



**AGRIBUSINESS INDICATORS:  
SYNTHESIS REPORT**



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# FOREWORD

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African agriculture is undergoing an unprecedented period of change. Across Sub-Saharan Africa, economic growth rates are up, projected to strengthen to 5.2 percent during 2015–16, up from 4.6 percent in 2014 and rising to 5.3 percent in 2017. Rapid urbanization, and spiraling demand for food represent an economic opportunity—the value of Africa’s food and beverage markets are expected to top \$1 trillion by 2030, up from only \$313 billion today. Urban demand for food products is projected to increase at a compound annual growth rate of around 4 percent. In lock step, consumer demand is also changing, and new marketing channels are emerging. Strong growth opportunities exist for agribusiness provided the farming sector can deliver agricultural and food products at competitive prices. These projected changes bring with them risks and opportunities both for farmers and the larger agricultural sector. In particular these changes require policy makers and planners to think differently: to factor these changes into their planning for new policies, regulations, and public investments, while paying attention to the critical need for improving the enabling environment so that agriculture and agribusinesses can thrive.

This report covers nine Sub-Saharan countries and aims to provide policy makers with the tools and data with which they can better understand how their own country is faring in the market orientated agricultural sector while also learning from those countries which are performing well.

The report looks at the policy environment as well as key sub-sectors such as seed, fertilizer, finance, mechanization, and transport. It brings into the public domain, often for the first time, key comparisons of costs, regulations, perceptions by the private sector of Government policies, and differences in farmers’ access to inputs at the country level. We believe such information can help policy makers and planners make informed decisions about their policies, introduce key data for an improved policy dialogue and contribute to the larger aim of encouraging evidence-based policy making in Africa. Readers and users of the information are invited to look at the findings and use their judgment and knowledge of local conditions as an input for sound policy-making. We expect that this analytical work will have a role in creating the next generation of policies that help to unleash the potential of the agriculture and agribusiness sectors and contribute to the twin goals of ending poverty and boosting shared prosperity.

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At the World Bank, the fieldwork, country studies, and synthesis report have been a collaborative effort involving qualified agriculture specialists and editors. The team was composed of the following people: Grahame Dixie, Task Manager and Agribusiness advisor to AES; John Holtzman, program coordinator for ABI and principal investigator on the Mozambique, Burkina Faso, and Rwanda country studies; James Mbata, senior agricultural economist and principal investigator on the Ethiopia, Kenya, and Nigeria country studies; Samjhana Thapa, economist and principal investigator on the Ghana, Tanzania, and Zambia country studies; Raissa Adomayakpor, research assistant and analyst; Damian Milverton, editor; and Alina Alvarezm, graphics designer. The document was edited by Gunnar Larson, Patricia Van de Velde, Chaitri N. Hapugalle, and Christopher Dielmann.





# LIST OF ABBREVIATIONS

<b>ABI</b>	Agribusiness Indicators	<b>ha</b>	hectare
<b>ABS</b>	African Seed and Biotechnology Program	<b>IFDC</b>	International Fertilizer Development Center
<b>ADC</b>	Agricultural Development Corporation	<b>IFPRI</b>	International Food Policy Research Institute
<b>ADP</b>	Agricultural Development Project	<b>ISTA</b>	International Seed Testing Association
<b>AES</b>	Agriculture and Environmental Services Department, World Bank	<b>KNFAP</b>	Kenya National Federation of Agricultural Producers
<b>AISE</b>	Agricultural Input Supply Enterprise, Ethiopia	<b>KSC</b>	Kenya Seed Company
<b>AMSEC</b>	Agriculture Mechanization Services Enterprises Center	<b>KTZ</b>	Kenya, Tanzania, Zambia
<b>AU</b>	African Union	<b>LICs</b>	Low-Income Countries
<b>BBA</b>	Benchmarking Business of Agriculture	<b>LPI</b>	Logistic Performance Index
<b>BMGF</b>	Bill and Melinda Gates Foundation	<b>MAFAP</b>	Monitoring African Food and Agricultural Policies
<b>CAADP</b>	Comprehensive Africa Agriculture Development Programme	<b>MFI</b>	Microfinance Institution
<b>CAGR</b>	Compound Annual Growth Rate	<b>MICs</b>	Middle-Income Countries
<b>CIF</b>	Cost Insurance and Freight	<b>MINAGRI</b>	Ministry of Agriculture, Rwanda
<b>CILSS</b>	Permanent Interstate Committee for Drought Control in the Sahel	<b>mmt</b>	Million Metric Tons
<b>CNEA</b>	Citizens Network for Foreign Affairs	<b>MoA</b>	Ministry of Agriculture
<b>COCOBOD</b>	Ghana Cocoa Board	<b>MoFA</b>	Ministry of Food and Agriculture
<b>COFOG</b>	Classification of Functions of Government	<b>mt</b>	Metric Tons
<b>COMTRADE</b>	Commodity Trade Statistics Database (of the United Nations)	<b>NEPAD</b>	New Partnership for Africa's Development
<b>CSO</b>	Civil Society Organization	<b>NGO</b>	Nongovernmental Organization
<b>CTA</b>	Confederação das Associações Económicas de Moçambique	<b>NPK</b>	Nitrogen Phosphate Potassium Fertilizer
<b>ECE</b>	Ethiopian Seed Enterprise	<b>NPLs</b>	Nonperforming Loans
<b>ECOWAS</b>	Economic Community of the West African States	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>ECX</b>	Ethiopian Commodity Exchange	<b>PER</b>	Public Expenditure Review
<b>EE</b>	Enabling Environment	<b>RAI</b>	Rural Access Index
<b>EU</b>	European Union	<b>REC</b>	Regional Economic Community
<b>FAO</b>	Food and Agriculture Organization	<b>RTA</b>	Ethiopian Road Transport Authority
<b>FAST</b>	Forum for African Seed Testing	<b>SADC</b>	Southern African Development Community
<b>FO</b>	Farmer Organization	<b>SSA</b>	Sub-Saharan Africa
<b>GDP</b>	Gross Domestic Product	<b>UEMOA</b>	Union Economique et Monétaire Ouest Africaine
<b>GGC</b>	Ghana Grains Council	<b>UNPCB</b>	Union des Producteurs du Coton Burkinabè
<b>GIS</b>	Geographical Information System	<b>USAID</b>	U.S. Agency for International Development
<b>GLSS 5</b>	Ghana Living Standard and Measurement Survey, Fifth Round, 2008	<b>VAT</b>	Value Added Tax
<b>GoE</b>	Government of Ethiopia	<b>WB</b>	World Bank
<b>GoR</b>	Government of Rwanda	<b>WBG</b>	World Bank Group
		<b>WRS</b>	Warehouse Receipt System
		<b>ZANFU</b>	Zambian National Farmers' Union

All dollar amounts are U.S. dollars unless otherwise indicated.



# EXECUTIVE SUMMARY

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## OBJECTIVE OF THE AGRIBUSINESS INDICATORS PROJECT

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The need for countries in Sub-Saharan Africa to build more productive, modern, and market-oriented farming sectors is one of our most pressing development challenges. In coming years, African agriculture will have to increase food production and expand and intensify value chains in order to meet changing demand on the part of a rapidly expanding and urbanizing consumer base. The process of doing this will enable African countries to begin pushing back against their currently growing reliance on food imports. An essential precondition for bringing this transformation to pass is to increase and improve the information on which farmers and agribusinesses base their production and investment decisions, and on which public sector institutions base their policies.

The purpose of the Agribusiness Indicators (ABIs) Project is to provide this kind of empirical information in the form of a series of metrics and indicators that can be used to measure change over time and to make direct comparisons between countries, especially policy makers. These indicators will be used to inform policy dialogue, including dialogue between representatives of the private and public sectors. It will provide a common framework of reference with which to communicate their respective concerns, priorities, and intentions. This will facilitate better communication that leads to constructive interaction between public officials, farmers' producer organizations, private investors, civil society organizations (CSOs), and others. Ultimately, it will be their decisions that determine the course of agricultural development and commercialization in their respective countries. The Agribusiness Indicators are intended to furnish them with information from sources within both the private and public sectors which can be cross-referenced and correlated. This type of information has generally not been available in the past. Some of the indicators are particularly useful in revealing the attributes of countries with policy portfolios that are supportive of agribusiness investment.

## AGRIBUSINESS INDICATORS AS A PILOT OF A LARGER GLOBAL-LEVEL PROGRAM

This ABI report is the first pilot phase of a larger program called Benchmarking the Business of Agriculture (BBA). Building on the lessons of ABI and of the World Bank's *Doing Business* report, some of the comparisons of the nine original pilot countries are planned to be extended to 80 countries in all regions of the world and at all stages of agricultural transition. This more extensive sample will provide an ongoing reporting process that will enable countries to measure, compare, and contrast performance over time, and to correlate this performance with different policies and policy environments.

## AREAS OF FOCUS

The ABI country studies synthesized in this report analyze six areas that relate to the state of development of agribusiness in a given country: policies, seed and fertilizer inputs, mechanization, finance, infrastructure, and transport services. The report devotes one chapter to each, focusing in particular on small and medium size farms and the network of mostly small and medium enterprises that are necessary to support the emergence of a more modern farming sector.

In the executive summary the issues have been clustered differently, covering the perspectives of the farming sector and the agribusiness community regarding the policy environment. The key indicators used in this report are set out in table S.1, along with their mean, median, and high and low scores. These are intended to reflect the findings from the field, the key issue areas that the study has identified, and the quantified measures used.

## COUNTRY FOCUS

The countries selected for this study were Burkina Faso, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Rwanda, Tanzania, and Zambia. The individual country studies of these nine countries were carried out and published in 2012 and 2013. The country studies sought to identify and measure the root causes to which the problems being experienced within the respective countries can be attributed.

The 2008 World Development Report, *Agriculture for Development*, classified countries into “three worlds of

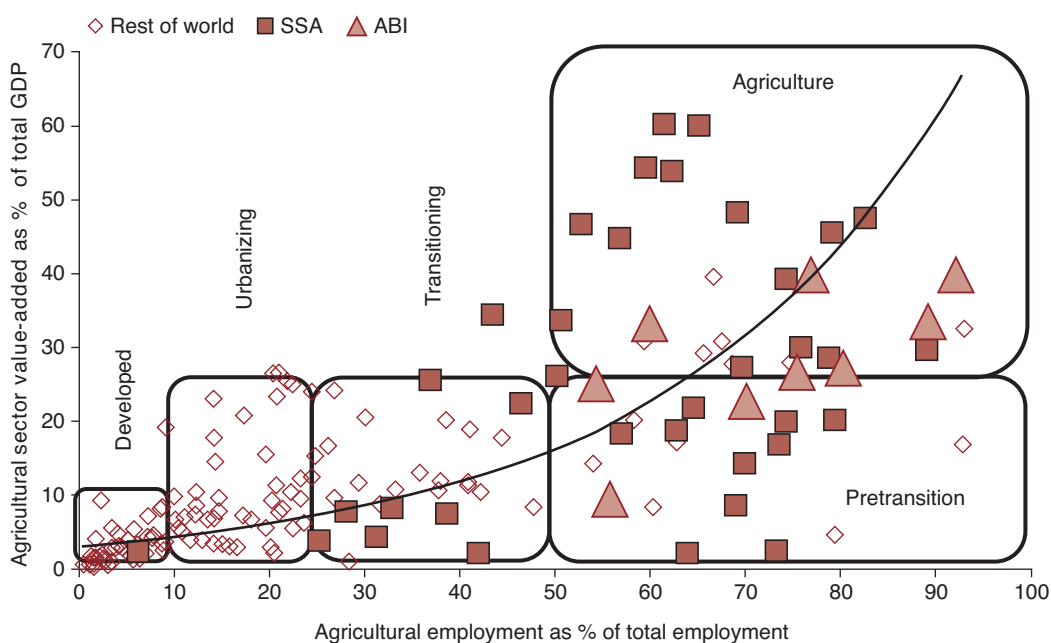
agriculture”: agriculture-based, transforming, and urbanized countries. This classification is based on two factors: the proportion of a country's total gross domestic product (GDP) that comes from the agriculture sector, and the proportion of a country's workforce that is employed in the agriculture sector. As manufacturing and service sectors of the economy grow, agriculture accounts for a diminishing proportion of employment and GDP—a process known to development economists as the *agricultural transformation*. This depiction of where countries are situated along the agriculture-based to urbanized continuum is illustrated in the figure S.1, in which the nine ABI pilot countries are represented as triangles. The squares represent other countries in Sub-Saharan Africa, and the diamonds represent countries in regions elsewhere in the world. For the purposes of the ABI studies and the larger Benchmarking the Business of Agriculture (BBA) program, the three worlds of agriculture were further divided into two successive phases of transition and into urbanizing and developed economies—a set of distinctions that will assume greater significance as the BBA expands into additional developing regions.

## STUDY APPROACH

The ABI country study teams visited each country two or three times, spending between four and eight weeks in each. Local consultants were employed to help the teams identify important sources of information, including existing surveys, research papers, and reports. Data on 54 indicators were collected, 44 of which are presented in this report. The local consultants also assisted the study teams in preparing meetings and interviews with respondents representing public officials, private sector investors, and farmers' organizations. Their perspectives about the factors that actively restrict agricultural modernization and commercialization were useful in enabling the study teams to compose summaries of the different investment climates in the nine countries.

Because the nine country study reports that served as background material for this synthesis were peer reviewed by individuals with extensive experience in the respective countries, the data collected by monitoring the indicators will become more reliable and refined over time. Much of the information presented here has never been chronicled

**FIGURE S.1. AGRICULTURAL TRANSFORMATION AND NINE ABI PILOT COUNTRIES**



Source: ABI/BBA analysis based on Food and Agriculture Organization (FAO) and World Bank (WB) data.

before and may therefore be time bound, yielding insights into the initial conditions covered by the studies but not necessarily representing trends and developments over time. For instance, data on fertilizer prices were gathered during a two-year period during which international fertilizer prices greatly fluctuated. How representative this flux is will only become clear over time, which is of course one of the purposes of having indicators to monitor. The limited size of the sample makes it impossible to determine how representative the study’s findings are, and there are important concerns about how comparable scored perception indicators are across countries. That said, the responses of investors and prospective investors indicating how they perceived the business environment demonstrated substantial alignment with other, more objective measures of whether or not the private sector is seen as partner in economic development.

## RATIONALE OF THE INDICATORS SELECTED

**Farming Sector Indicators (Table S.1).** Typical cereal yields by a country are given to provide context to the indicators. The first grouping of indicators covers the economic land use of inputs. It is vital for farmers’ productivity to have access to high-quality inputs and services provided

in a timely fashion. This will, in turn, help generate greater marketable surpluses that lead to improved incomes, some of which will be reinvested in agriculture-related activities both on and off the farm.

