.0	2.8	2.6
Gambia, The	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9
Ghana	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2
Guinea	2.3	2.3	2.2	2.2	2.2	2.3	2.5	2.6	2.8	2.8
Guinea-Bissau	2.5	2.6	2.6	2.7	2.7	2.6	2.6	2.6	2.5	2.5
Kenya	2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.4	2.4	2.3
Lesotho	0.2	0.3	0.4	0.6	0.7	0.7	0.8	0.8	0.8	0.8
Liberia	4.0	3.6	3.2	2.9	2.7	2.6	2.6	2.5	2.5	2.5
Madagascar	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Malawi	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6
Mali	3.3	3.2	3.0	3.0	2.9	2.9	2.9	3.0	3.0	3.0
Mauritania	2.9	2.9	2.9	3.0	2.9	2.9	2.9	2.9	2.8	2.8
Mauritius	0.3	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1
Mozambique	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.9	2.9	2.9
Namibia	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.9	1.9
Niger	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8
Nigeria	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
Rwanda	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6
Sao Tome and Principe	2.7	2.5	2.3	2.1	1.9	1.9	1.9	1.9	1.9	1.9
Senegal	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Seychelles	0.4	2.8	-2.6	1.0	1.8	1.6	2.2	1.3	1.2	1.0
Sierra Leone	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1
Somalia	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8
South Africa	1.4	1.5	1.5	1.6	1.6	1.6	1.5	1.5	1.4	1.4
South Sudan	4.5	3.9	3.3	2.8	2.4	1.9	1.5	1.1	0.7	0.6
Sudan	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Tanzania	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Togo	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4
Uganda	3.2	3.2	3.2	3.2	3.2	3.4	3.5	3.7	3.7	3.7
Zambia	2.8	2.9	3.0	3.1	3.1	3.1	3.1	3.0	3.0	2.9
Zimbabwe	1.2	1.4	1.5	1.7	1.8	1.8	1.7	1.5	1.5	1.4

Source: World Development Indicators

GDP per capita growth (annual %)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	-2.8	1.1	-0.2	4.7	1.3	1.2	-2.5	-5.8	-3.4	-5.3
Benin	-0.5	-0.7	0.1	1.9	4.2	3.4	-0.7	1.1	3.0	4.0
Botswana	-9.4	6.7	4.6	3.2	10.1	2.8	-3.2	2.4	0.8	2.2
Burkina Faso	-0.1	2.2	3.5	3.3	2.7	1.3	0.9	2.9	3.3	3.5
Burundi	0.5	1.8	0.7	1.2	1.7	1.0	-6.9	-3.7	-2.6	-1.6
Cabo Verde	-2.5	0.2	2.7	-0.2	-0.5	-0.7	-0.2	3.4	2.8	4.3
Cameroon	-0.6	0.6	1.3	1.7	2.6	3.1	2.9	1.9	0.9	1.2
Central African Rep.	7.0	3.5	3.4	4.6	-36.2	-0.2	3.9	4.0	3.1	2.8
Chad	0.8	9.8	-3.2	5.3	2.2	3.4	-0.5	-9.2	-5.9	-0.4
Comoros	0.7	1.3	1.6	0.7	2.0	-0.3	-1.2	-0.1	0.4	0.5
Congo, Dem. Rep.	-0.5	3.6	3.4	3.6	4.9	5.9	3.4	-0.9	0.4	2.4
Congo, Rep.	4.0	5.5	0.6	1.1	0.9	4.2	0.1	-5.2	-5.6	-1.5
Cote d'Ivoire	0.9	-0.3	-6.6	8.0	6.2	6.1	6.1	5.3	5.0	4.7
Equatorial Guinea	-3.2	-13.0	1.9	3.7	-8.2	-3.7	-12.7	-12.3	-8.2	-6.4
Eritrea	2.0	0.6	7.2	..	..	..	..	..	..	..
Eswatini	0.8	3.1	1.6	4.0	5.7	1.2	-0.4	2.3	0.9	-0.4
Ethiopia	5.8	9.5	8.1	5.6	7.5	7.2	7.4	6.5	6.6	4.0
Gabon	-3.1	3.4	3.2	1.3	1.7	0.6	0.5	-1.0	-2.3	-1.4
Gambia, The	3.3	3.4	-7.1	2.4	1.7	-3.9	2.7	-2.6	1.5	3.5
Ghana	2.2	5.2	11.3	6.7	4.8	0.6	-0.1	1.1	5.8	4.0
Guinea	-3.4	2.5	3.3	3.6	1.6	1.3	1.3	7.9	10.3	5.6
Guinea-Bissau	0.8	2.0	5.3	-4.3	0.5	-1.7	3.4	3.6	3.3	1.2
Kenya	0.5	5.5	3.3	1.8	3.1	2.7	3.1	3.3	2.4	3.9
Lesotho	2.0	5.8	6.5	5.4	1.2	2.4	2.0	2.4	-3.1	0.7
Liberia	1.2	2.4	4.8	4.9	5.8	-1.9	-2.5	-4.1	0.0	-1.2
Madagascar	-6.7	-2.5	-1.3	0.2	-0.5	0.6	0.4	1.4	1.5	2.4
Malawi	5.3	3.8	1.9	-1.0	2.3	2.8	0.0	-0.3	1.3	0.8
Mali	1.3	2.1	0.1	-3.7	-0.6	4.0	2.9	2.7	2.3	1.8
Mauritania	-3.9	1.8	1.7	2.7	3.0	2.5	-1.5	-0.9	0.2	0.8
Mauritius	3.0	4.1	3.9	3.2	3.1	3.6	3.4	3.8	3.7	3.7
Mozambique	3.5	3.8	4.2	4.3	4.2	4.5	3.6	0.8	0.8	0.3
Namibia	-1.5	4.1	3.2	3.2	3.8	4.5	4.2	-0.7	-2.7	-1.9
Niger	-4.4	4.3	-1.6	7.6	1.2	3.4	0.4	1.0	0.9	1.2
Nigeria	5.2	5.2	2.5	1.5	3.9	3.5	0.0	-4.2	-1.8	-0.7
Rwanda	3.5	4.6	5.1	6.2	2.2	5.0	6.1	3.3	3.3	5.8
Sao Tome and Principe	-0.3	4.0	2.0	1.0	2.8	4.6	1.9	2.2	1.9	0.7
Senegal	-0.6	0.8	-1.3	2.2	0.0	3.7	3.4	3.4	4.1	3.8
Seychelles	-1.5	3.0	10.8	0.3	4.1	2.9	2.6	3.1	3.1	2.6
Sierra Leone	0.9	3.0	3.9	12.6	18.1	2.3	-22.3	3.8	2.0	1.5
Somalia	..	..	..	..	..	..	..	..	..	..
South Africa	-2.9	1.6	1.7	0.6	0.9	0.2	-0.3	-0.9	-0.1	-0.7
South Sudan	0.4	1.4	-7.8	-47.6	10.5	1.4	-12.1	-12.1	..	..
Sudan	0.5	0.8	7.3	11.8	1.9	0.2	2.4	2.2	1.8	-4.6
Tanzania	2.3	3.3	4.5	1.4	3.6	3.6	3.0	3.7	3.6	2.1
Togo	2.7	3.3	3.6	3.7	3.4	3.2	3.1	2.3	1.9	2.3
Uganda	3.5	2.3	6.0	0.6	0.3	1.6	1.6	1.0	0.0	2.2
Zambia	6.2	7.1	2.4	4.3	1.8	1.5	-0.2	0.7	0.4	0.8
Zimbabwe	10.7	18.1	12.5	14.7	0.2	0.6	0.1	-0.8	3.2	4.7