Access to affordable seed, fertilizer, mechanical inputs, and inputs supplied by the private sector are key factors affecting farm productivity and profitability. Significant differences are revealed between the nine countries. Retail prices of unsubsidized fertilizer in the ABI countries vary by some 200 percent. Particularly in the rain-fed (nonirrigated) farming systems that make up most African agriculture, fertilizer use tends to be extremely sensitive to price. A number of countries are moving toward allowing private sector participation in the multiplication of foundation seed, and this direction may lead to major breakthroughs in the countries where the public sector monopoly over foundation seed is correlated with outstanding seed scarcity. The emergence of new seed laws and regulations is important in creating a clear path toward a thriving seed industry. In this regard, the performance of ABI countries has been patchy and generally slow.

Africa lags behind the rest of the world in farm mechanization. Mechanization is typically most closely associated with rising labor costs and rural labor shortages that are

**TABLE S.1. KEY AGRIBUSINESS INDICATORS USED: FARMING SECTOR**

Farming Sector	Indicators	Mean	Median	High	Low
<b>Input use and economics</b>	<b>Average cereal yield (kg/ha)</b>	<b>1,651</b>	<b>1,660</b>	<b>2,693</b>	<b>694</b>
Fertilizers	Fertilizer nutrients (kg/ha) (Abuja target 50+)	20	17	<b>60</b>	3
	Nutrient/output ratio (good < 5)	6	5	<b>2</b>	13
Seeds %	Use of certified maize seeds (%)	31	19	<b>70</b>	6
	Maize seed to grain price ratio (good < 5)	7	7	<b>2</b>	13
Tractors	Tractor density (SSA average 13 per 100 km <sup>2</sup> )	11	9	<b>27</b>	1
<b>Input sourcing and costs</b>					
Fertilizers	Average fertilizer (unsubsidized) rural retail price US\$/ton	721	760	<b>475</b>	1,023
	Fertilizer subsidy—Y/N?	7 Y, 2 N		<b>Y</b>	N
	Fertilizer import taxes (%)	1.8	0.0	<b>0.0</b>	8.5
Seeds	Private sector production of foundation seed (%)	14.8	2.5	<b>100.0</b>	0.0
	Imported seed as % total certified seed	59	54	<b>100</b>	12
	Private sector production of certified seed (%)	16	15	<b>56</b>	0
	Time (years) for seed testing and registration	2.7	2.0	<b>2.0</b>	5.0
	Existence/implementation of national seed regulations/laws (0–5)	2.9	2.5	<b>4.9</b>	2.0
Tractors	Tractors imported by private sector (%)	65	60	<b>10</b>	100
	Tractor import tariffs as % CIF prices	2.3	0.0	<b>0.0</b>	16.0
	Parts import tariffs as % CIF prices	16.4	16.0	<b>0.0</b>	27.0
	Cost of tractor rental (pilot average \$82)	82	68	<b>46</b>	163
Distribution	Agrodealer network (number per 10,000 farms)	3.0	2.1	<b>8.4</b>	0.3
<b>Financing</b>					
Access	Number of bank branches per 100,000 adult population	1.9	1.4	<b>5.0</b>	0.8
	Percentage of commercial banks lending to Ag (3 years) (%)	7	8	<b>14</b>	2
Cost	Average lending rates for Ag loans (real rates)	10	12	<b>5</b>	22
	Percentage of nonperforming Ag loans	20	13	<b>4</b>	59
<b>Road access</b>	Rural Access Index (%)	23	24	<b>36.1</b>	10.3
Quality	Road network in poor condition (%)	34	34	<b>8.7</b>	69.0
	Logistic Performance Index (LPI) infrastructure quality (0–5)	2.10	2.16	<b>2.41</b>	1.53
Cost	Cost of transportation (\$/mt/km)—main routes	0.10	0.10	<b>0.05</b>	0.15
	Cost of transportation (\$/mt/km)—secondary routes	0.26	0.24	<b>0.13</b>	0.47

Note: High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%).

Source: ABI Country Reports, 2012.

driven by migration to urban areas. However, the possibilities of a sustainable private sector providing machinery contracting services can be choked off by the unintended consequence of public policy. Conversely, supportive policies can help mechanization take root as has been the example in China and Pakistan. The indicators used to measure policy environment as it affects mechanization

include (i) who imports tractors; (ii) import taxes on tractors and spare parts, which are essential to maximizing the useful life of the national tractor fleet; and (iii) cost of hiring plowing services, which is a useful method for enabling smaller-scale producers to access the benefits of machinery without having to make these investments themselves.

**TABLE S.2. KEY AGRIBUSINESS INDICATORS USED: PRIVATE SECTOR**

Private Sector	Indicators	Mean	Median	Low	High
Perception: policy environment	Enabling environment (0–5)	3.1	3.0	2.5	<b>4.3</b>
	Policy consistency (0–5)	2.5	2.5	1.5	<b>3.5</b>
	Private sector advocacy (0–5)	2.4	2.0	1.0	<b>3.7</b>
Perception: business environment	Fertilizer business environment (0–5)	2.6	3.0	0.0	<b>4.2</b>
	Ease of entry/operations in seeds (0–5)	2.9	2.5	1.5	<b>4.9</b>
	Mechanization business environment (0–5)	2.8	2.8	1.0	<b>5.0</b>

*Note:* High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%).

*Source:* ABI Country Reports.

The ABI study used another metric to measure the density of input dealers. These businesses are important not only in delivering inputs, but increasingly in providing technical advice. The number of agricultural input supplying businesses was found to vary considerably between countries, by as much as 20-fold. Rural finance indicators reflect the relative importance of agricultural credit in the overall loan portfolio of commercial banks, the interest rates charged to agricultural borrowers, and the density of commercial banks in rural areas. Rural transport indicators cover the issues of access, quality of roads, and unit costs expressed as U.S. dollars per kilometer per metric ton on both primary and secondary rural roads.

**Private Sector (Table S.2).** Public expenditure can provide only a small proportion of the investment needed by agriculture. Progressive thinking, for example in the Comprehensive Africa Agriculture Development Programme (CAADP), focuses on how to leverage greater private sector investment, both by producers and by the business networks supporting them. The report aims to provide governments with insights into how the private sector perceives the business environment generally, as well as how that environment affects farm production’s most important inputs: seed, fertilizer, mechanization, and finance.<sup>1</sup>

Inconsistent and unpredictable public policy is an anathema to private investment at all levels. It introduces an element of often arbitrary risk that discourages investments and causes delayed investment decisions on the part of producers, small and medium enterprises, and multinational corporations.

The presence of fora in which representatives of the public and private sectors are able to interact and consult one another regarding policies and commercial strategies, and to express their concerns and priorities, appears to be strongly correlated to countries in which agricultural performance is better than otherwise might be expected.<sup>2</sup> The perception indicators are given on a scale of 0 to 5, with 0 indicating very negative impressions and 5 indicating very positive impressions.

### AGRICULTURAL POLICY ENVIRONMENT (TABLE S.3)

The policy indicators include measures of public investment in agriculture as well as levels of support in fertilizer, banking, and transport. The indicators include (i) the CAADP target of 10 percent of government spending on agriculture, (ii) measures of the proportionality of government agricultural spending in relation to the sector’s overall importance in the economy, and (iii) whether expenditure on research and development exceeds a target of 1 percent of agricultural GDP.

Indicators are generated on the relative importance of fertilizer subsidies; country membership of international seed agreements; and the presence of instruments that facilitate agricultural lending, such as credit reference agencies and warehouse credits. Market access is closely related to the availability, cost, and travel time using the rural road network. A perception indicator measures the ease of entry into the trucking business in terms of costs, waiting periods, corruption, and so on.

<sup>1</sup> The perception/opinion indicators are correlated with each other. Perception is based in part on reality that can influence the private sector behavior. These findings should be treated as indicative and illustrative, as they are based on perceptions of a small sample of private firms.

<sup>2</sup> International examples include the Netherlands, Denmark, and Chile, while Wiggins and Keats come to similar conclusions on the basis of their analysis of experiences in African countries, see “Leaping & Learning: Linking Smallholders to Markets” (Wiggins and Keats 2013).



**TABLE S.3. KEY AGRIBUSINESS INDICATORS USED: POLICY ENVIRONMENT**

Policy Environment	Indicators	Mean	Median	Low	High
Investment in agriculture	Ag spending as percentage of budget—current	7.9	6.5	2.0	<b>14.5</b>
	Trend in Ag spending budget—2001–10	3↑, 3 Flat, 3 ↓		N/A	<b>N/A</b>
	Ag public expenditure ratio to Ag GDP	0.26	0.30	0.06	<b>0.43</b>
	Ag R&D spending as percentage Ag GDP, where when 1, Ag PE% = Ag GDP%	0.55	0.43	0.26	<b>1.53</b>
Input support	Fertilizer subsidy as percentage of Ag Ministry budget	20.5	18.5	4.0	<b>38.1</b>
	ISTA membership or adherence to OECD requirements	2 Yes, 7 No		N/A	<b>N/A</b>
Banking support	Evidence of credit reference (0–5)	1.6	1.5	0.0	<b>3.0</b>
	Presence of collateral registry for loans	2 Yes, 7 No		N/A	<b>N/A</b>
	Existence of warehouse receipts (0–5)	1.4	1.0	0.0	<b>4.0</b>
Transportation support	Time (days) to get truck registered and licensed	13	7	5	<b>29</b>
	Ease of entry into trucking (0–5)	3.7	4.0	4.0	<b>2.5</b>

*Note:* High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%). ISTA = International Seed Testing Association; OECD = Organisation for Economic Co-operation and Development.

*Source:* ABI Country Reports.

## FARMER ACCESS TO INPUTS AND SERVICES INDICATOR RESULTS (TABLE S.4)

The nine ABI pilot countries exhibit major differences in farmers' access to and use of inputs, though in general their use of fertilizer and certified seed is low. The level of mechanization is extremely low (often about 1/10) compared to that of comparator countries. Input-output ratios of seed and fertilizer are mixed and often depend on the presence of subsidies to be financially favorable enough to encourage farmers to use these inputs.

Kenya and Zambia have the highest level of fertilizer use, although only Kenya exceeds the Abuja Declaration target of 50 kg of nutrient equivalents per hectare. Kenya also outperforms other countries in terms of using certified maize seeds and the density of tractors. Mozambique and Nigeria are the weakest performers in both seed and fertilizer. Tanzania is the ABI country that is most reliant on imported seed.

Major differences appear between the nine countries in their use of on-farm mechanization. For instance, there is a 17-fold difference in tractor density between Rwanda and Zambia. More generally, the contrast between Sub-Saharan Africa and the rest of the world is significant.

African agriculture is highly dependent on animal and human power, which provides 25 and 65 percent of power in farming, respectively. Countries in the rest of the world are much more reliant on mechanical power in farming. Countries like Brazil and Tunisia have around 10 times the tractor density of the ABI average. The level of tractorization is affected by regulations and policies, and it is more directly influenced by the cost of labor. International experience has shown that mechanization does not replace labor but rather substitutes for rural labor shortages, and its success is largely a response to rural labor rates rising.

The price of fertilizer varies widely between the ABI pilot countries. Mozambican growers have to pay over \$1,000 per metric ton for urea. In contrast, Ghanaian growers pay about half that price when subsidies are removed. Most countries have introduced fertilizer subsidies and have kept import tariffs to zero, although other miscellaneous taxes are often charged. The most recent and comprehensive study of agricultural subsidies in Africa characterizes fertilizer subsidies as a mixed blessing at best.<sup>3</sup> Their introduction leads to quick and highly

<sup>3</sup> Jayne, T.S., Shahidur Rashid. 2013. "Input Subsidy Programs in Sub-Saharan Africa: A Synthesis of Recent Evidence." *Agricultural Economics*, Michigan State University, August.

**TABLE S.4. AGRIBUSINESS INDICATORS: FARMING SECTOR**

Farming Sector	Indicators	Burkina Faso																			
		Mean	1,651	1,230	2,169	694	1,970	1,314	1,363	1,660	2,693	1,768									
Input use and economics (kg/ha)	Average cereal yield																				
	Fertilizer nutrients (kg/ha) (Abuja target 50+)	20	10.1	18.3	2.6	17.0	10.1	6.5	59.6	37.0	19.8										
	Nutrient/output ratio (good < 5)	6	5.1	3.4	11.0	2.4	6.7	3.5	8.0	12.7	2.6										
Seeds	Use of certified maize seeds (%)	31	50	12	6	18	27	7	70	65	19										
	Hybrid maize seed to grain price ratio (best between 2 and 5)	7	13.0	NA	10.0	7.0	11.0	4.0	5.0	10.0	2.0										
Tractors	Tractor density (SSA average 13 per 100 km <sup>2</sup> )	11	8.9	1.3	12.7	4.0	7.4	5.7	27.0	23.0	11.0										
<b>Input sourcing and costs</b>																					
Fertilizers	Average fertilizer (unsubsidized) rural retail price US\$/ton	721	808	800	1,023	614	682	809	514	760	475										
	Fertilizer subsidy—Y/N?	7 Y, 2 N	Y	Y	N	N	Y	Y	Y	Y	Y										
Seeds	Fertilizer import taxes (%)	1.8	8.5	0	2.5	0	0	5	0	0	0										
	Private sector production of foundation seed (%)	14.8	0	0	13	5	NA	0	0	100	0										
	Private sector production of certified seed (%)	66	100	NA	15	12	79	54	10	100	100										
Imported seed as % total certified seed	14	NA	NA	15	1	56	15	15	1	7											
Time (years) for seed testing and registration	2.7	5.0	3.0	3.0	2.0	2.0	2.0	3.0	3.0	2.0	2.0										
Existence/implementation of national seed regulations/laws (0–5)	2.9	2.5	2.0	2.0	2.0	4.0	2.0	3.5	4.5	3.0											

*(Continued)*

**TABLE S.4. AGRIBUSINESS INDICATORS: FARMING SECTOR (CONTINUED)**

Farming Sector	Indicators	Burkina Faso										
		Mean	Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana	
Tractors	Tractors imported by private sector (%)	65	59	42	60	100	10	10	100	100	100	
	Tractor import tariffs as % CIF prices	2.3	16	0	5	0	0	0	0	0	0	
	Parts import tariffs as % CIF price	16.4	20	30	25	0	10	5	16	15	27	
	Cost of tractor rental (pilot average \$82)	82	51	163	62	81	68	93	50	125	46	
Distribution	Agrodealer network (number per 10,000 farms)	3.0	2.1	1.8	0.3	2.2	1.3	2.1	5.8	NA	8.4	
<b>Financing</b>	Access	Number of bank branches per 100,000 adult population	1.9	1.2	NA	1.6	0.8	2.0	1.3	1.4	NA	5.0
	Percentage of commercial banks lending to Ag (3 years) (%)	7	9	3	6	11	14	2	6	9	5	
	Average lending rates for Ag loans (real rates)	11	10	12	19	-9	5	15	8	17	22	
	Percentage of nonperforming Ag loans	20	NA	16	NA	NA	58	6	9	10	21	
<b>Road access</b>	Quality	Rural Access Index (%)	23	24	36	24	10	24	20	32	24	
	Road network in poor condition (%)	34	9	69	32	34	29	34	34	48	18	
Cost	Logistic Performance Index (LPI) infrastructure quality (0–5)	2.14	2.40	1.88	2.04	2.22	2.41	2.27	2.16	1.83	2.05	
	Cost of transportation (\$/MT/KM)—main routes	0.10	0.05	0.09	0.10	0.11	0.10	0.06	0.15	0.11	0.10	
	Cost of transportation (\$/MT/KM)—secondary routes	0.26	0.14	0.37	0.23	0.24	0.13	0.47	0.24	0.13	0.35	

Note: High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%). Source: ABI Country Reports.

visible results as farmers respond. However, their benefits in terms of yield increases wane over time, they are costly, and once introduced, governments find it politically very difficult to discontinue them.

In the seed sector there are major differences between countries in terms of the level of involvement by the government or private sector. The public sector dominates *foundation seed* multiplication in all of the countries except Zambia. This can lead to serious difficulties because the quantities, qualities, and varieties being propagated may not be those that farmers prefer. Furthermore, there is no market mechanism in place to align supply with demand—often changing demand. The private sector dominates the production of *certified seed* in Ghana, Zambia, Burkina Faso, and Tanzania. Tanzania is the only country in the sample where *imported seed* plays a significant role in the national seed market. Like Zambia, which is a major seed exporter, Tanzania has modern seed laws and regulations. Nigeria, Ethiopia, Rwanda, and Mozambique are perceived as having seed laws that are either outdated or underdeveloped.

In Kenya, Zambia, Ghana, and Ethiopia, tractor importation is exclusively a private sector activity, while in Tanzania and Nigeria it is dominated by the public sector. With the exception of Burkina Faso, none of the ABI countries charge significant import tariffs on tractors. However, nearly all countries, with the exception of Ethiopia, charge tariffs on tractor parts, such as air filters and tires. These are key requirements for maintaining and maximizing the useful life of the national tractor fleet. Tariffs on tractor parts exceed 20 percent in Ghana, Mozambique, and Rwanda. Contract machinery services are a promising means by which to extend the benefits of mechanization to smaller-scale producers. Burkina Faso, Ghana, and Kenya have plowing hiring rates of \$50 per hectare or less. Rwanda has the highest rates at \$163 per hectare, as well as one of the lowest tractor density rates in the study. Government attempts to operate these services at below cost have not only largely failed but have generally choked off private sector participation in the delivery of these services.

Significant differences exist in the number of input suppliers in relation to the number of farms. Ghana and Kenya

have the highest density of input suppliers, have the highest levels of fertilizer use, and are among those with the highest rates of certified seed use. Both countries took a proactive approach to encouraging the emergence of a knowledgeable private import supplier sector.

In Zambia, Ghana, Rwanda, and Burkina Faso, the percentage of commercial bank lending made to the agriculture sector exceeds 9 percent. The lowest agricultural lending is reported in Nigeria and Kenya. The highest real interest rates on agricultural loans are in Ghana and Mozambique. Interest rates on agricultural loans generally exceed those to urban enterprises for a variety of reasons that will become clear throughout this report.

Burkina Faso appears to be particularly well served by its rural transport infrastructure, including road quality and logistics, and in terms of the unit costs of moving farm inputs and outputs along primary and secondary roads.

**Private Sector and the Business Environment (Table S.5).** The agribusiness sector had the most positive perspective of the agribusiness enabling environment in Zambia, followed by Tanzania, Rwanda, Burkina Faso, and Ghana. The most negative views were expressed in Nigeria and Ethiopia. The *consistency of policy* in particular correlates to the willingness of both agribusiness and farmers to make long-term investments. Rwanda and Kenya both scored the highest, followed closely by Zambia in policy consistency. Burkina Faso was viewed as having an especially volatile policy environment. Zambia, Kenya, and Tanzania were rated highest on quality and effectiveness of the interaction between the public and private agribusiness sector. Private sector perception of the business environment in fertilizer, seed, and mechanization was seen as especially positive in Zambia, followed by Kenya. The positive perception of the farm machinery sector in Ethiopia reflects the strong role the private sector plays in importing tractors as well as the absence of tariffs on imported tractor parts.

**Government Policies (Table S.6).** Three ABI pilot countries have achieved the CAADP target of spending 10 percent or more of the government's budget on agriculture: Burkina Faso, Rwanda, and Ethiopia. Ghana is moving toward achieving this target, as well. Public spending on agriculture in Burkina Faso, Rwanda, Ghana,

**TABLE S.5. AGRIBUSINESS INDICATORS: PRIVATE SECTOR PERCEPTION**

Private Sector	Indicators	Burkina Faso								
		Mean	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
Perception: policy environment	Enabling environment (0–5)	3.1	3.0	2.8	2.5	3.6	2.5	3.0	4.3	2.9
	Policy consistency (0–5)	2.5	3.5	2.0	2.0	2.5	2.0	3.5	3.0	2.6
	Private sector advocacy (0–5)	2.4	3.0	1.5	1.3	3.3	2.0	3.5	3.7	1.0
Perception: business environment	Fertilizer business environment (0–5)	2.6	2.0	3.0	0.0	4.0	1.0	4.0	4.2	3.0
	Ease of entry/operations in seeds (0–5)	2.7	2.0	2.0	1.5	3.7	2.0	2.5	4.9	2.5
	Mechanization business environment (0–5)	2.8	1.0	3.0	5.0	3.6	1.0	5.0	2.8	1.9

Note: High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%). Source: ABI Country Reports.

**TABLE S.6. AGRIBUSINESS INDICATORS: POLICY ENVIRONMENT**

Policy Environment	Indicators	Burkina Faso								
		Mean	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
Investment in agriculture	Ag spending as percentage of budget—current	7.9	14.5	5.1	13.8	6.5	2.0	4.3	6.0	9.0
	Trend in Ag spending budget—2001–10	3↑, 3→, 3↓	down	same	up	same	down	down	up	up
	Ag public expenditure ratio to Ag GDP	0.26	0.43	0.16	0.30	0.24	0.06	0.15	0.30	0.36
	Ag R&D spending as percentage of Ag GDP	0.55	0.36	0.37	0.26	0.53	0.43	1.53	0.29	0.60
	Fertilizer subsidy as percentage of Ag Ministry budget	20.5	4.0	NA	NA	18.5	NA	NA	38.1	12.0
Banking support	ISTA membership or adherence to OECD requirements—Y/N?	2Y, 5N	N	N	N	N	N	Y	Y	N
	Evidence of credit reference (0–5)	1.6	0.0	1.5	0.0	1.5	2.0	3.0	3.0	2.0
	Presence of collateral registry agency for loans	2Y, 5N	N	N	N	N	N	Y	N	Y
Transportation support	Existence of warehouse receipts (0–5)	1.4	1.5	0.0	3.0	4.0	0.0	0.0	1.0	3.0
	Time (days) to get truck registered/operating license	13	6	7	7	6	28	29	21	5
	Ease of entry into trucking (0–5)	3.7	3.5	4.0	4.0	3.6	3.5	2.5	4.0	4.0

Note: High scores are indicated by green and emboldened figures (that is, 14.5%) and low scores by pink and a black surround (that is, 2.0%). Source: ABI Country Reports.

Zambia, and Ethiopia more closely parallels the sector's relative importance in the overall economy. Kenya is the only ABI country achieving the target of investing over 1 percent of agricultural GDP in agricultural research and development. Seven countries operate fertilizer subsidy schemes. Zambia has the highest percentage of public agricultural expenditure dedicated to this one item, followed by Rwanda. Of the four countries in which data could be collected, fertilizer subsidies alone accounted for about one fifth of the agricultural budget. Kenya and

Zambia are both members of the OECD and ISTA international seed schemes in order to ensure that their seed industry is well harmonized with international standards. In terms of the emergence of a more diverse range of financial instruments, significant differences are observed. Both Kenya and Zambia operate credit reference agencies. Only Kenya and Ghana currently have a collateral registry agency for movable assets in place. Tanzania, Ethiopia, and Ghana also have relatively advanced warehouse receipt systems in place.



# CHAPTER ONE

## INTRODUCTION

### THE SECTORAL CONTEXT: THE POVERTY, GROWTH, AND AGRICULTURE NEXUS

**Agriculture is extremely important in the nine pilot countries.** On average, the agriculture sector accounts for 65 percent of employment and 75 percent of domestic trade in Sub-Saharan Africa. For decades, investment in the sector was considered a strategic focus for spurring economic growth, generating employment, and reducing poverty. Despite efforts by governments, donors, the private sector, nongovernmental organizations (NGOs), and civil society, the pilot countries continue to confront poverty, malnutrition, and food insecurity—all of which are exacerbated in times of external and internal shocks such as droughts as well as food and fuel price spikes.

**Meeting the demands of burgeoning urban markets will require vastly improved food production systems.** Research by the FAO projects that the increase in population and change in diets will lead to a 70 percent increase in global food demand by 2050. Urban populations in all nine ABI pilot countries are growing rapidly, comprising sizable middle-income and low-income segments. Like elsewhere in the developing world, an increasing proportion of food demand will be manifest in cities, and much of it will be supplied by smallholder, and in some instances medium-size, farmers (see figure S.1). With increasing proportions of food production serving urban consumers, addressing vulnerability to food insecurity in rural areas will remain a persistent priority for policy makers.

**Increased use of modern seed, fertilizers, and farm machines is instrumental in bringing about increased agricultural yields.** Together with access to financial and transport services, access to these inputs is a vital element of agricultural modernization. No region in the world has been able to expand agricultural growth rates and tackle hunger without improved seed, use of chemical fertilizers, and other modern inputs. Mechanization enables timely field preparation, precision planting, and fertilizer application which often assume greater importance among modern varieties. Farmers' ability to access seed, fertilizer, pesticides, herbicides, and other inputs relies in large measure on their proximity to agro-input dealers. If these dealers are located



within reasonable distances that do not entail prohibitive travel times, access is, of course, more likely. And where these dealerships operate within dense networks of competing input suppliers, the prices of these inputs tend to be more competitive. Distance, however, is not the only constraint facing more remotely located farmers. A variety of other policy-related, financial, institutional, and regulatory factors can also militate against the adoption of modern inputs as well as including limited commitment of public and private investment. Substantial impetus for increased public and private investment is likely to result from gains in productivity that generate marketable surpluses and lead to higher incomes—surpluses and incomes that can be reinvested in additional value-adding activities both on and off the farm. These in turn can be instrumental in establishing forward and backward linkages that “fill out” and greatly strengthen agricultural value chains, creating new investment opportunities for agribusinesses which cumulatively lead to commercialization throughout the sector and beyond it in the greater rural economy.

## CHARACTERISTICS OF THE ABI PILOT COUNTRIES

Even though the nine pilot ABI countries differ in terms of geography, climate, and socioeconomic development, improving the competitiveness of agribusiness is a common goal. Six of the nine countries—Burkina Faso, Ethiopia, Mozambique, Rwanda, Tanzania, and Zambia—are low-income countries with large agricultural sectors, a large rural population (five countries have  $\geq 74$  percent of population in rural areas), and a high proportion ( $\geq 70$  percent) of the economically active labor force employed in agriculture. Ghana and Nigeria are emerging middle-income countries with about half of their populations in urban areas and 4.1 percent urban population growth rates over the period from 2000 to 2010. Nigeria, Kenya, Tanzania,

and Zambia also have per capita incomes averaging over \$400 per person per year.

Two of the countries, Ghana and Kenya, appear to be in the second stage of development in which the economy is still largely agricultural but transitioning toward urbanization. Six of the countries fall in stage one of the agricultural development continuum, characterized by a low value of output per agricultural worker ( $< \$300$  per worker in six countries in constant 2,000 US\$ prices), a very high proportion of the labor force in agriculture, and agriculture contributing at least 30 percent of GDP. Nigeria is an outlier in that it has a large extractive sector and more industry than the other eight countries. (See table S.1.)

Nigeria also differs markedly from the other pilot countries in that it has a large land area (second only to Ethiopia) and the largest total area of agricultural land, a large population (158.4 million in 2010), and high population density (174 people per square kilometer), trailing only Rwanda (at 431 people per square kilometer). Nigeria is the only very large country (on all measures) in the sample. Five other countries (Ethiopia, Kenya, Mozambique, Tanzania, and Zambia) have large land areas but vary significantly in other characteristics, such as population, population density, urbanization, GDP per capita, and arable land (cultivated in annual crops). On average, the agricultural sector's contribution to GDP is 25 to 35 percent in Sub-Saharan Africa, while it varies in pilot countries at about 20 percent in Zambia, and as high as 45 percent in Ethiopia. While the sector contributes about 26 percent of GDP, in countries like Kenya, it also indirectly contributes to about 25 percent of GDP through the creation of backward and forward linkages in the food manufacturing, distribution, and service industries.

## CHAPTER TWO

# METHODOLOGY

An important part of the value of the agribusiness indicators is in the weight ascribed to the indicator and how the reader may understand what the indicated response answers and what it does not. In this chapter, we describe the creation of the indicators, the methodology, and the particularities and integrity of the responses. The purpose of this chapter is to enable readers to make more informed decisions on the value and weight of each indicator by explaining its origins, interpretation, and limitations.

### AGRIBUSINESS INDICATORS IN AFRICA (ABI): APPROACH, METHODS, INDICATORS

The grant agreement called for pilot testing the ABI approach intensively in one country. The team did this in Ghana in fall 2010, focusing on two staple grain value chains—maize and rice. The fieldwork was highly instructive and helped the team narrow the range of (future) inquiry to a core set of cross-cutting constraints and issues. The team felt that the value chain work was not fully satisfactory. More time and effort would have been required to do comprehensive value chain analyses. The fieldwork was useful in identifying the following cross-cutting areas that shed light on the ease or difficulty of agriculture becoming more market forward:

- » Access to and availability of certified seed
- » Availability of and access to fertilizer
- » Access to farm machinery, particularly tractor hire services
- » Access to agricultural production and agro-enterprise finance
- » Cost and efficiency of rural transport, particularly trucking
- » Various policy measures (public expenditure on agriculture, percentage of a key export crop free on board [FOB] price captured by producers, role of private agribusiness advocacy groups, tariffs on imports of capital goods and spare parts for tractors)
- » Measures of consistency of the enabling environment for agribusiness

### INDICATOR DEVELOPMENT

The key areas of investigation were fleshed out by developing a set of indicators for each group, defining each clearly, specifying how each indicator would be calculated, identifying likely sources of information and how the team would collect such

information, and signaling what potential data collection problems or issues might be encountered. The team developed an indicator matrix in early 2011. This was revised and refined several times over the course of the project. Technical specialists in the World Bank Group were consulted in this process. Most of the indicators are *descriptive* or *positive* indicators that are designed to provide a baseline against which a country can benchmark its own performance over time, and allow for a country to compare its performance on specific indicators with other African countries. A few of the indicators are *normative*, implying specific policy or regulatory prescriptions or actions. They are designed to suggest performance shortcomings after comparison with other countries, as well as stimulate discussions and debate among public, private, and donor/NGO stakeholders, founded on comparative data.