Source: World Development Indicators

GDP growth (annual %)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	0.9	4.9	3.5	8.5	5.0	4.8	0.9	-2.6	-0.1	-2.1
Benin	2.3	2.1	3.0	4.8	7.2	6.4	2.1	4.0	5.8	6.9
Botswana	-7.7	8.6	6.0	4.5	11.3	4.1	-1.7	4.3	2.9	4.5
Burkina Faso	3.0	5.4	6.6	6.5	5.8	4.3	3.9	5.9	6.3	6.5
Burundi	3.8	5.1	4.0	4.4	4.9	4.2	-3.9	-0.6	0.5	1.6
Cabo Verde	-1.3	1.5	4.0	1.1	0.8	0.6	1.0	4.7	4.0	5.5
Cameroon	2.2	3.4	4.1	4.5	5.4	5.9	5.7	4.6	3.5	3.9
Central African Rep.	8.6	4.6	4.2	5.1	-36.0	0.1	4.6	5.0	4.5	4.3
Chad	4.2	13.6	0.1	8.9	5.7	6.9	2.8	-6.3	-3.0	2.6
Comoros	3.2	3.8	4.1	3.2	4.5	2.1	1.1	2.2	2.7	2.8
Congo, Dem. Rep.	2.9	7.1	6.9	7.1	8.5	9.5	6.9	2.4	3.7	5.8
Congo, Rep.	7.5	8.8	3.4	3.8	3.4	6.8	2.6	-2.8	-3.1	1.0
Cote d'Ivoire	3.3	2.0	-4.4	10.7	8.9	8.8	8.8	8.0	7.7	7.4
Equatorial Guinea	1.3	-8.9	6.5	8.3	-4.1	0.4	-9.1	-8.8	-4.7	-2.9
Eritrea	3.9	2.2	8.7	..	..	..	..	..	..	..
Eswatini	1.6	3.8	2.2	4.7	6.4	1.9	0.4	3.2	1.9	0.6
Ethiopia	8.8	12.6	11.2	8.6	10.6	10.3	10.4	9.4	9.5	6.8
Gabon	0.1	7.1	7.1	5.3	5.6	4.3	3.9	2.1	0.5	1.2
Gambia, The	6.4	6.5	-4.3	5.6	4.8	-0.9	5.9	0.4	4.6	6.6
Ghana	4.8	7.9	14.0	9.3	7.3	2.9	2.2	3.4	8.1	6.3
Guinea	-1.1	4.8	5.6	5.9	3.9	3.7	3.8	10.8	13.4	8.7
Guinea-Bissau	3.4	4.6	8.1	-1.7	3.3	1.0	6.1	6.3	5.9	3.8
Kenya	3.3	8.4	6.1	4.6	5.9	5.4	5.7	5.9	4.9	6.3
Lesotho	2.2	6.1	6.9	6.0	1.8	3.1	2.8	3.2	-2.3	1.5
Liberia	5.3	6.1	8.2	8.0	8.7	0.7	0.0	-1.6	2.5	1.2
Madagascar	-4.0	0.3	1.5	3.0	2.3	3.3	3.1	4.2	4.3	5.2
Malawi	8.3	6.9	4.9	1.9	5.2	5.7	2.8	2.5	4.0	3.5
Mali	4.7	5.4	3.2	-0.8	2.3	7.0	6.0	5.8	5.4	4.9
Mauritania	-1.0	4.8	4.7	5.8	6.1	5.6	1.4	2.0	3.0	3.6
Mauritius	3.3	4.4	4.1	3.5	3.4	3.7	3.6	3.8	3.8	3.8
Mozambique	6.4	6.7	7.1	7.2	7.1	7.4	6.6	3.8	3.7	3.3
Namibia	0.3	6.0	5.1	5.1	5.6	6.4	6.1	1.1	-0.9	-0.1
Niger	-0.7	8.4	2.3	11.8	5.3	7.5	4.3	4.9	4.9	5.2
Nigeria	8.0	8.0	5.3	4.2	6.7	6.3	2.7	-1.6	0.8	1.9
Rwanda	6.3	7.3	7.8	8.8	4.7	7.6	8.9	6.0	6.1	8.7
Sao Tome and Principe	2.4	6.7	4.4	3.1	4.8	6.5	3.8	4.2	3.9	2.7
Senegal	2.1	3.6	1.5	5.1	2.8	6.6	6.4	6.4	7.1	6.8
Seychelles	-1.1	6.0	7.9	1.3	6.0	4.5	4.9	4.5	4.3	3.6
Sierra Leone	3.2	5.3	6.3	15.2	20.7	4.6	-20.6	6.1	4.2	3.7
Somalia	..	..	..	..	..	..	..	..	..	..
South Africa	-1.5	3.0	3.3	2.2	2.5	1.8	1.3	0.6	1.3	0.6
South Sudan	5.0	5.5	-4.6	-46.1	13.1	3.4	-10.8	-11.2	..	..
Sudan	3.2	3.5	-2.0	0.5	4.4	2.7	4.9	4.7	4.3	-2.3
Tanzania	5.3	6.3	7.7	4.5	6.8	6.7	6.2	6.9	6.8	5.2
Togo	5.5	6.1	6.4	6.5	6.1	5.9	5.7	4.9	4.4	4.9
Uganda	6.8	5.6	9.4	3.8	3.6	5.1	5.2	4.8	3.9	6.1
Zambia	9.2	10.3	5.6	7.6	5.1	4.7	2.9	3.8	3.4	3.8
Zimbabwe	12.0	19.7	14.2	16.7	2.0	2.4	1.8	0.8	4.7	6.2