## STUDY APPROACH

As described in the Executive Summary, the ABI country study teams visited each country two or three times, spending between four and eight weeks in each. Countries were selected to give breadth and cover as many particularities as possible. Both lusophone and franco-phone countries were added as well as countries with geographically and climatically different areas. Local consultants were employed to help the teams identify important sources of information, including existing surveys, research papers, and reports. Data on 54 indicators were collected, 44 of which are presented in this report. Local consultants assisted the study teams in preparing meetings and interviews with respondents representing public officials, private sector investors, and farmers' organizations. Their opinions and perspectives about the factors that are restricting agricultural modernization and commercialization were useful in enabling the teams to compose summaries of the different situations in the nine countries.

## INFORMATION-GATHERING APPROACH

The working hypothesis at the outset was that approximately 80 percent of the information required to inform the indicators already exists in some form, albeit not always readily available and often available from disparate sources. There may also be public sector gatekeepers who are reluctant to release information because it is not final, because the underlying data are problematic, or the findings are politically sensitive. Information is often not

available in readily usable form. In some cases, agricultural production figures are not released for years or are not released at all if actual figures are well below targets. Crop production forecasts and estimates may also be subject to manipulation, resulting in upward "adjustments." Linear extrapolation from past trends is also not uncommon.

ABI developed a hybrid approach with which information is collected from multiple sources so that findings can be triangulated:

- » International data sources, typically on accessible websites
- » African government secondary databases and documents reporting data relevant to ABI indicators, typically not found on websites
- » Special studies that have generated and analyzed primary data, usually done by universities, research institutes, or consultants, and often funded by donor agencies
- » Key interviews with private sector agribusiness managers, leaders of trade or industry associations and farmer organizations (FOs), selected representatives of academia and the donor community, and key technocrats, agency department heads, and policy makers in government ministries and agencies
- » Available records from trade, industry and commodity associations, FOs, parastatal agencies, and selected government-run or donor-funded projects

These sources are listed by topic in table 2.1.

ABI's approach did not include launching formal surveys, though small, purposively chosen samples were selected for opinion/perception questions in which informants were asked to provide ordinal ratings on a 0 to 5 scale. A shortcoming of these types of questions is that the sample tends to be small and biased toward larger agro-enterprise firms that are easily accessible, literate, and understand the concepts behind ratings.

ABI analysts were able to cross-check and triangulate information from multiple sources in each country and internationally. A select sample of key informants was interviewed, covering participants and service providers along the main staple crop value chains of interest (maize and rice, and sometimes wheat or a key cash crop such as cotton or coffee), as well as knowledgeable observers.

**TABLE 2.1. SOURCES FOR INDICATORS**

Category	Key Informants and Documents
<b>Access to certified or improved seed production and use</b>	Ministry of Agriculture (departments dealing with seeds, fertilizer, and agricultural machinery); agricultural research institutes (and any umbrella scientific research-type institution); any agency or parastatal responsible for foundation seed production (and any agencies doing certified seed multiplication); any cross-agency bodies, such as a Seed/Varietal Approval Committee; any Ministry of Agriculture agency responsible for inspection, quality control, or certification; private seed multipliers and any private seed association; selected FOs (using improved seed)
<b>Fertilizer importation, mixing, distribution, and use</b>	Ministry of Agriculture (departments dealing with agricultural inputs, typically seeds, fertilizers, and agrichemicals); agricultural research institutes (and perhaps an umbrella scientific research-type institution); any agency or parastatal responsible for fertilizer importation and distribution; private agrodealer association; selected FOs (using fertilizer with improved seed); any government agency responsible for inspection, quality control, or testing of fertilizer; any private fertilizer importers, producers, or mixers/blenders; selected private wholesale traders/distributors (probably members of agrodealer association)
<b>Agricultural mechanization (with special attention to tractors)</b>	Ministry of Agriculture (division that works on mechanization); any government agency that imports and distributes tractors (for example, parastatal); private sector importers of tractors, spare parts, and tires; Ministry of Commerce/Customs for detailed data on imports of tractors and for information on import duties, value-added tax (VAT), and other charges/fees applied to imports of tractors and spare parts; any private sector association for tractor importers, distributors, or service centers; selected owners of tractors—FOs or cooperatives, NGOs, large farmers (who probably rent out their equipment); selected users of tractor hire services (FOs, NGOs); any agricultural machinery centers that provide tractor hire services and maintain/repair agricultural equipment (may not exist)
<b>Access to agricultural credit and agribusiness finance</b>	Central Bank (CB), commercial banks, microfinance institutions (MFIs), and rural banks; a sample of credit users—FOs that take loans and on-lend to smaller agro-enterprises or small farms, medium sized commercial farms, agroprocessors, importers of agricultural inputs (especially fertilizer and equipment), traders of agricultural commodities (and exporters); investment funds (if exist), program or project credit lines, grant components (typically of projects) targeting agribusiness Secondary research: Central Bank website and statistical bulletins, International Monetary Fund (IMF)/bank financial sector assessment program document, government financial sector strategy/plan, financial sector surveys (if any)
<b>Transport indicators (mainly trucking)</b>	Traders, (grain) trade associations, transporters, truckers' union or shippers' associations, freight forwarders/international shipping companies Secondary sources of information: Transport Ministry planning and monitoring and evaluation (M&E) documents, transport surveys (if any), Rural Access Index (RAI) and Logistic Performance Index (LPI) measures, World Bank Group (WBG) Africa infrastructure assessments (ABI staff can get the last two). In some countries, a transport regulatory authority, road fund, or a road/highway administration may produce annual reports with much useful information. International organizations such as the World Food Program have logistics units that can provide a list of transporters that they use and negotiated transport rates. Bilateral donors (such as the Department for International Development [DFID]) providing technical assistance to the Ministry of Transport may be good sources as well. Focus on collecting information from grain traders and input suppliers on transport prices paid to ship agricultural products and inputs; traders' (shippers) opinions/perceptions of transport services (provided by truckers)
<b>Policy-related indicators</b>	Seed multipliers/dealers; fertilizer/agro-input dealers; fertilizer importers; importers/sellers of tractors; agricultural machinery service centers (or individuals/large farmers who provide custom-hire tractor services); traders of agricultural products (especially grain); agroprocessors (especially millers); agricultural exporters (of staple and/or cash crops)

In cases where quantitative data were generated, such as in estimates of rural transport costs, ABI analysts interviewed samples of transporters, traders, and agribusiness firms, using triangulation techniques to successively approximate plausible estimates.

In order to guide information gathering in the field, the ABI team developed guidelines for questions and checklists for each indicator group. These guidelines, which have undergone continual refinement, are quite detailed and may appear to go well beyond the scope of what is required to inform particular indicators. The guidelines were designed, however, to pull together relevant background information of a policy, regulatory and institutional nature, which would aid in interpreting data gathered solely to inform or calculate indicators. In many cases, background information is found in recent government planning and strategy documents, agriculture sector and agribusiness studies, donor strategies, program design papers, or other documents.

Table 2.2 indicates the probable typology for each indicator. The nature of this research and attempts to get the most correct information for each indicator may mean that those sources vary by country. For example, monthly rural retail prices for urea were available through a pilot bulletin that was published monthly for some countries and not for others. For certain indicators, detailed customs information was shared, and in other countries the information was received as redacted data from the government.

## QUALIFICATIONS: BE AWARE OF FACTORS

This synthesis report focuses on possible causes that are restricting agricultural production and highlights a number of indicators and metrics that will help to create better understanding and manage change. Much of this information has not been collected before. Rarely have cross-country comparisons at this scale and with these types of data been attempted. In compiling this report, the team has had to make a number of judgment calls, especially when presented with conflicting or incomplete information. Every effort has been made to triangulate data. The individual country reports were peer reviewed by individuals with experience in each of the countries. The quality and accuracy of a number of these indicators will improve over time with repeated collection through programs like the BBA. We recommended that this report

be used by countries as a point of departure for further investigation, consultation, and verification rather than as a reference for making immediate policy changes.

Given disincentives to public service, government institutions that generate and report agricultural and economic statistics struggle to fulfill their mandates despite high levels of foreign assistance. Out of necessity, this study relied heavily on information of variable quality, reliability, and accuracy, including secondary data from government and international sources as well as on some primary data (for example, from the national agricultural census and periodic national sample surveys of rural households). In relation to our best efforts to interpret incomplete and sometimes ambiguous data, the critical reader is asked to exercise his or her own judgment. We have somewhat more faith in information we generated in interviews with key informants or in their responses to pointed e-mailed questions.

Perception indicators have been used to gauge the private sector's view of government policies and their implementation. These can be criticized because of limited sample size and concerns about consistency across countries of scored perception indicators. Nevertheless, these are included in the report because they demonstrate substantial alignment with other, more objective measures of whether or not the private sector is seen as partner in economic development.

So as to provide the reader with as many tools as possible to exercise judgement on the agribusiness indicators, the following section with by-country results provides information on the type of informants and the type, by indicator.

### BOX 2.1. A NOTE ON TRIANGULATION

For quite a few of the indicators, the paper mentions the use of triangulation in the results. The purpose of triangulation in qualitative research is to increase the credibility and validity of the results. Several scholars have aimed to define triangulation throughout the years, but the definition most closely used for the purposes of this study is according to O'Donoghue and Punch (2003), a "method of cross-checking data from multiple sources to search for regularities in the research data."

Where multiple different sources were used, such as published data from different sources, or several perceptions to aggregate into, triangulation meant taking various sources and creating an average of each response.

**TABLE 2.2. TYPE OF DATA**

<b>Farm</b>	<b>Indicators</b>	<b>Description</b>
<b>Input use and economics</b>		
<b>Fertilizers</b>	Average cereal yield (kg/ha)	Government published data/international organizational data
	Fertilizer nutrients (kg/ha) (Abuja target 50+)	Government published data/international organizational data
	Unsubsidized nutrient/output ratio (about 5)	Investigator calculations based on government published data/interview; expressed as “Calculate nitrogen price from urea price and use maize price during the postharvest period. Urea is 46% N.” Maize price is an average of weekly prices over several months postharvest. Our interpretation is that lower ratios are better.
<b>Seeds</b>	Use of certified maize seeds (%)	Government published data
	Hybrid maize seed to grain price ratio (best between 2 and 5)	Informed opinions/interviews
<b>Tractors</b>	Tractor density (SSA average 13 per 100 km <sup>2</sup> )	Government published data/international organizational data
<b>Input sourcing and costs</b>		
<b>Fertilizers</b>	Average fertilizer (unsubsidized) rural retail price US\$/ton	Market information/ International Fertilizer Development Center (IFDC)
	Fertilizer subsidy—Y/N?	Government published data
	Fertilizer import taxes (%)	Triangulated data from sources (customs, FAO)
<b>Seeds</b>	Private sector production of foundation seed (%)	Informed opinions/perception triangulated with available data
	Private sector production of certified seed (%)	Private sector/public sector published data
	Imported seed as total certified seed (%)	Private sector/public sector published data
	Time (years) for seed testing and registration	Government published data/international data
	Existence/implementation of national seed regulations/laws (0–5)	Government published data/international organizational data
<b>Tractors</b>	Tractors imported by private sector (%)	Government published data/international organizational data/interviews with private sector
	Tractor import tariffs as % CIF prices	Government published data/international organizational data
	Parts imports tariffs as % CIF price	Government published data/international organizational data
	Cost of tractor rental (pilot average \$82)	Opinion interviews/averaged
<b>Distribution</b>	Agrodealer network—number per 10,000 farms	International organizational data/interviews and averages
<b>Financing</b>		
<b>Access</b>	Number of bank branches per 100,000 adult population	Central Bank/international data
	Commercial banks lending to Ag (3 years) (%)	Central Bank
<b>Cost</b>	Average lending rates for Ag loans (real rates)	Central Bank/banks
	Nonperforming Ag loans (%)	Published data—Central Bank

*(Continued)*

**TABLE 2.2. TYPE OF DATA**

<b>Farm</b>	<b>Indicators</b>	<b>Description</b>
<b>Road access</b>	Rural Access Index (%)	International organizational data
<b>Quality</b>	Road network in poor condition (%)	International organizational data
	LPI infrastructure quality (0–5)	International organizational data, World Bank Logistics Performance Index
<b>Cost</b>	Cost of transportation (\$/mt/km)—main routes	Informal interviews—multiple sources; average
	Cost of transportation (\$/mt/km)—secondary routes	Informal interviews—multiple sources; average
<b>Private Sector</b>	<b>Indicators</b>	
<b>Perception of policy environment</b>	Enabling environment (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
	Policy consistency (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
	Private sector advocacy (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
<b>Perception of business environment</b>	Fertilizer business environment (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
	Ease of entry/operations in seeds (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
	Mechanization business environment (0–5)	Perception based: interviewee (private sector participant); rate between 0 and 5
<b>Policy Environment</b>	<b>Indicators</b>	
<b>Investment in agriculture</b>	Ag spending as percentage of budget—current	Government published data/international organizational data/IMF
	Ag spending as percentage of budget—2001–10	Government published data/international organizational data/IMF
	Ag spending as percentage of Ag GDP	Government published data/international organizational data/IMF
	Ag R&D spending as percentage of Ag GDP	Government published data/international organizational data
<b>Input support</b>	Fertilizer subsidy as percentage of Ag Ministry budget	Government source
	ISTA membership or adherence to OECD requirements—Y/N	International organizational data: OECD
	Effectiveness of mechanization strategies	Opinion interview; expressed qualitatively
<b>Banking support</b>	Evidence of credit reference (0–5)	Perception based: rate between 0 and 5
	Presence of collateral registry for loans	Government source/interviews
	Existence of warehouse receipts (0–5)	Perception based: rate between 0 and 5
<b>Transportation support</b>	Time (days) to get truck registered/operators' license	Opinion interview/average based on interviews and possible published data
	Ease of entry into trucking (0–5)	Perception based: rate between 0 and 5

## CHAPTER THREE

# POLICY ENVIRONMENT

Private sector perceptions of public policy and the government's role in the local economy are defining characteristics and determinants of whether or not the business environment is an enabling environment. This relies on the government's own attitudes toward business, and whether its commitment to needed policy reforms is genuine or simply a matter of politically expedient public rhetoric. Investors have a strong preference for stable, rational, and predictable policies that allow for long-term planning, particularly when the investment has a long gestation period. Increased public spending on agricultural research and extension and purposeful reforms introduced to improve the capacity of the institutions responsible for governing and regulating the agriculture sector can reassure prospective investors regarding the government's commitment. Rational and constructive policies relating to agribusinesses' vital role in promoting agricultural development can likewise be instrumental in convincing investors that the national government is an honest and reliable broker. Cultivating these types of perceptions on the part of investors and prospective investors is particularly important in contexts in which public expenditure on agriculture is limited, as is the case in the nine pilot ABI countries. It creates a more positive environment for public-private partnerships in which private investment complements and supplements public spending.

A purposefully limited government role in input and product marketing functions such as distribution, storage, transport, and processing benefits agribusiness effectively and reduces the chances that private sector participation in these activities will be crowded out. It also enables government institutions to focus their attention and their efforts where intervention is warranted, for instance in settings characterized by market failure and missing and incomplete markets. The government's ability to identify and purposefully respond to these conditions with the right mix of incentives, regulations, controls, and strategic public investments is a vital element of a constructive public sector engagement in the agriculture sector. Although it is likely to take time, this constructive and strategically selective engagement in the agricultural economy can foster increased investment on the part of agribusinesses and ultimately lead to development of the kind of competitive market that is characteristic of commercialized agriculture.



## KEY FINDINGS (TABLE 3.1)

### **Agricultural Spending as a Share of Total Budget.**

This proportion is an indicator used to reflect the fiscal costs of agricultural policy, and the priority that a government assigns to agriculture relative to other sectors. The Comprehensive Africa Agriculture Development Programme (CAADP) prescribes that African countries allocate 10 percent of their total budget to agriculture. According to the results of a 2012 study, only 19 percent of Sub-Saharan African countries achieved this target; 57 percent of the countries allocated less than 5 percent to agriculture (World Bank 2012). Among the nine ABI pilot countries, three achieved this level of commitment as of 2010–11: Burkina Faso at 14.5 percent, Ethiopia at 13.8 percent, and Rwanda at 10.2 percent. In Ethiopia, Ghana, and Zambia, budgetary allocations have increased recently. The lowest performers with regard to this indicator have been Nigeria at 2 percent and Kenya at 4.3 percent—both proportions that declined between 2000 and 2010.

### **Agricultural Spending as a Proportion of Agricultural GDP.**

Public expenditure on agriculture relative to agricultural GDP is important because it provides scale to the agricultural expenditure discussion. In larger, more diverse economies (of middle- and higher-income countries), public expenditure on agriculture is typically lower than it is in low-income countries, where agriculture contributes proportionally more to GDP. In Burkina Faso, Ghana, Rwanda, Ethiopia, and Zambia, the ratio is 0.3 and above. Nigeria is the outlier with public expenditure in agriculture which is only 0.06 of the percentage value of agriculture in the country's total GDP.<sup>4</sup>

### **Public Spending on Agricultural Research as a Share of Agricultural GDP.**

Agricultural research is a particularly strategic area in which to invest public resources. This research is essential for sustained productivity growth and for delivering technologies and methods that enable producers to adjust to the effects of climate change. Among

<sup>4</sup> To make sound judgments about whether public expenditure in agriculture is too low or too high, in-depth analyses of the composition of public expenditure are required. Both the World Bank and FAO have received grants from the BMGF to do such in-depth expenditure pattern reviews in some 20 African countries.

low-income countries where public resources are often acutely scarce, 1 percent of agricultural GDP is generally seen as an appropriate level of public investment. In higher-income developing countries this proportion tends to increase to 3 or 4 percent. Among the ABI pilot countries, Kenya is the only one for which the proportion of agricultural GDP invested in publicly funded agricultural research exceeds 1 percent, at 1.35 percent.

### **Private Sector Perception of the Enabling Environment (0–5).**

The way investors and prospective investors subjectively apprehend the local environment for agribusiness differed markedly between the ABI pilot countries, and strong correlations emerged between these perceptions and the level of the local government's involvement. Assigning this indicator a number rating of between 0 and 5, in which 0 is very unfavorable and 5 is highly favorable, Zambia received the highest rating at 4.1, followed by Tanzania at 3.6. Governments in both Zambia and Tanzania were seen as imposing a limited set of regulations that made for an operating environment in which businesses had the necessary latitude to make important investment decisions. Ethiopia and Nigeria received the lowest ratings, both at 2.5. Investors in both countries saw themselves as crowded out of input and output markets by high levels of government intervention. The private sector perceptions captured by the pilot ABI are noteworthy, but they are based on a limited sample and are not necessarily representative of a larger cohort of investors or of the private sector in general.

### **Private Sector Perception of Policy Consistency and Predictability (0–5).**

In three countries, private sector perception was positive: Kenya and Rwanda both at 3.5 and Zambia at 3.0. The rating of consistency was based in large part on one or a small number of trade policy issues, and particularly on the ability of traders to export maize or rice across borders to neighboring countries. In Burkina Faso (1.5), Ethiopia (2.0), Mozambique (2.0), and Nigeria (2.0), private sector perceptions were generally less favorable due to export bans imposed by the government as measures to curb price volatility in the international commodity markets during 2007 and 2008. Some of these barriers have gone against the spirit of the regional trade agreements signed with the Economic Community of the West African States

**TABLE 3.1. ENABLING AND POLICY ENVIRONMENT INDICATORS**

Policy Environment	Indicators	Mean	Burkina Faso							
			Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
Investment in agriculture	Ag spending as percentage of budget—current	7.9	14.5	5.1	13.8	6.5	2.0	4.3	6.0	9.0
	Trend in Ag spending budget—2001–10	3↑, 3→, 3↓	down	same	up	same	down	down	up	up
	Ag public expenditure ratio to Ag GDP <sup>a</sup>	0.26	0.43	0.16	0.30	0.24	0.06	0.15	0.30	0.36
	Ag R&D spending as percentage of Ag GDP	0.55	0.36	0.37	0.26	0.53	0.43	1.53	0.29	0.60
Input support	Fertilizer subsidy as percentage of Ag Ministry budget	20.5	4.0	NA	NA	18.5	NA	NA	38.1	12.0
	ISTA membership or adherence to OECD requirements—Y/N	2Y, 5N	N	N	N	N	N	Y	Y	N
	Evidence of credit reference (0–5)	1.6	0.0	1.5	0.0	1.5	2.0	3.0	3.0	2.0
Banking support	Presence of collateral registry agency for loans	2Y, 5N	N	N	N	N	N	Y	N	Y
	Existence of warehouse receipts (0–5)	1.4	1.5	0.0	3.0	4.0	0.0	0.0	1.0	3.0
Transportation support	Time (days) to get truck registered/operating license	13	6	5	7	6	28	29	21	5
	Ease of entry into trucking (0–5)	3.7	3.5	4.0	4.0	3.6	3.5	2.5	4.0	4.0

<sup>a</sup> When 1, then percentage of public expenditure on agriculture is the same as the agricultural GDP.  
Source: ABI Country Reports.

(ECOWAS) and the *Union Economique et Monétaire Ouest Africaine* (UEMOA).<sup>5</sup> In Nigeria and Ghana, rice import tariffs and related fees have been subject to many changes, undercut operations of some private importers, and discouraged private investment in domestic rice production and processing.

**Private Sector Perception of Advocacy Groups (0–5).** Advocacy groups often play an important role in lobbying for policy reforms and in persuading legislators and other public officials, making them an important source of leverage for agribusinesses in developing countries. Their role in representing business in policy dialogue makes them a vital asset to investors who wish to have a voice in that dialogue, and a force in crafting an enabling environment for investors. Most typically, the benefit of these types of dialogues is that they better enable government policies to be aligned with commercial realities and market opportunities. In Africa, these groups have generally been less influential, although with the help of some bilateral donors, this has recently begun to change. In three of the ABI pilot countries, agribusinesses rate the capacity and effectiveness of these advocacy groups in influencing public policy quite favorably:

in Zambia ABI respondents rated their effectiveness at 3.7, Kenya at 3.5, and Tanzania at 3.3. In a few countries, umbrella organizations of these groups represent a wide range of private agribusiness interests across commodity groups and agro-industries. In other countries where apex organizations do not exist, commodity associations have been effective, focusing more narrowly on representing the interests of the participants in specific value chains. In Zambia, the national farmers union (ZANFU), and in Kenya, the National Federation of Agricultural Producers (KNFAP) are seen as having been influential in this capacity. These farmers' unions cut across value chains and are not tied to commodity-specific associations (often called interprofessional associations or trade associations dominated typically by exporters). There are strong producer groups tied to a particular key commodity, for instance cotton in Burkina Faso. As a result, respondents in Zambia rated them quite favorably, at 3.7 out of 5. Kenyan and Tanzanian respondents gave favorable ratings as well, at 3.5 and 3.3, respectively. In Rwanda, on the other hand, where the chamber of commerce represents the interests of multiple sectors and industries, respondents found its influence on behalf of agribusiness to be less effective.

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<sup>5</sup> ECOWAS is regional economic community (REC) of 15 West African countries, including all three West African ABI study countries—Burkina Faso, Ghana, and Nigeria. UEMOA covers a subset of the ECOWAS countries—six francophone countries plus Guinea-Bissau in West Africa (including Burkina Faso)—and Chad.

## CHAPTER FOUR

# SEED

Improved, high-quality, often certified seed is a critical input for increasing crop yields and improving agricultural productivity. The low rates of improved seed use among smallholders in the nine pilot ABI countries are a major cause of their low yields, particularly when considered in combination with their low rate of use of other inputs. Maize yields throughout the continent are a case in point. The average yield of 1.5 tons maize per hectare is roughly one fifth the yield typical of maize production in industrialized countries.

The factors believed to prevent the majority of African farmers from using improved seeds include lack of awareness, cost, and often most critically, the shortage of improved seed at the right time and place. Awareness and cost can be closely related. The farmer who does not understand the potential effects of an improved seed variety on his or her productivity and income is likely to see the higher price of that input as being unwarranted and therefore may be much less willing to adopt the variety. Yet the cost of improved seed is usually less than 5 to 10 percent of his or her total production costs. Although the yield gaps that characterize so much of African agriculture may seem daunting, the enormous potential to increase productivity by effectively targeting these constraints must inform policy formulation because the opportunity is great and the opportunity costs of business as usual are unsustainable. The selection of seed variety is a critical decision for farmers. Helping to inform those decisions with better information is one of the most important services a farmer can be provided.

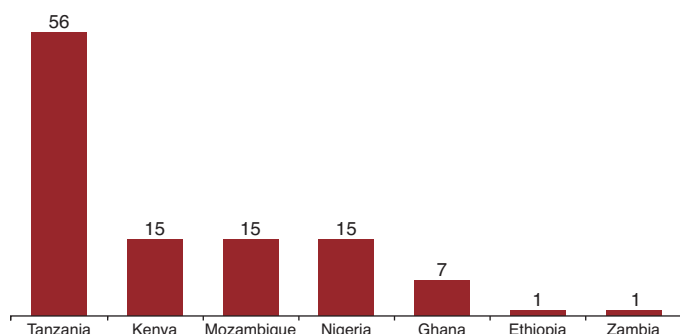
The seed industries in many African countries limit plant breeding and testing to a limited number of crops, principally maize and sorghum, with little if any attention to tubers, grains, legumes, and horticultural plants that are food staples within many countries. Public sector and parastatal agencies often play a dominant role in seed multiplication and marketing, raising concerns that private firms are being crowded out. Lengthy and complicated varietal testing requirements, certification procedures, regulations, and price-setting policies inhibit the emergence of private seed production and distribution. A number of these concerns appear to be corroborated by the findings of the ABI pilot study.

**TABLE 4.1. SUMMARY OF SEED INDICATORS**

Indicators	Burkina Faso									
	Mean	Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
<b>Seeds</b>										
Use of certified maize seed (%)	31	50	12	6	18	27	7	70	65	19
Hybrid maize seed to grain price ratio	7	13.0	NA	10.0	7.0	11.0	4.0	5.0	10.0	2.0
Private sector production of foundation seed (%)	14.8	0	0	13	5	NA	0	0	100	0
Private sector production of certified seed (%)	66	100	NA	15	12	79	54	10	100	100
Imported seed as percentage of total certified seed	14	NA	NA	15	1	56	15	15	1	7
Time (years) for seed testing and registration	2.7	5.0	3.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Existence/implementation of national seed regulations/laws (0–5)	2.9	2.5	2.0	2.0	2.0	4.0	2.0	3.5	4.5	3.0
Ease of entry/operations in seeds (0–5)	2.7	3.5	2.0	2.0	1.5	3.7	2.0	2.5	4.9	2.5
ISTA membership OECD	2Y, 5N	N	N	N	N	N	N	Y	Y	N
Agrodealer network—number per 10,000 farms	3.0	2.1	1.8	0.3	2.2	1.3	2.1	5.8	NA	8.4

Source: ABI Country Reports.

**FIGURE 4.1.** SEED IMPORTS IN THOUSANDS OF METRIC TONS, 2011–12



Source: ABI Country Reports.

## KEY FINDINGS (TABLE 4.1, FIGURES 4.1, 4.2)

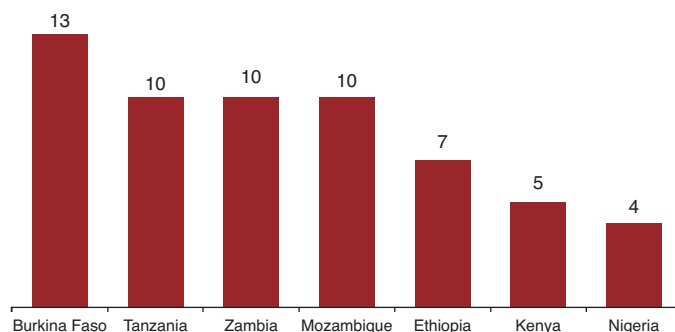
The use of certified maize seed is measured in terms of the percentage of a country’s total maize area planted with certified seed. **Of the nine ABI pilot countries, Kenya and Zambia have the largest proportion of maize-cultivated areas planted with certified maize seed** at 70 and 65 percent, respectively. In Burkina Faso the proportion is 50 percent. The seed industries in the three countries are characterized by large networks of agro-input dealers, a role that is often dominated by government and parastatal agencies in other countries.

**Mozambique, Nigeria, and Rwanda have the smallest proportion of maize area planted with improved seed at 6, 7, and 12 percent, respectively.**

These three countries are also notably subject to certified maize seed shortages and have seed industries that are unable to adequately supply farmers at reasonable prices and in a timely manner. There is evidence of a disconnect between demand for improved seed and agencies’ ability to supply farmers at those volumes and with the types of seeds that farmers want, suggesting that these seed systems are not demand driven. This may warrant a reexamination of the role of the public sector in the seed industry.