Source: World Development Indicators

Employment in agriculture (% of total employment) (modeled ILO estimate)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	45.9	48.7	51.2	50.9	50.3	49.8	49.4	49.4	49.3	49.1
Benin	43.7	43.7	43.6	43.3	42.6	42.2	42.2	42.1	41.8	41.4
Botswana	25.1	24.9	24.7	24.3	24.0	23.9	23.6	23.4	23.2	23.0
Burkina Faso	52.2	48.0	43.7	39.2	34.6	30.4	30.0	29.7	29.2	28.7
Burundi	91.8	91.7	91.6	91.5	91.6	91.4	91.6	91.8	91.9	92.0
Cabo Verde	14.5	14.4	14.2	14.2	14.1	14.1	14.0	13.8	13.6	13.4
Cameroon	56.5	54.9	53.1	51.4	49.5	47.6	47.1	46.8	46.6	46.3
Central African Rep.	70.2	70.1	70.1	69.8	74.0	73.8	73.6	73.3	73.1	72.8
Chad	81.7	82.5	81.7	81.6	81.2	80.8	80.9	81.3	81.7	81.6
Comoros	56.5	56.9	56.9	57.1	57.2	57.3	57.2	57.1	57.1	56.9
Congo, Dem. Rep.	71.3	71.4	71.2	70.7	70.2	69.7	69.0	68.9	68.8	68.6
Congo, Rep.	38.9	39.0	38.8	38.3	37.9	37.3	36.1	35.9	36.0	35.8
Cote d'Ivoire	46.3	46.1	46.6	45.6	45.2	47.3	48.5	48.9	48.4	48.0
Equatorial Guinea	43.6	43.6	43.3	43.1	42.7	42.4	41.8	41.5	41.5	41.4
Eritrea	64.7	65.3	64.4	63.8	63.8	63.4	63.2	63.0	62.9	62.7
Eswatini	14.1	14.0	13.8	13.7	13.5	13.3	13.3	13.2	13.1	13.0
Ethiopia	75.3	73.9	72.8	72.3	71.0	70.0	68.9	68.0	67.1	66.2
Gabon	40.4	40.0	39.9	39.5	39.1	38.6	38.1	38.1	37.8	37.6
Gambia, The	30.9	30.9	30.8	30.5	30.2	30.1	29.9	30.0	29.9	29.7
Ghana	51.4	49.9	48.4	46.8	45.4	40.4	35.2	34.7	34.3	33.9
Guinea	69.1	69.2	68.7	68.5	68.2	68.0	67.7	68.0	67.0	66.5
Guinea-Bissau	69.5	69.5	68.9	69.5	69.1	69.1	69.0	68.5	68.2	68.0
Kenya	60.1	59.7	59.5	59.1	58.7	58.4	58.3	58.2	57.8	57.5
Lesotho	70.0	69.2	69.0	68.1	68.1	68.1	67.8	67.6	67.1	66.9
Liberia	47.6	47.3	46.7	46.2	45.5	45.7	45.9	46.5	46.4	46.2
Madagascar	75.0	73.2	71.3	68.9	69.2	68.9	68.8	68.6	68.4	68.2
Malawi	73.8	73.3	73.1	72.9	72.6	72.4	72.3	72.2	72.1	71.9
Mali	66.7	66.5	66.5	67.2	67.0	66.7	62.3	66.0	65.7	65.3
Mauritania	58.4	58.3	58.4	57.6	57.3	56.2	55.4	56.0	55.7	55.4
Mauritius	9.0	8.6	7.7	7.7	7.6	7.5	7.4	7.3	7.2	7.1
Mozambique	77.3	76.6	75.7	74.9	73.9	73.0	72.1	72.0	71.9	71.7
Namibia	31.5	31.7	29.4	27.4	31.4	29.3	24.4	20.1	19.9	19.7
Niger	77.8	77.6	77.5	77.0	76.6	76.3	76.2	76.2	76.1	75.9
Nigeria	41.1	40.8	40.2	39.3	38.3	37.7	37.1	36.9	36.8	36.6
Rwanda	77.6	77.3	77.0	76.6	73.0	68.5	67.6	67.5	67.1	66.6
Sao Tome and Principe	26.5	26.0	25.7	25.4	25.1	24.6	24.5	24.2	24.0	23.7
Senegal	41.0	39.9	38.6	37.5	36.2	34.8	33.3	33.0	32.5	32.0
Seychelles	..	..	..	..	..	..	..	..	..	..
Sierra Leone	65.5	64.3	63.1	61.3	59.1	57.6	59.7	59.5	59.2	58.8
Somalia	72.8	72.5	72.3	72.4	72.5	72.7	72.6	72.5	72.5	72.4
South Africa	5.1	4.9	4.6	4.8	5.0	4.7	5.6	5.6	5.2	5.2
South Sudan	42.3	41.9	42.4	50.3	47.5	47.3	46.0	48.1	48.9	49.6
Sudan	44.7	44.5	44.6	44.3	43.9	44.0	43.7	43.4	43.2	43.1
Tanzania	71.0	70.6	70.0	69.7	69.0	68.1	67.8	67.5	66.9	66.3
Togo	38.1	37.7	37.1	37.0	36.5	36.1	35.6	35.3	34.9	34.5
Uganda	73.8	70.8	68.5	66.1	71.9	71.7	71.3	71.4	71.1	70.8
Zambia	67.9	64.2	60.7	56.0	55.8	55.2	54.7	54.4	54.2	53.9
Zimbabwe	68.1	67.2	65.9	65.5	66.1	67.3	67.1	67.2	67.1	67.2

Source: World Development Indicators

Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	77.8	77.8	77.9	77.9	77.9	77.9	77.8	77.8	77.7	77.7
Benin	71.3	71.0	70.9	70.9	70.9	71.0	71.0	71.1	71.1	71.2
Botswana	63.2	60.3	64.5	68.2	71.3	71.4	71.7	71.8	72.0	72.3
Burkina Faso	71.2	70.4	69.5	68.6	67.7	66.7	66.7	66.8	66.8	66.6
Burundi	79.6	79.3	79.0	78.7	78.4	78.2	78.5	78.7	79.0	79.0
Cabo Verde	66.1	66.5	66.9	67.3	67.7	68.0	68.4	68.6	68.9	69.1
Cameroon	78.0	75.9	76.0	76.1	76.2	76.3	76.3	76.4	76.4	76.3
Central African Rep.	72.6	72.5	72.6	72.5	72.7	72.6	72.4	72.2	72.1	72.1
Chad	71.6	71.5	71.5	71.4	71.4	71.3	71.3	71.3	71.3	71.3
Comoros	42.4	42.6	42.8	43.0	43.2	43.4	43.6	43.8	43.9	44.1
Congo, Dem. Rep.	67.4	66.3	65.2	64.0	64.0	64.0	63.9	63.9	63.9	63.6
Congo, Rep.	69.4	69.5	69.6	69.6	69.6	69.6	69.5	69.5	69.3	69.2
Cote d'Ivoire	61.2	60.6	60.0	59.5	58.9	58.4	57.9	57.4	57.3	57.3
Equatorial Guinea	61.3	61.9	61.8	61.8	61.9	62.3	62.7	62.3	62.1	62.1
Eritrea	79.8	80.0	80.1	80.3	80.4	80.5	80.6	80.6	80.5	80.6
Eswatini	49.8	50.1	50.4	50.8	51.2	51.6	52.0	52.3	52.7	53.0
Ethiopia	81.5	81.3	81.1	80.9	80.8	80.6	80.5	80.4	80.2	80.3
Gabon	48.7	49.2	49.6	50.0	50.4	50.8	51.3	51.6	51.9	52.1
Gambia, The	59.1	59.3	59.4	59.5	59.5	59.5	59.5	59.5	59.4	59.5
Ghana	69.9	69.4	69.1	68.7	68.2	67.8	67.4	67.5	67.5	67.5
Guinea	65.0	65.0	64.9	64.9	64.8	64.8	64.8	64.7	64.6	64.6
Guinea-Bissau	72.1	72.2	72.2	72.4	72.5	72.6	72.7	72.8	72.9	73.0
Kenya	66.0	66.1	66.2	66.3	66.3	66.3	66.3	66.3	66.3	66.3
Lesotho	68.2	67.7	67.2	66.7	66.2	66.3	66.4	66.6	66.8	67.0
Liberia	56.4	56.4	56.4	56.3	56.2	56.2	56.2	56.2	56.1	56.1
Madagascar	88.7	89.1	88.7	88.3	87.8	87.2	86.5	86.4	86.3	86.4
Malawi	77.3	77.3	77.4	77.5	77.5	77.4	77.3	77.2	77.2	77.3
Mali	71.0	71.1	71.2	71.2	71.3	71.3	71.1	71.0	71.0	71.0
Mauritania	46.9	46.5	46.1	45.8	45.9	46.0	46.1	46.2	46.3	46.3
Mauritius	57.6	58.3	57.5	57.7	58.7	59.0	59.3	58.7	58.4	58.2
Mozambique	83.0	82.5	81.8	81.2	80.5	79.7	78.9	78.8	78.7	78.5
Namibia	57.5	57.6	57.9	58.3	61.1	61.0	60.5	60.1	60.4	60.8
Niger	79.2	79.2	79.1	79.1	79.0	79.0	78.9	78.8	78.8	78.7
Nigeria	54.9	55.0	55.0	55.1	55.1	55.1	55.1	55.2	55.2	55.2
Rwanda	84.8	84.8	84.7	84.6	84.4	84.2	84.1	84.0	83.9	83.9
Sao Tome and Principe	58.4	58.7	59.0	59.2	59.4	59.5	59.6	59.6	59.6	59.5
Senegal	49.4	48.8	48.3	47.8	47.3	46.8	46.2	46.3	46.4	46.4
Seychelles	..	..	..	..	..	..	..	..	..	..
Sierra Leone	62.0	61.2	60.4	59.6	58.8	58.0	58.3	58.2	58.2	58.1
Somalia	46.0	46.0	45.9	45.9	46.0	46.1	46.2	46.2	46.3	46.4
South Africa	54.0	52.4	52.3	52.7	53.2	53.4	54.6	54.7	55.6	55.5
South Sudan	73.5	73.4	73.3	73.3	73.2	73.1	73.0	73.0	73.0	73.0
Sudan	47.6	47.5	47.4	47.3	47.3	47.2	47.2	47.2	47.2	47.1
Tanzania	86.9	86.3	85.7	85.0	84.3	83.4	83.4	83.4	83.3	83.2
Togo	79.2	78.6	77.9	78.0	78.0	78.0	78.0	77.9	77.8	77.7
Uganda	70.8	70.8	71.0	71.1	71.1	71.0	71.0	71.0	70.9	71.0
Zambia	77.2	76.5	75.9	75.3	75.3	75.2	75.2	75.2	75.2	75.2
Zimbabwe	82.6	82.6	82.7	82.8	83.0	83.1	83.2	83.3	83.4	83.5

Source: World Development Indicators

Fertilizer consumption (kilograms per hectare of arable land)

Country	2009	2010	2011	2012	2013	2014	2015	2016
Angola	5.5	8.4	12.0	8.9	9.3	9.3	8.1	8.0
Benin	6.7	9.0	4.3	9.9	5.0	15.5	11.3	14.7
Botswana	48.6	83.1	29.7	54.8	81.4	58.3	89.6	89.6
Burkina Faso	9.5	9.4	10.7	13.6	15.5	15.9	16.3	21.8
Burundi	1.9	3.6	5.6	5.8	9.3	10.3	15.1	5.4
Cabo Verde	..	..	..	..	..	..	..	..
Cameroon	7.0	9.2	11.0	10.3	10.1	9.6	13.6	9.7
Central African Rep.	..	..	0.4	0.3	0.3	0.3	0.3	..
Chad	..	..	..	..	..	..	..	..
Comoros	..	..	..	..	..	..	..	..
Congo, Dem. Rep.	0.8	1.1	1.0	0.7	1.4	2.9	3.0	2.5
Congo, Rep.	4.6	0.5	1.3	2.2	2.9	1.9	1.8	1.8
Cote d'Ivoire	15.3	32.1	19.4	26.9	37.6	42.4	50.6	51.7
Equatorial Guinea	..	..	..	..	..	..	..	..
Eritrea	2.8	0.4	0.8	1.0	1.2	1.3	2.6	2.8
Eswatini	..	..	..	..	..	..	..	..
Ethiopia	17.7	21.8	20.8	30.6	18.7	26.2	18.5	14.4
Gabon	12.0	3.2	5.6	10.1	10.1	11.5	24.5	26.8
Gambia, The	6.3	7.3	10.3	2.6	0.4	0.7	0.9	1.2
Ghana	19.0	18.7	13.2	34.8	25.3	15.7	23.5	20.9
Guinea	0.6	0.9	3.6	2.9	2.9	1.1	2.7	1.6
Guinea-Bissau	..	..	..	..	..	..	..	..
Kenya	31.9	30.3	43.6	34.4	38.8	42.9	28.6	38.2
Lesotho	..	..	..	..	..	..	..	..
Liberia	..	..	..	..	..	..	..	..
Madagascar	2.3	2.4	3.2	2.9	2.9	5.6	3.5	5.2
Malawi	30.8	35.4	29.5	24.6	27.3	37.7	30.4	21.6
Mali	6.1	19.6	22.0	20.7	25.9	29.1	27.0	44.2
Mauritania	..	..	..	..	..	..	..	..
Mauritius	228.0	163.2	243.2	274.8	248.1	284.7	155.3	235.3
Mozambique	4.0	8.2	7.4	5.6	5.9	7.5	4.2	3.7
Namibia	1.6	4.4	6.6	15.0	10.9	6.1	14.5	26.1
Niger	0.4	0.5	0.5	0.9	0.6	1.0	0.4	0.4
Nigeria	5.3	12.2	6.6	8.7	9.0	9.4	7.7	5.5
Rwanda	1.3	0.1	0.1	5.1	11.2	12.6	19.7	10.9
Sao Tome and Principe	..	..	..	..	..	..	..	..
Senegal	6.4	8.2	6.8	10.5	12.4	11.7	16.3	16.4
Seychelles	52.0	32.2	321.4	525.0	341.7	337.1	816.9	521.7
Sierra Leone	..	..	..	..	..	..	..	..
Somalia	..	..	..	..	..	..	..	..
South Africa	60.2	53.8	60.3	59.5	57.7	65.0	58.5	58.5
South Sudan	..	..	..	..	..	..	..	..
Sudan	..	..	..	3.3	2.6	4.2	4.9	7.2
Tanzania	7.5	8.8	8.6	7.7	11.2	8.9	8.9	12.6
Togo	6.2	9.0	10.2	5.3	21.0	1.7	10.0	11.0
Uganda	2.1	1.7	1.8	2.1	2.4	1.8	2.4	1.9
Zambia	25.8	29.2	46.1	37.6	49.0	50.5	55.9	89.6
Zimbabwe	28.8	34.1	26.5	18.3	19.0	25.5	22.9	22.9