**Certified Seeds as a Percentage of All Seed Used in Pilot Countries.** Most of the seed used by African farmers is generated from within the informal sector. Informal seed is most consistent with locally sourced, unimproved varieties, and recycled seed that generally does not lead to yield increases. Formal seed is typically purchased from

**FIGURE 4.2.** SEED-TO-GRAIN PRICE RATIO IN THE PILOT COUNTRIES, 2011–12 CROPPING SEASONS



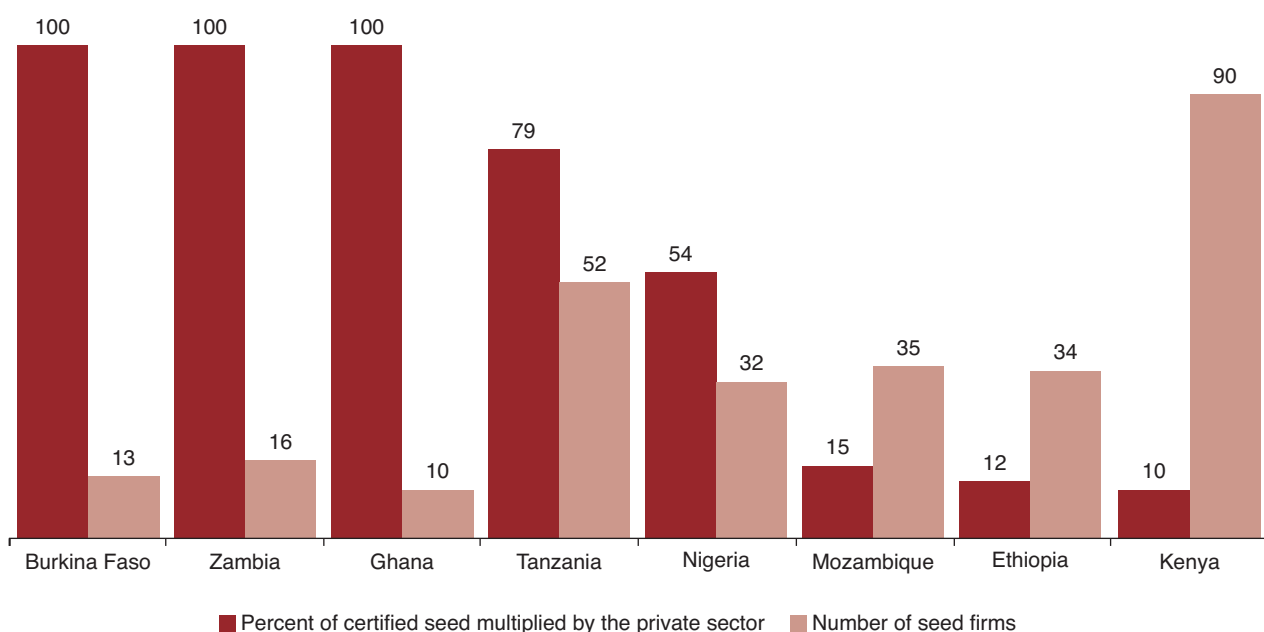
Source: ABI Country Reports.

trained and licensed agents who are usually certified by the regulatory authorities. Data on this indicator were available from only three ABI countries: Ethiopia, Kenya, and Nigeria. Kenya was the only country in the sample in which the majority of farmers (over 60 percent) used formal sources. In Nigeria, 90 percent of farmers used informal sources.

**Imported Seed as a Percentage of Total Certified Seed in Pilot Countries.** With the exception of Tanzania, where 56 percent of certified seed was imported in the 2011–12 growing season, imports were low at only 15 percent in Kenya, Mozambique, and Nigeria. In Ethiopia and Zambia this proportion was extremely low, at 1 percent. Ghana imported 7 percent of its certified seed. These low import levels appear to be the result of laws that require imported seed to undergo lengthy and cumbersome processes of testing and certification.

**Seed-to-Grain Price Ratio.** The ratio of the price of a unit of seed to the price of a unit of grain is an indicator used to gauge how efficient the seed industry is in a particular country. A useful benchmark is the seed-to-grain price ratio in the region of 5:1 for maize cultivated in African countries. At low seed-to-grain price ratios, hybrid maize seed is attractive to smallholder farmers, even if yields remain low (Lopez-Pereira and Morris 1994). At a high seed-to-grain price ratio of 20:1, the yield advantage must be very high for a hybrid seed business to be attractive and profitable. In Kenya, the seed-to-grain price ratio has improved progressively from about 10:1 in early 2000 to 5:1 in 2012 (Odame and Muage 2010).

**FIGURE 4.3. NUMBER OF SEED COMPANIES AND PERCENT OF CERTIFIED SEEDS SUPPLIED BY THE PRIVATE SECTOR**



Source: ABI Country Reports.

Note: Although KSC is a government parastatal, it has been restructured to operate like a private seed firm.

### Proportion of Foundation Seed Produced by the Private Sector.

Foundation seed is produced by public sector institutions in most of the ABI pilot countries. Zambia is the only pilot country in which foundation seed is supplied entirely by the private sector. Private sources in Ethiopia and Mozambique supply 5 and 13 percent of foundation seed, respectively. The predominance of the public sector in this seed production makes the capacity of the responsible public agencies a critical determinant of supply. Do the agencies have the necessary personnel, laboratory infrastructure, and financial resources to produce enough foundation seed to adequately multiply and distribute certified seed to farmers? If they lack these resources, their predominance in this industry is likely to be a major factor restraining the adoption of certified seeds.

### Proportion of Certified Maize Seed Supplied by the Private Sector, and the Private Sector's Share of the Certified Seed Market (figure 4.3).

Private sector involvement in certified seed is far more pronounced than it is in foundation seed. All of the certified maize seed in Burkina Faso, Ghana, and Zambia is produced and marketed by the private sector. In Tanzania the proportion is

79 percent. In Ethiopia, Mozambique, and Kenya, this proportion is much lower, at 12, 15, and 10 percent, respectively. In Kenya, the Kenya Seed Company (KSC), a government parastatal, operates more like a private firm and is the dominant player in the production and marketing of certified seed. The Ethiopian seed enterprises, the development enterprises, and regional seed companies are the predominant sellers of certified seed. In combination, these players have more than 80 percent of total market share of the Ethiopian seed market. The Ethiopian government uses the cost-plus approach to set a ceiling price for certified seed which constricts the potential profits of private seed companies. In Tanzania, taxes and lack of access to finance discourages private sector participation.

### Existence and Implementation of Seed Law (0–5).

A comprehensive and functioning set of seed laws and regulations facilitate access to improved seed. The existence of seed laws is seen as an opportunity to harmonize laws and facilitate levels of policy coordination that lend themselves to the development of the seed industry. A number of initiatives and processes are in place among regional groups, mostly regional economic communities, to facilitate the production and distribution of seed within

## BOX 4.1. EXAMPLE OF SUCCESSFUL REFORMS: TURKEY

Turkey is seen as an example of how changes in government regulations and control can enable the active participation of private sector actors and help in the development of the seed sector. Before reforms in 1980, the government dominated all stages of the seed industry in the country. The government variety testing program made it extremely difficult to introduce genetic advances in seed technology that were available elsewhere in the world. The time span for new variety introduction, including hybrids, and their approval by the key Variety Registration Committee, was a minimum of three years. Seed companies operating outside of Turkey had been reluctant to undergo the lengthy time period required to obtain commercial introduction of hybrids in Turkey or to make the local production of parent

lines available under the system of rigid price fixing and the minimum margin structure of the industry.

In 1982 Turkey introduced reforms allowing private companies to do their own variety performance tests, reporting results to the government while the testing requirements from the previous minimum of three years were lowered to one to three years, depending on the crop and type of seed (e.g., one year for hybrids, two years for vegetables). Since December 1983 each seed firm has been allowed to set its own seed prices (Gisselquist and Pray 1999). Reforms aimed at relaxing restrictions have had positive effects on the seed sector in Turkey. Table B4.1.1 illustrates the increased availability of new cultivars in Turkey.

**TABLE B4.1.1. EFFECTS OF REGULATORY REFORMS ON THE INTRODUCTION OF NEW VARIETIES IN TURKEY**

Crops	Total Number Approved Prior to 1982	Number of New Cultivars between 1982 and 1987	Number of New Cultivars between 1987 and 1992
Wheat	21	22	38
Sunflower	3	29	45
Maize	44	95	99
Sugar beets	11	18	6
Potatoes	8	13	35
Soybeans	2	43	27
Tomatoes	43	32	203
Cucumbers	1	8	115
Tobacco	31	7	2
Cotton	9	8	11

Source: Gisselquist and Pray 1999. Technology Transfer and Private R&D to Support Africa's Green Revolution.

and between member countries. These processes mostly involve harmonization of laws and regulations, particularly in terms of movements and trade policies that allow cross-border trade. This type of regional harmonization of seed legislation, regulation, and trade policy remains incomplete in a number of pilot countries, despite years of effort.

Tanzania has been a party to several harmonization agreements with other countries in the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA), and the Southern African Development Community (SADC). While Tanzania's

Seeds Act is in compliance with the East African Community harmonization agreement, Kenya and Uganda have still not adopted their laws to allow full implementation of the agreements.

Since 2002, the 17 member states of the West African Economic and Monetary Union (UEMOA), the Economic Community of the West African States (ECOWAS), and the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) have been working on a regional agreement aimed at facilitating cross-border trade in seed. In 2008, the ECOWAS Council of Ministers adopted the seed agreement but implementation remains limited.



When agreements like these are more fully implemented, they should allow seeds of any variety that are registered in one country to be produced and commercialized in all the participating countries without further testing and certification. All the pilot countries studied were at different stages of initiating, reforming, and/or updating existing seed laws. In Rwanda, the national seed law was passed in 2003, and national seed policies were developed in 2007; both have been reinforced by the decrees of the Ministry of Agriculture and Animal Resources (MINAGRI) of 2010. However, the seed law and policies are still to be implemented. Similar situations exist in Nigeria, Kenya, Ethiopia, and Ghana.

**Time for Seed Testing and Registration (2-Year Standard).** With the exception of Kenya (which has enabled international seed trade with other countries under the OECD seed testing scheme), most ABI countries have a two- to three-year period of testing prior to the release of new seed and imported varieties. Restrictions on imports limit seed supply. In most countries, it takes two to three cropping seasons in order to complete a full testing and registration cycle. The number of years required for new seed variety release is two years in Ethiopia, Ghana, Nigeria, Tanzania, and Zambia. The process is longer in Burkina Faso (five years), Kenya (three years), and Mozambique (three years). In Kenya, a variety approval process fee is levied and attributable to national

performance trials (\$500), and distinctness, uniformity, and stability tests (\$600 for two seasons).

**Membership in ISTA and Adherence to OECD Guidelines.** Participation in international seed standard organizations such as the OECD and the ISTA by Kenya and Zambia has facilitated trade in certified seed. However, most of these organizations' trading partners in Africa, including the other ABI pilot countries, do not belong to OECD or ISTA. Although Tanzania does not belong to either ISTA or OECD, the country benefits from membership in the regional Common Market for Eastern and Southern Africa (COMESA) and has been able to engage in international trade with the other countries in the region.

**Private Sector Perceptions of the Ease of Entry and of Ongoing Operation in the Seed Business (0–5).** Private sector respondents expressed positive impressions on the ease of entry into the seed business in Tanzania and Zambia. This may be related to the relatively limited presence of the public sector in the industry in these two countries. In Ethiopia and Nigeria, where government agencies and parastatals have a significant share of the seed market, private sector perception is far less positive. Government interventions in setting seed prices administratively and subsidizing distribution distort the seed market.

## CHAPTER FIVE

# FERTILIZER

Fertilizer use is estimated to account for yield increases of between 40 and 60 percent of global food production. Chemical or “inorganic” fertilizers are widely used in many of today’s farming systems, and their use supports scalable agricultural production. Their use has made it possible for the global population to expand from 1.6 billion in 1900 to more than 7 billion today (Smil 2001). Inorganic fertilizer is tailored to provide crop plants with specific nutrients and is a critical complementary input to improved seed. Maize is an important case in point—obtaining high yields for hybrid maize requires the right type of fertilizer to be applied at both the right times and in the right quantities. Increasing chemical fertilizer use in African countries has been a priority for decades, and the food and fuel crisis imbued the objective with new urgency. In the longer term, replenishing soil fertility using various forms of fertilizer is a solid option for agricultural sustainability in a region where land-use practices have often mined the soil of nutrients, leading to widespread land degradation.

### KEY FINDINGS (TABLE 5.1)

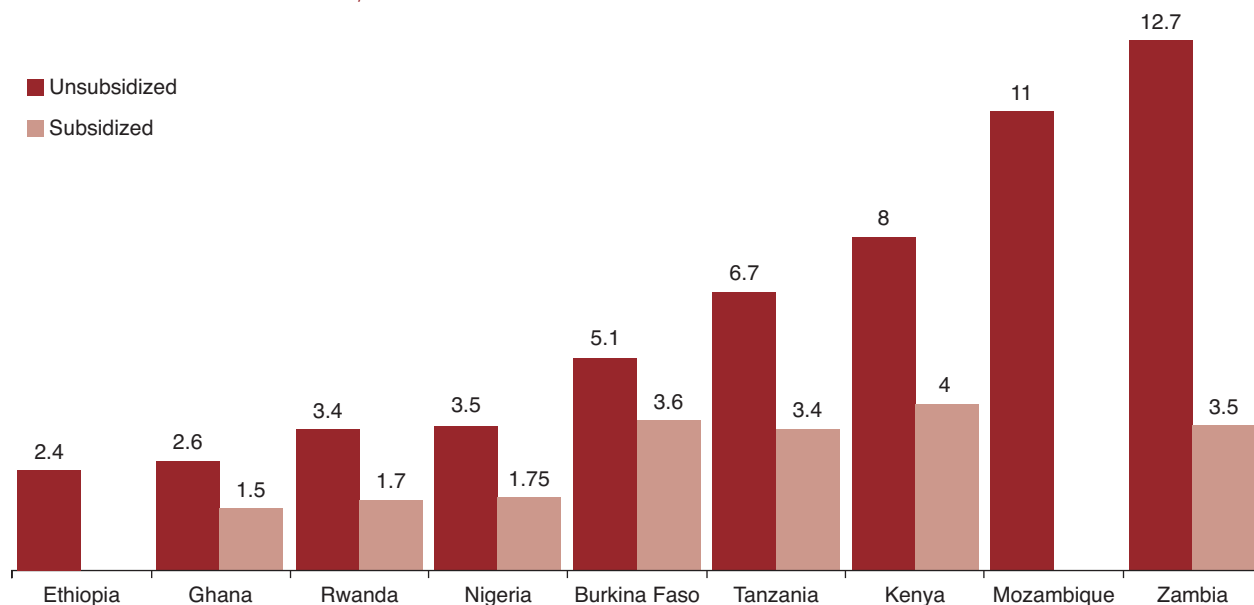
**Fertilizer Nutrient Use per Hectare (kg/ha).** At 59.6 kg/ha, Kenya is the only ABI pilot country that has met the Abuja Declaration target of 50 kg/ha as of 2011–12. Kenya’s high average fertilizer application rate is influenced by policies that have facilitated a competitive private fertilizer trade and was further helped by donor investments that helped to expand networks of fertilizer distributors and other agrodealers. Countries with more agrodealers selling fertilizer and a denser network of distributors, such as Kenya and Ghana, have higher fertilizer use per hectare, as well as lower rural retail prices. As of 2010, Zambia was within striking distance of the Abuja Declaration target at 37.0 kg/ha, having expanded use of fertilizer with the help of high fertilizer subsidies and attractive maize support prices. Three other countries—Ethiopia, Rwanda, and Ghana—fall in the 17 to 20 kg/ha range, only 35 to 40 percent of the Abuja target. Fertilizer use in many African countries is concentrated on the most profitable and widely grown cash crops, such as cotton, tobacco, and cocoa, including in Burkina Faso, Ghana, and Mozambique. In some of the ABI countries, input credit is provided and recaptured by parastatal marketing agencies or large private firms when they later purchase the farm output. Fertilizer use on staple food crops is limited in many African