Source: World Development Indicators

Starting a Business - Score

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Angola	52.04	46.46	51.28	53.82	55.63	57.15	77.48	79.67	80.09	80.52
Benin	39.65	40.36	43.2	49.3	54.25	80.05	81.37	90.56	90.58	90.6
Botswana	71.89	71.88	78.17	78.21	77.95	76.2	76.21	76.21	76.22	76.22
Burkina Faso	60.89	60.96	64.62	65.95	69.21	69.06	86.69	88.06	88.17	88.19
Burundi	68.35	71.03	71.97	91.66	93.74	94.25	94.51	94.45	91.94	94.84
Cabo Verde	77.78	80.34	80.75	81.31	83.62	83.52	83.45	83.48	83.39	83.51
Cameroon	49.73	67.65	71.41	72.87	72.6	73.8	74.8	75.27	82.39	86.26
Central African Rep.	32.33	32.33	39.74	37.11	38.28	31.36	33.7	33.11	37.02	60.9
Chad	18.82	17.73	25.54	30.2	34.28	41.86	41.92	51.91	50.26	52.09
Comoros	46.91	48.73	48.31	52.61	58.23	59.31	71.17	69.87	72.01	72.25
Congo, Dem. Rep.	30.15	39.92	44.7	46.46	26.77	57.67	84.83	84.84	89.78	90.24
Congo, Rep.	42.71	40.73	43.41	47.62	48.51	60.46	60.53	58.58	63.83	64.1
Côte d'Ivoire	47.37	47.53	49.75	51.06	74.93	89.77	89.97	89.91	90	93.7
Equatorial Guinea	36.92	36.05	36.7	36.99	36.86	36.74	36.59	36.9	54.96	55.74
Eritrea	33.25	35.95	38.36	42.14	42.8	44.81	46.16	46.36	50.6	51.91
Eswatini	64.6	65.72	66.2	66.85	70.91	73.47	73.46	74.32	74.35	74.55
Ethiopia	30.39	32.41	27.95	37.65	46.57	49.22	53.64	55.96	68.43	70.79
Gabon	69.44	68.54	69.51	70.11	73.78	73.71	73.95	74.09	80.48	82.59
Gambia, The	58.05	58.09	58.05	63.2	61.26	68.37	67.32	69.37	69	69.91
Ghana	84.6	84.38	84.9	84.93	83.17	83.73	83.73	83.73	84.02	84.29
Guinea	31.52	30.43	34.15	48.29	55.53	52.82	77.4	77.58	79.15	83.9
Guinea-Bissau	4.26	4.29	49.29	55.03	52.57	49.13	50.58	73.3	74.04	75.22
Kenya	64.65	65.82	65.53	68	68.38	67.68	70	79.31	82.23	82.41
Lesotho	77.38	77.5	77.69	82.39	82.59	82.84	82.85	83	83.06	83.13
Liberia	76.8	76.46	83.93	85.89	90.35	90.56	90.64	90.64	90.77	88.14
Madagascar	66.6	63.05	79.17	79.42	79.48	79.75	78.16	81.76	87.78	88.1
Malawi	64.34	64.29	66.49	60.03	61.83	66.96	69.71	76.73	76.43	77.18
Mali	58.99	61.63	60.62	62.18	63.45	62.92	66.05	84.12	83.83	84.05
Mauritania	51.22	51.59	56.62	57.14	58.17	65.96	86.87	86.87	91.8	92.18
Mauritius	91.36	91.4	91.43	91.46	91.43	91.61	91.63	91.65	92	94.34
Mozambique	69.78	74.5	75.58	75.01	75.35	75.86	74.39	73.54	71	67.56
Namibia	67.76	68	68.16	67.99	68.46	68.67	68.92	68.87	68.9	69.06
Niger	44.25	44.27	44.79	44.99	53.48	54.41	77.62	86.16	93.65	93.69
Nigeria	..	..	..	..	74.21	77.37	77.64	78.99	80.75	82.97
Rwanda	89.76	89.91	90.42	85.52	85.7	80.6	82.92	87.17	87.66	91.39
São Tomé and Príncipe	48.01	23.62	64.65	68.97	69.3	72.89	73.76	75.28	77.33	78.32
Senegal	71.09	71.28	73.02	74.14	74.16	85.04	85.99	86.07	89.7	89.94
Seychelles	76.2	76.5	76.68	76.87	78.32	78.42	78.55	78.64	78.68	78.65
Sierra Leone	73.38	74.5	76.89	78.67	83.68	84.53	84.73	91.15	90.94	91.18
Somalia	..	..	..	..	..	..	48.27	48.71	45.77	46.37
South Africa	80.73	80.72	81.42	81.43	81.43	79.71	79.71	79.96	79.97	81.22
South Sudan	..	..	..	54.92	53.96	53.96	53.96	53.96	55.68	65.36
Sudan	72.28	70.89	71.45	73.52	73.48	73.84	75.14	73.17	73.51	76.35
Tanzania	60.95	63.38	64.32	67.32	68.73	68.91	68.47	69.16	70.15	72.65
Togo	20.2	22.93	23.04	40.44	47.07	76.06	78.37	81.71	82.51	88.7
Uganda	59.26	59.74	63.91	64.14	64.19	65.92	69.26	71.3	72.25	72.25
Zambia	82.9	83.04	83.17	81.8	85.09	84.95	84.88	84.83	84.89	85.07
Zimbabwe	38.27	40.24	45.47	49.17	47.92	49.03	49.22	48.84	59.28	66.48

Source: World Development Indicators

Cost of Business start-up Procedures (% of GNI per capita)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	151.1	226.6	163.1	143.1	130.1	118.8	17	20.7	17.4	13.9
Benin	157.4	154.4	149.9	126.9	122.8	55.9	45.4	3.8	3.7	3.6
Botswana	1.4	1.5	1.1	0.8	0.9	0.8	0.7	0.8	0.7	0.6
Burkina Faso	50.5	49.9	47.7	46.8	44.5	44.7	43.5	43.4	42.6	42.5
Burundi	145.7	124.3	116.8	18.3	17.5	13.4	13.4	13.9	33.9	10.7
Cabo Verde	17	18.5	17	14.9	13.5	14.3	14.8	14.7	15.4	14.4
Cameroon	128.6	46.2	40.4	36	36.4	34.6	33	32.2	35.8	24.8
Central African Rep.	223.7	208.8	156.5	154	144.7	200.4	181.3	186	154.7	143.4
Chad	246.4	226.9	208.5	202	186.3	150.6	150.4	159.8	171.3	172.3
Comoros	144.7	138.3	138	114.9	90.3	86.9	89.7	98.4	84.1	82.5
Congo, Dem. Rep.	847.6	735.1	551.4	284.7	200.1	30	29.3	29.3	28.6	26.7
Congo, Rep.	86.5	95.2	85.2	55.3	52.1	52.7	52.3	61.2	77.7	75.5
Cote d'Ivoire	133.3	133	132.6	130	44.4	20	18.6	18.9	16.5	2.7
Equatorial Guinea	98.4	100.9	99.1	98.2	98.6	99	99.4	102.7	103.4	101.2
Eritrea	76.5	69.2	62.6	52.3	50.5	41.5	38.1	37.6	27	23.7
Eswatini	33.9	33	29.2	24.1	27.7	23.3	23.4	16.6	16.4	14.8
Ethiopia	268.4	200.4	189.1	141.9	105	93.7	79.1	69.3	57.8	52.7
Gabon	17.8	21.9	17.3	14.5	12.5	12.9	15.1	14.3	7.2	6.1
Gambia, The	215.1	199.6	206.1	158.7	174.3	131.2	141.6	125.2	128.2	120.9
Ghana	24.8	30	26.4	26.7	23.3	19.2	19.4	19.7	17.5	15.5
Guinea	139	147.7	118	95.3	83	77.7	74.1	72.8	62.6	38.2
Guinea-Bissau	183.6	183.3	102	86.4	93.1	102.6	118.4	105.6	99.9	91
Kenya	52.8	55.2	53.5	47.5	44.5	54.1	43.6	28.2	26.3	24.9
Lesotho	27	26	24.9	13	11.4	9.4	9.3	8.1	7.7	7.1
Liberia	85.6	88.3	68.4	52.7	19.1	17.4	16.8	16.7	15.7	12.6
Madagascar	46.2	54.3	49.4	47.4	47	44.8	43.7	40.4	35.7	33
Malawi	108	108.4	90.9	140.5	120.1	106.6	84.6	42.2	44.6	38.6
Mali	86.9	79.7	90.5	86.2	76.7	78.1	71.3	61	58.4	56.8
Mauritania	58.9	56	48.3	47.6	46.1	20.8	19.4	19.4	19.3	16.2
Mauritius	4.1	3.8	3.6	3.3	3.6	2.1	2	1.8	1	0.9
Mozambique	56.8	56.9	48.3	52.8	50.2	46.1	57.8	64.6	92.9	120.5
Namibia	20.4	18.5	17.2	18.5	14.7	13.1	11.1	11.5	11.3	10
Niger	118.7	118.6	114.4	112.8	80.1	76.7	67.8	32.4	8.3	8.1
Nigeria	..	..	..	..	58.7	33.4	31.2	31.3	29.2	27.6
Rwanda	10.1	8.8	4.7	30.2	30.8	59.8	55	48.5	44.6	14.8
Sao Tome and Principe	98.2	88.8	23.1	19.7	19.4	17.5	16.7	15.2	13.2	12.3
Senegal	63.7	63.1	68	64.4	64.3	63.8	63.4	62.7	33.8	32
Seychelles	19.2	16.8	15.4	13.8	16	15.2	14.2	13.4	13.2	13.4
Sierra Leone	118.8	110.7	93.3	80.4	44.1	37.9	44.2	8.6	10.3	8.4
Somalia	..	..	..	..	..	..	180	176.5	203.6	195.2
South Africa	5.9	6	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2
South Sudan	..	..	..	192.3	372.1	242.4	330.1	422.4	305	122.6
Sudan	37.6	48.7	44.2	27.8	28.1	25.1	14.8	30.5	27.8	20.9
Tanzania	121.7	102.2	94.7	86.5	75.2	73.8	77.3	71.7	63.9	58.7
Togo	205	178.1	177.2	142.3	121.4	94.9	77.8	71.2	66	41.7
Uganda	84.4	94.4	84.5	76.7	78.3	64.4	39.7	37.1	33.6	33.6
Zambia	28.4	27.9	26.9	27	32.6	33.7	34.3	34.7	34.2	32.8
Zimbabwe	353.8	198.3	156.5	126.9	128.9	120	118.4	121.5	110	110.7

Source: World Development Indicators

Time required to start a business (days)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Angola	68	66	66	66	66	66	36	36	36	36
Benin	34.5	34.5	32.5	29.5	18.5	12.5	12.5	8.5	8.5	8.5
Botswana	59	59	40	40	41	48	48	48	48	48
Burkina Faso	14	14	13	13	13	13	13	13	13	13
Burundi	13	13	13	7	5	5	4	4	4	4
Cabo Verde	24	18	18	18	18	18	18	18	18	18
Cameroon	35.5	20.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	13.5
Central African Rep.	24	24	22	22	22	22	22	22	22	22
Chad	62	62	53	60	60	60	60	60	60	58
Comoros	22	22	22	20	16	16	16	16	16	16
Congo, Dem. Rep.	126.5	84.5	65.5	58.5	31.5	16.5	11.5	11.5	7	7
Congo, Rep.	158.5	158.5	158.5	158.5	98.5	50.5	50.5	50.5	49.5	49.5
Cote d'Ivoire	40	40	32	32	8	7	7	7	8	6
Equatorial Guinea	155	155	150	150	150	150	150	149	33	33
Eritrea	84	84	84	84	84	84	84	84	84	84
Eswatini	60	56	56	56	38	30	30	30	30	30
Ethiopia	20	20	40	40	39	39	35	35	33	32
Gabon	54	54	54	54	47	47	47	47	33	31
Gambia, The	27	27	27	27	27	26	25	25	25	25
Ghana	11	11	11	11	14	14	14	14	14	14
Guinea	40	40	40	43	23	15	15	15	15	15
Guinea-Bissau	216.5	216.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Kenya	33	33	35	34	34	32	28	22	23	23
Lesotho	39	39	39	29	29	29	29	29	29	29
Liberia	21	21	7	7	6	6	6	6	6	18
Madagascar	12	12	12	12	12	12	13	12	8	8
Malawi	36	36	36	37	40	38	38	37	37	37
Mali	8	8	8	8	11	11	8.5	8.5	11	11
Mauritania	19	19	19	19	19	8	8	8	6	6
Mauritius	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5.5	5
Mozambique	34	21	21	21	21	21	21	21	17	17
Namibia	66	66	66	66	66	66	66	66	66	66
Niger	17	17	17	17	17	15	15	10	7	7
Nigeria	..	..	..	..	30.3	30.3	30.3	24.9	18.9	10.9
Rwanda	7	7	7	8	7	7	6	4	4	4
Sao Tome and Principe	145	147	11	8	8	7	7	7	7	7
Senegal	9	9	6	6	6	6	6	6	6	6
Seychelles	33	33	33	33	32	32	32	32	32	32
Sierra Leone	12	12	12	12	12	12	10	8	8	8
Somalia	..	..	..	..	..	..	70	70	70	70
South Africa	45	45	45	45	45	46	46	45	45	40
South Sudan	..	..	..	14	14	14	14	14	13	13
Sudan	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	34.5
Tanzania	31	31	31	29	29	29	29	29	29	27.5
Togo	84	84	84	38	19	10	10	6	6	5.5
Uganda	27	26	26	29	28	28	27	26	24	24
Zambia	19	19	19	18.5	8.5	8.5	8.5	8.5	8.5	8.5
Zimbabwe	94	87	87	87	91	91	91	91	61	32