**TABLE 5.1. SUMMARY OF FERTILIZER INDICATORS**

Indicators	Burkina Faso									
	Mean	Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
<b>Fertilizer</b>										
Fertilizer nutrients (kg/ha) (Abuja target 50+)	20	10.1	18.3	2.6	17.0	10.1	6.5	59.6	37.0	19.8
Nutrient/output ratio (good < 5)	6	5.1	3.4	11.0	2.4	6.7	3.5	8.0	12.7	2.6
Average fertilizer (unsubsidized) retail price US\$/ton	721	808	800	1,023	614	682	809	514	760	475
Fertilizer subsidy—Y/N?	7 Y, 2 N	Y	Y	N	N	Y	Y	Y	Y	Y
Fertilizer import taxes (%)	1.8	8.5	0	2.5	0	0	5	0	0	0
Fertilizer business environment (0-5)	2.6	2.5	2.0	3.0	0.0	4.0	1.0	4.0	4.2	3.0
Fertilizer subsidy as percentage of Ag Ministry budget	20.5	4.0	30.0	NA	NA	18.5	NA	NA	38.1	12.0
Agrodealer network—number per 10,000 farms	3.0	2.1	1.8	0.3	2.2	1.3	2.1	5.8	NA	8.4

Source: ABI Country Reports.

**FIGURE 5.1. NUTRIENT/OUTPUT PRICE RATIO**



Source: ABI Country Reports.

countries, unless there is a well-funded subsidy program as there is in Rwanda and Zambia. A major factor limiting use of fertilizer on food crops in Africa is the high cost of fertilizer in rural areas. African farmers generally pay far more for their fertilizer than do Asian farmers.

**The Nutrient/Output Ratio (figure 5.1).** ABI’s main proxy for determining whether fertilizer use is profitable is the nutrient/output cost ratio. This ratio compares the price per kilogram of nitrogen fertilizer to the cost of maize—the primary grain on which it is applied. The study designates, as a general rule, a ratio of 5:1 or less to encourage fertilizer use, while acknowledging that other determinants such as physical response of crop to fertilizer make this ratio complex. Ratios in the 6:1 to 9:1 range are less likely to encourage fertilizer use, although it may still be profitable. Ratios of 10:1 or over actively discourage fertilizer use (Morris et al. 2007), although relative prices are only one determinant; the other determinant is the physical response of the crop to fertilizer application. Our interpretation is that lower ratios are better. Fertilizer subsidies and price supports reduce (improve) this ratio, making fertilizer use proportionately more attractive to farmers.

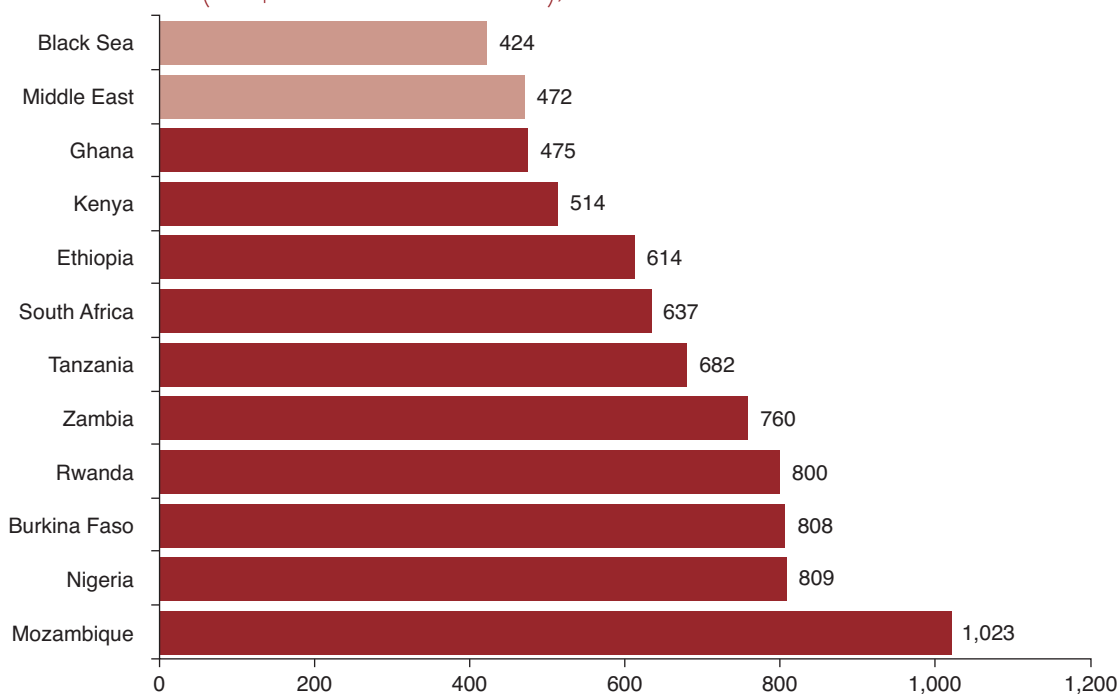
The ratio of unsubsidized prices varies widely across the ABI pilot countries. ABI findings show that the ratio was low in Ethiopia (2:4) and Ghana (2:6) but very high in

Kenya (8:0), Mozambique (8:14), and Zambia (12:7). The ratio ranged from 1:5 (Ghana) to 4:0 (Kenya) using subsidized urea prices, which means that subsidized fertilizer use on maize is very attractive financially for producers. In Zambia, the combination of subsidized input prices and price supports for outputs improved the nutrient/output ratio to 1:8, compared to the ratio of 12:7 without subsidies or price supports. The ratios shown in figure 5.1 use both nonsubsidized (blue bar) and subsidized (red bar) input prices and market output prices.<sup>6</sup>

**The Value/Cost Ratio.** This ratio measures the technical response to fertilizer use in terms of the O/N ratio, or units of crop output from one unit of nutrient to the nutrient/output price ratio  $[P_n/P_o]$ , noted above. The value/cost ratio (VCR) uses *average* rather than *marginal* productivity data and is therefore an approximate measure. Although the VCR is a better indicator of profitability than the nutrient-output ratio, the necessary data are not available in most African countries, which suggests that most African ministries of agriculture and agricultural research institutes have no empirical basis with which to

<sup>6</sup> In order to calculate the nutrient/output ratio in economic as opposed to financial terms, real, undistorted prices are required. Hence, ABI uses unsubsidized fertilizer prices and spot market prices for cereals as opposed to high support prices set for grain by grain boards or food security agencies. The latter prices are typically not available to most sellers of grain.

**FIGURE 5.2. AVERAGE RETAIL PRICE OF UREA IN RURAL AREAS (US\$ PER METRIC TON), 2011–12**



Source: ABI Country Reports.

Note: The Black Sea and Middle East regions are cost insurance and freight (CIF) variant.

assess the potential economic benefits of using fertilizer. In the ABI countries where data were available, Kenya and Ethiopia, the VCR was rather low, at 1:3 to 2:4 and 2:3, respectively. Typically, a ratio greater than or equal to two suggests that fertilizer use should be profitable.

It is important to note that the calculated values of both ratios are extremely sensitive to the agricultural product prices chosen for the calculation and can fluctuate dramatically according to when the ratios are calculated. Grain prices vary across months during the marketing season, and maize sales prices vary seasonally. An unweighted annual average price across months is not ideal. Prices should reflect levels during the period of most frequent and plentiful sales, which in Africa is typically during the three to four months after the main harvest.

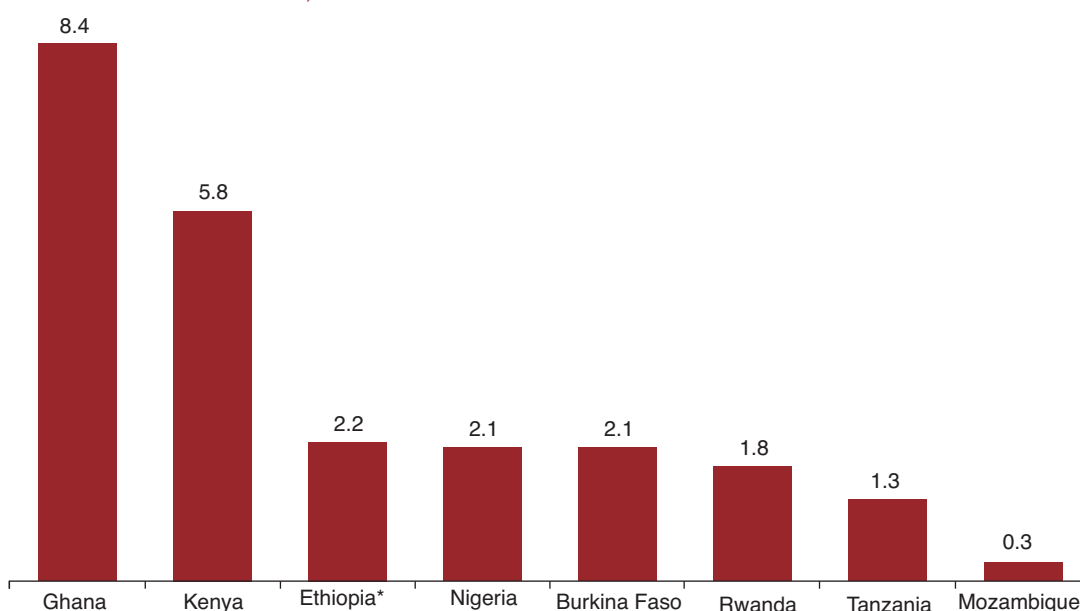
**Average Retail Price of Urea in Rural Areas (US\$/ton, figure 5.2).** There is significant variability in fertilizer prices for the ABI countries. In Ghana and Kenya, competition among private sector actors is believed to have helped to drive down prices in rural areas where the input distribution network is denser. There is an inverse relationship between fertilizer prices and fertilizer use

per hectare. African farmers generally pay much more for fertilizer than farmers in most other parts of the world.

**Urea Prices in All ABI Countries Vary Widely and Are Generally Well Above FOB.** Prices in the Middle East (\$472) and in the Black Sea region (\$424) were used as comparisons.<sup>7</sup> Among the nine ABI pilot countries, Ghana (\$475) had the lowest-priced fertilizer in part due to competition among at least five well-financed importers, as well as a large number of rural agrodealers. Kenya has nine importers and a dense input supplier network. High fertilizer prices at retail outlets in Mozambique (\$1,023), Nigeria, (\$809), and Burkina Faso (\$808) discourage farmers from purchasing urea and contribute to low average application rates. Burkina Faso's retail urea price in market towns was the third highest among study countries at \$808 per metric ton in 2011–12, in part due to the country being landlocked, with high transport costs from coastal ports, as well as due to limited commercial import volume.

<sup>7</sup> Ghana's fertilizer prices were collected in 2012, significantly before other data, which may account for the low cost.

**FIGURE 5.3. AGRO-INPUT DEALER DENSITY: AGRO-INPUT DEALERS PER 10,000 FARMERS**



Source: ABI Country Reports.

\*In Ethiopia, agrodealers are cooperatives.

**Agrodealer Density (Agrodealers per 10,000 Farmers, figure 5.3).**

The density of input suppliers varied between the best and worst countries by a factor of over 20. Ghana (8.4) and Kenya (5.8) have the best-developed agrodealer networks. Agrodealer density is inversely related to the distance and time a farmer must travel to an input market. In both Kenya and Ghana, the policy environment has been more conducive to the emergence of private sector dealers, input dealer associations, and dealers capable of providing input buyers with technical advice. In Kenya the high number of agrodealers per 10,000 farmers is in good part because of the AgMark project financed by the U.S. Agency for International Development (USAID), reducing the average distance farmers traveled to fertilizer sellers from 8.1 km (1997) to only 4.0 km (2010). Over the same period, the use of fertilizer applied per hectare in Kenya rose from an average of 58 kg to over 100 kg. Moreover, In Burkina Faso, only 12 percent of farmers traveled from less than 10 km to buy inputs.

**Fertilizer Import Taxes (%).** In accordance with the Abuja Declaration, fertilizer imports are tax exempt in the ABI countries with two exceptions: Mozambique and Burkina Faso. While the types of taxes and amounts

vary, some countries have imposed miscellaneous taxes on the declared value of fertilizer, such as import declaration fees, high duties on micronutrients used in fertilizer blending, and VAT on imported raw materials. Mozambique has a 2.5 percent duty for imports originating outside of the Southern African Development Community (SADC) zone. Burkina Faso has a 5 percent duty on fertilizer imports from outside ECOWAS, as well as 3.5 percent in additional fees. Ghana adds miscellaneous taxes totaling 4.5 percent of the declared fertilizer value, while Kenya requires payment of a 2.25 percent import declaration fee.

Some countries charge higher duties on imports of micronutrients, thus penalizing domestic fertilizer blenders. As a result, domestic blenders have trouble competing with international suppliers. For example, Zambia applies 15 percent duty plus 16 percent VAT; Nigeria also applies a 5 percent VAT for fertilizers that are used in blending within the country from imported raw materials. These practices have undercut the emergence of a domestic fertilizer industry in those two countries and restrict the capacity of the local fertilizer blenders to create fertilizers designed to match the nutrient requirements of specific crops in particular areas.