Source: World Development Indicators

CPIA transparency, accountability, and corruption in the public sector rating (1=low to 6=high)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	2.5	2.5	2.5	2.5	2.5	..	..	..	..
Benin	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Botswana	..	..	..	..	..	..	..	..	..
Burkina Faso	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Burundi	2	2	2	2	2	2.5	2	2	1.5
Cabo Verde	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4	4
Cameroon	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Central African Rep.	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Chad	2	2	2	2	2	2.5	2.5	2.5	2.5
Comoros	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Congo, Dem. Rep.	2	2	2	2	2	2	2	2	2
Congo, Rep.	2.5	2.5	2.5	2	2	2	2	2	2
Cote d'Ivoire	2.5	2	2.5	2.5	3	3	3	3	3
Equatorial Guinea	..	..	..	..	..	..	..	..	..
Eritrea	2	2	2	2	2	2	2	2	2
Eswatini	..	..	..	..	..	..	..	..	..
Ethiopia	2.5	2.5	3	3	3	3	3	3	3
Gabon	..	..	..	..	..	..	..	..	..
Gambia, The	2	2	2.5	2	2	2	2	2	2
Ghana	4	4	4	4	4	3.5	3.5	3	3.5
Guinea	2	2	2	2	2.5	2.5	2.5	2.5	2.5
Guinea-Bissau	2.5	2.5	2.5	2	2	2	2	2	1.5
Kenya	3	3	3	3	3	3	3	3	3
Lesotho	3.5	3.5	3.5	3.5	3.5	3	3	3	3
Liberia	3	3	3	3	3	3	3	3	3
Madagascar	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	2.5
Malawi	3	3	3	3	2.5	2.5	2.5	2.5	2.5
Mali	3.5	3.5	3.5	3	3	3	3	3	3
Mauritania	2.5	2.5	2.5	2.5	2.5	3	3	3	3
Mauritius	..	..	..	..	..	..	..	..	..
Mozambique	3	3	3	3	3	3	2.5	2.5	2.5
Namibia	..	..	..	..	..	..	..	..	..
Niger	2.5	3	3	3	3	3	3	3	3
Nigeria	3	3	3	3	3	3	3	3	3
Rwanda	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Sao Tome and Principe	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Senegal	3	3	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Seychelles	..	..	..	..	..	..	..	..	..
Sierra Leone	3	3	3	3	3	3	3	3	3
Somalia	..	..	..	..	..	..	..	..	1.5
South Africa	..	..	..	..	..	..	..	..	..
South Sudan	..	..	..	2	2	2	1.5	1.5	1.5
Sudan	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Tanzania	3	2.5	3	3	3	3	3	3	3
Togo	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3
Uganda	2.5	2.5	2.5	2	2	2	2	2	2
Zambia	3	2.5	2.5	3	3	3	3	3	3
Zimbabwe	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2

Source: World Development Indicators

Agricultural value added (% GDP)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017
Burundi	37	37	37	37	36	36	37	36	
Benin	24	23	23	22	21	21	22	23	22
Burkina Faso	32	33	31	31	32	31	30	29	28
Botswana	3	2	2	3	2	2	2	2	2
Central African Rep.	51	50	52	51	44	41	40	40	40
Côte d'Ivoire	21	25	27	23	21	21	23	21	20
Cameroon	14	14	13	14	14	14	15	15	15
Congo, Dem. Rep. of	24	21	21	20	19	19	18	19	20
Congo, Republic of	5	4	3	4	4	5	7	9	7
Comoros	43	40	39	37	36	35	34		
Cape Verde	8	8	8	8	8	8	9	8	6
Algeria	9	8	8	9	10	10	12	12	12
Egypt	13	13	14	11	11	11	11	12	11
Ethiopia	46	41	41	44	41	39	36	35	34
Gabon	5	4	3	3	3	4	4	5	
Ghana	31	28	24	22	22	21	19	18	17
Guinea	16	17	16	17	18	18	18	18	16
Gambia, The	26	29	19	20	19	17	17	17	17
Guinea-Bissau	44	45	45	47	44	41	47	46	49
Equatorial Guinea	1	1	1	1	1	1	2	2	2
Kenya	23	25	26	26	26	27	30	32	32
Liberia	58	45	44	39	37	36	34	34	34
Lesotho	6	5	5	5	6	6	5	5	
Morocco	13	13	13	12	13	12	13	12	13
Madagascar	27	26	26	26	24	24	23	21	
Mali	32	33	35	38	37	37	38	38	38
Mozambique	28	27	26	25	24	23	23	23	22
Mauritania	24	20	17	18	18	22	25	24	23
Mauritius	4	4	4	4	3	3	3	3	3
Malawi	30	30	29	28	29	29	27	26	26
Namibia	8	9	8	8	6	7	6	6	7
Niger	39	41	38	38	36	37	36	39	40
Nigeria	36	24	22	22	21	20	21	21	21
Rwanda	30	29	28	29	29	29	28	29	31
Sudan	25	23	24	33	34	32	31	31	30
Senegal	15	15	13	14	14	13	15	15	15
Sierra Leone	55	53	55	51	48	52	59	58	60
São Tomé and Príncipe	11	11	11	12	12	11	12	12	11
Eswatini	9	10	10	10	10	9	10	9	
Seychelles	2	2	2	2	3	2	2	2	
Chad	47	52	51	55	50	51	50	49	49
Togo	33	31	31	43	40	42	41	41	41
Tunisia	8	8	9	9	9	9	10	9	
Uganda	26	26	25	26	25	25	24	24	25
South Africa	3	2	2	2	2	2	2	2	2
Zambia	12	9	10	9	8	7	5	6	7
Zimbabwe	12	11	10	10	9	11	10	10	10

Source: ReSAKSS (Regional Strategic Analysts and Knowledge Support System)

Data compiled for tracking implementation of the Comprehensive Africa Agriculture Development Programme (CAADP).

Spending, total (as a share of AgGDP, %)

Country	2009	2010	2011	2012	2013	2014	2015	2016
Benin	0.6	0.7	0.8	0.6	0.5	0.6	0.6	0.6
Botswana	3.6	3.2	2.5	2.1	2.5	2.3	2.5	2.3
Burkina Faso	0.7	0.7	0.8	0.7	0.9	1.0		
Burundi	0.8	0.6	0.6	0.5	0.4	0.5	0.4	0.4
Cabo Verde	1.0	1.0	1.1	1.1	0.8	0.9	1.1	1.2
Cameroon				0.3	0.3	0.4	0.4	
Central African Rep.	0.1	0.1	0.2	0.2	0.3	0.3	0.5	0.4
Chad	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Congo, Dem. Rep.	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2
Congo, Rep.	1.0	0.9	1.0	0.6	0.6	0.4	0.2	0.3
Cote d'Ivoire	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5
Eritrea	0.4	0.4	0.3					
Eswatini	1.1	1.0	0.7	0.5	0.6	0.7	0.8	0.7
Ethiopia	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3
Gabon	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Gambia, The	0.5	0.3	0.8	1.0	0.7	0.9	0.7	0.9
Ghana	0.7	0.7	0.7	0.7	1.0	0.9	1.0	0.9
Guinea	0.1	0.1	0.2	0.4	0.3	0.3	0.2	0.2
Guinea-Bissau	0.0	0.0	0.0					
Kenya	1.1	0.9	0.9	0.8	0.8	0.8	0.6	0.5
Lesotho	1.4	1.0	0.9	1.0	0.9	0.7	1.6	0.9
Liberia	0.4	0.5	0.5					
Madagascar	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Malawi	0.7	0.7	0.7	0.8	0.7	0.5		
Mali	0.6	0.6	0.5	0.4	0.4	0.3	0.4	0.4
Mauritania	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5
Mauritius	3.9	4.7	3.9	4.3	4.9	4.4	5.0	4.8
Mozambique	0.4	0.4	0.4	0.4	0.3	0.4	0.5	0.4
Namibia	2.2	1.9	2.4	1.9	2.4	3.1		
Niger	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.3
Nigeria	0.3	0.2	0.3	0.2	0.2	0.2		
Rwanda	0.6	0.7	0.7	0.7	0.7	0.8	0.5	0.4
Senegal	1.1	1.2	1.3	1.0	1.3	1.6	1.0	0.9
Sierra Leone	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2
South Africa	2.0	2.2	2.4	2.9	3.1	2.8		
Tanzania	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.2
Togo	0.2	0.4	0.4	0.2	0.2	0.2	0.2	0.2
Uganda	0.8	0.9	0.8	0.7	0.8	0.9	1.0	0.6
Zambia	0.3	0.4	0.4	0.4	0.5	0.5		
Zimbabwe	0.4	0.7	0.9	1.3	1.8	1.4	1.4	1.4

Source: ASTI (Agricultural Science and Technology Indicators). ASTI database. International Food Policy Research Institute (IFPRI).
<http://www.asti.cgiar.org/>

Government agriculture expenditure (% of total expenditure)

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	2.0	1.6	1.3	1.0	1.1	0.8	0.5	0.7	0.5
Burundi	2.4	2.2	5.6	5.6	4.1	3.1	3.6	2.3	
Benin	7.1	5.9	4.7	6.7	6.2	8.0	6.9	11.8	7.2
Burkina Faso	10.8	8.5	11.3	11.5	10.5	11.6	9.4	8.2	9.7
Botswana	2.4	3.4	2.7	2.9	2.1	2.1	1.9	1.1	1.5
Central African Rep.	2.0	2.9	3.9	5.3	9.9				
Côte d'Ivoire	2.7	3.0	3.3	5.9	4.6	4.8	3.4	4.5	3.5
Congo, Dem. Rep. of	1.4	0.5	0.1	0.3	0.5				
Congo, Republic of	1.3	1.7	2.3	1.4					
Comoros					1.0	0.7	0.6	0.4	0.3
Cape Verde	5.4	4.2	5.4	5.0	6.2	6.6	7.5	7.8	10.0
Egypt	1.7	1.7	1.7	1.5	1.3	1.5	1.8	2.0	2.1
Ethiopia	18.4	11.1	10.0	10.9	9.1	8.2	6.8	9.2	7.2
Ghana	3.3	3.2	3.2	2.9	0.6	0.7	0.5	0.6	0.7
Guinea	6.4	4.1	7.9	8.2	4.6	7.3	3.1	9.6	
Gambia, The	3.4	2.9	2.8	3.5	2.6	2.2	6.5	3.2	2.7
Kenya	4.1	4.3	5.5	3.4	2.7	2.6	1.5	1.8	2.3
Liberia	7.2	8.2	6.7	8.2					
Lesotho	2.1	1.9	1.8	1.9	1.7	1.5	4.0	3.7	4.7
Madagascar	25.1	10.5	10.6	8.5	9.8	3.4	6.4	5.2	4.6
Mali	10.0	12.2	12.7	8.1	9.8	10.8	12.4	12.3	11.8
Mozambique	4.6	4.2	3.2	2.9	12.5	18.1	5.7	7.3	3.9
Mauritius	3.5	3.7	2.3	2.3	2.4	2.4	2.2	1.9	1.9
Malawi	28.9	15.9	18.7	11.4	14.1	23.4	19.0	17.4	8.4
Namibia	3.0	5.7	6.4	5.7	4.4	5.0	4.3	4.8	3.5
Niger	5.4	7.4	14.8	7.8	8.6	12.3	8.0	4.2	9.0
Nigeria	3.6	3.2	2.7	3.0	2.9	3.4	2.4	2.0	
Rwanda	2.9	3.3	8.2	8.7	7.9	6.9	7.8	10.5	
Sudan	3.5	4.5	4.3	5.6	8.0	7.4			
Senegal	9.6	8.2	9.3	11.2	8.8	12.1	11.3	10.6	
Sierra Leone	5.8	8.9	7.5	5.9					
Eswatini	2.2	3.0	2.0	2.2	4.0	3.6	3.6	4.1	2.4
Seychelles	1.1	1.5	0.7	0.5	1.6	1.5	2.4	2.5	
Togo	5.1	6.4	5.7	6.6	7.8	5.8	6.3	7.4	4.4
Uganda	6.0	3.9	3.7	4.9	4.7	3.9	3.9	2.4	
South Africa	1.8	1.7	1.7	1.7	1.5	1.5	1.4	1.8	1.3
Zambia	9.3	11.4	6.1	5.9	6.3	9.4	9.7	6.4	9.9
Zimbabwe	12.5	15.0	14.5	4.9	5.5	9.5	4.6	3.9	
Africa wide	3.2	3.2	3.1	2.9	2.8	2.9	2.8	3.0	3.1

Source: ReSAKSS (Regional Strategic Analysts and Knowledge Support System). 2018

Data compiled for tracking implementation of the Comprehensive Africa Agriculture Development Programme (CAADP).



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