**Fertilizer Subsidy Programs.** Most of the ABI pilot countries introduced fertilizer subsidy programs to accelerate adoption rates. The two exceptions were Ethiopia and Mozambique. Seed and fertilizer subsidy programs in Africa focus mainly on fertilizer-responsive cereal crops, such as (hybrid) maize, rice, and to a lesser extent, wheat. The proportion of fertilizer that is subsidized and used by farmers varies from low levels, less than 5 percent of total fertilizer use in Mozambique in 2009–10, to 15 percent in Burkina Faso, and almost 90 percent of the fertilizer used by smallholders in Zambia. Correspondingly, the magnitude of the subsidies received by farmers varies from nearly one-quarter of the fertilizer cost in Burkina Faso to 50 percent in Rwanda to 75 percent in Zambia. The timeliness of fertilizer distribution varies across countries, and subsidized fertilizer has often been distributed late to farmers. The subsidies typically target small and medium-sized farms.

**Fertilizer (and Seed) Subsidy Program as Percent of Ministry of Agriculture Budget.** In keeping with the Abuja Declaration, public expenditure on fertilizer (and seed) subsidies as a proportion of total public expenditure on agriculture is high in Rwanda (30 percent) and Zambia (38 percent) compared to Burkina Faso

(4 percent). The most recent and comprehensive study identifies their benefits as providing a quick and highly visible response and a “power political tool.”<sup>8</sup> However, the benefits tend to wear off over time, and the costs are high and can divert public funds from investments that provide better returns over a longer period of time. Once started it is very challenging for governments to discontinue subsidies.

**Private Sector Perception of the Fertilizer Policy and Business Environment.** In Zambia (4.2), Kenya (4), and Tanzania (4), private sector importers and agrodealers perceive their countries’ fertilizer policy and business environment positively. These impressions appear to relate mainly to the ease of participation, in spite of active participation by their governments. In Rwanda (2), Burkina Faso (1.5), Nigeria (1), and Ethiopia (0), the private sector was far less optimistic. Each of these countries is characterized by heavy public sector involvement in the importation and distribution of fertilizer, as well as subsidies that discourage private sector participation. In Ethiopia, where the private sector once participated actively in fertilizer distribution, the government’s reentry into importation and distribution during the later 1990s led to a general private sector exit from the activity.

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<sup>8</sup> Jayne, T.S., and Shahidur Rashid. 2013. “Input Subsidy Programs in Sub-Saharan Africa: A Synthesis of Recent Evidence.” *Agricultural Economics, International Association of Agricultural Economists*, vol. 44(6), November, pp. 547–562.

## CHAPTER SIX

# FARM MECHANIZATION

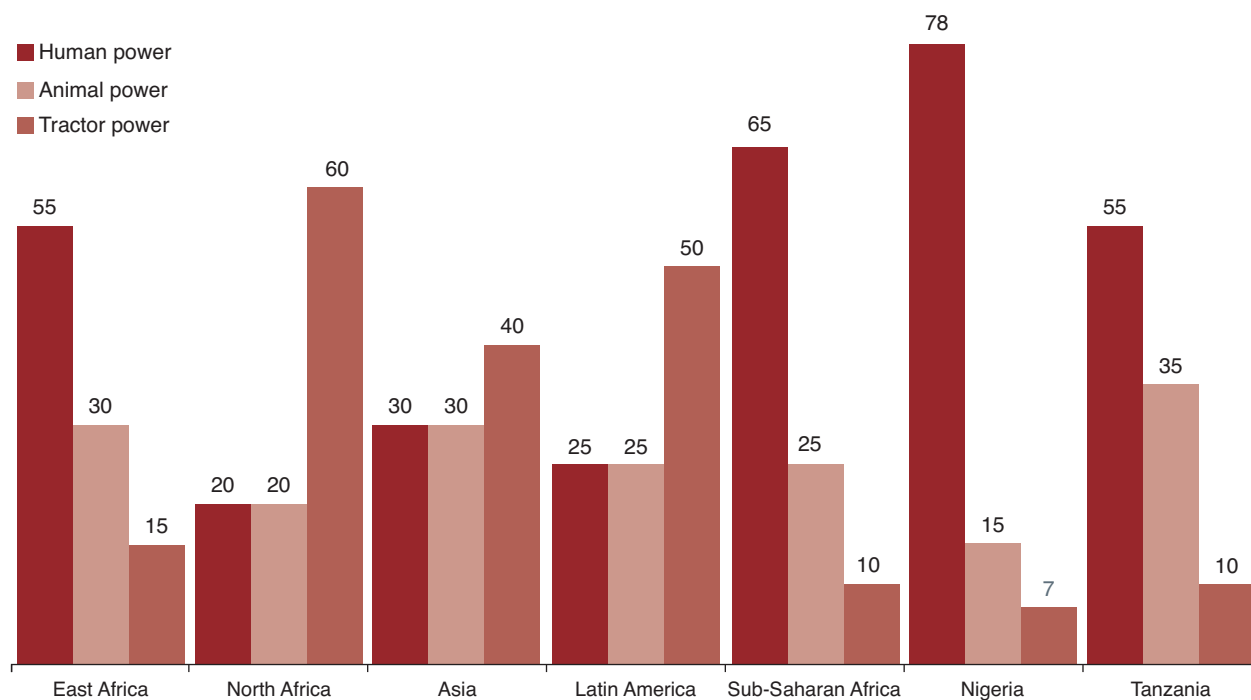
The use of farm machinery is associated with agricultural modernization, productivity growth, and the need to compensate for less farm labor throughout much of the world. In general, countries that perform best in terms of reducing hunger are also countries that manifest higher net investment rates per agricultural worker (FAO and UNIDO 2008). Throughout the 1990s, the value added per worker in the group of countries with less than 2.5 percent of the population being undernourished was about 20 times higher than in the group with more than 35 percent being undernourished. This disparity has been attributed to the differences in agricultural investment in the two groups of countries. Mechanization plays a critical role in realizing the full benefits of improved seed, fertilizers, and pesticides, as well as irrigation water. Studies by the United Nations Industrial Development Organization (UNIDO) suggest that African agriculture's heavy reliance on human power (65 percent), compared to that of Asian agriculture (30 percent), Latin American agriculture (25 percent), and North American agriculture (20 percent) is an important factor contributing to low productivity and low rates of commercialization (figure 6.1). Sub-Saharan farmers use nearly three times as much human power as farmers in North Africa, and tractor power in North America is six times higher. In Sub-Saharan Africa, the rate of capital depreciation exceeds the rate at which capital is invested in agriculture, and this applies directly to farm machinery. As a result, annual capital stock per worker has been declining over the last 20 years (FAO 2012). This is emblematic of the very low rates of agricultural investment that are typical throughout much of the region. Unless this investment can be significantly increased, smallholder farmers in Africa will continue to rely overwhelmingly on their own power and that of their draft animals.

### KEY FINDINGS (TABLE 6.1)

**Tractor Density (figure 6.2).** The number of tractors per 100 square kilometers of arable land increases as more farms become larger and more commercialized. Kenya and Zambia have the highest number of tractors, at 27 and 21 per 100 square kilometers, respectively. This appears to be a reflection of these two countries moving toward larger-scale, commercialized farming. The lowest tractor densities among the ABI pilot

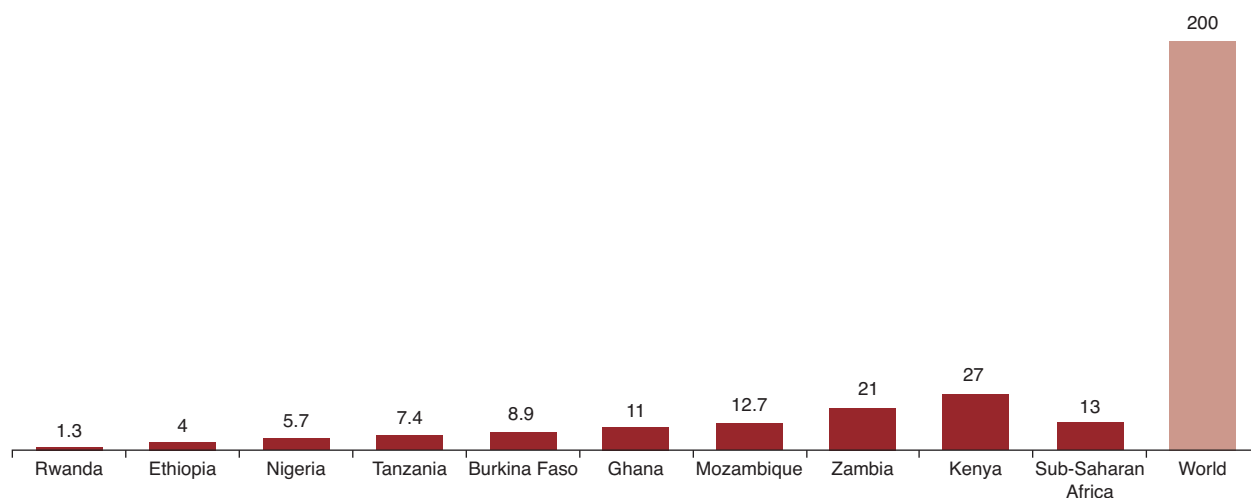


**FIGURE 6.1.** FARM POWER SOURCES (PERCENTAGES) IN SUB-SAHARAN AFRICA, ASIA, AND LATIN AMERICA, 2006



Source: FAO 2008; FMA&RD 2011.

**FIGURE 6.2.** TRACTORS PER 100 KM<sup>2</sup> IN SELECTED COUNTRIES



Source: FAOStat 2012.

countries are Rwanda at 1.3, Ethiopia at 4, and Nigeria at 5.7. Comparisons with countries in other regions reveal just how far behind African countries are in the area of mechanization. The numbers of tractors per 100 square kilometers of arable land in Tunisia and Brazil are 143 and 129, respectively; the global average is about 200.

**Average Tractor Horsepower per Hectare (table 6.2, figure 6.3).** Although Kenya (0.27) and

Zambia (0.21) have some of the highest tractor densities among the pilot countries, they lag behind international comparators such as Tunisia (1.43) and Pakistan (0.9). Both countries would need to increase the fleet of tractors 18 times in order to reach the average level of horsepower of Tunisia. Horsepower per hectare is generally very low in Africa (0.13). In most of the pilot countries, tractors are predominantly small- and medium-range horsepower (typically 30 to 70 horsepower), which make up more than

**TABLE 6.1. SUMMARY OF FARM MECHANIZATION INDICATORS**

Indicators	Burkina									
	Mean	Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
<b>Mechanization</b>										
Tractor density (SSA average 13 per 100 km <sup>2</sup> )	11	8.9	1.3	12.7	4.0	7.4	5.7	27.0	23.0	11.0
Tractors imported by private sector (%)	65	59	42	60	100	10	10	100	100	100
Tractor import tariffs as percentage of CIF prices	2.3	16	0	5	0	0	0	0	0	0
Parts import tariffs as percentage of CIF prices	16.4	20	30	25	0	10	5	16	15	27
Cost of tractor rental (pilot average \$82)	82	51	163	62	81	68	93	50	125	46
Mechanization business environment (0-5)	2.8	1.0	2.0	3.0	5.0	3.6	1.0	5.0	2.8	1.9

Source: ABI Country Reports.

**TABLE 6.2. ESTIMATE OF TOTAL TRACTOR HORSEPOWER (HP) PER 100 SQUARE KILOMETER IN KENYA, 2011**

Tractor Capacity (HP)	Probability of Distribution ( $P_i$ )	Estimated Numbers for Each Group	Midpoint of Horsepower for Each Class of Tractors	Total Horsepower in Each Group
70-80	0.20	2,880	75.0	216,000
81-120	0.70	10,080	100.5	1,013,040
121-200	0.10	1,440	160.5	231,120
Total		14,400		1,460,160
Average horsepower/ha arable land <sup>b</sup>				0.28 HP/ha
Average horsepower/100 km <sup>2</sup> of arable land				2,755 HP/100 km <sup>2</sup>

Source: Kenya Ministry of Agriculture 2011; Field Survey.

<sup>a</sup> About 14,400 tractors were estimated to be in Kenya in 2011.

<sup>b</sup> Total arable land under cultivation in Kenya in 2011 was about 53,000 km<sup>2</sup>.

**TABLE 6.3. AVERAGE COST OF HIRING TRACTORS FOR FARM OPERATIONS IN KENYA, 2011-12**

	Amount Charged by			
	ADC and Other Parastatals		Private Sector Actors	
	K Sh	US\$	K Sh	US\$
<b>First plowing</b>	2,500	31.25	4000	50
<b>Second plowing</b>	800	10	2000	25
<b>Harrowing</b>	1200	15	2500	31.25
<b>Spraying and herbicides</b>	800	10	1200	15

Source: Kenya Ministry of Agriculture 2011; Field Survey and ABI Kenya Country Report.

70 percent of the total number of tractors. Horsepower per hectare in Rwanda is 0.01, in Ethiopia 0.04, and in Tanzania 0.08.

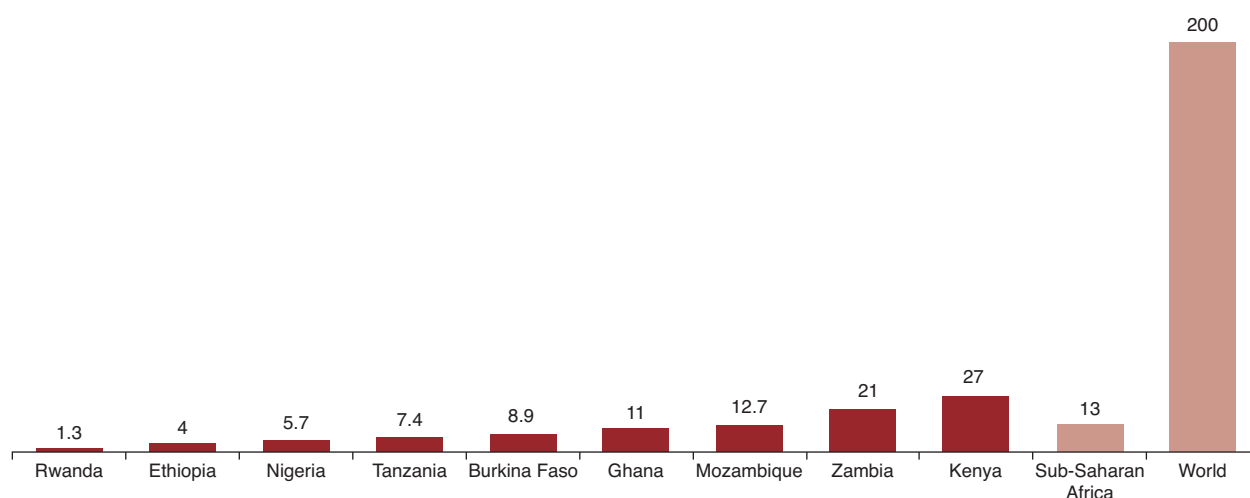
**Average Cost of Plowing 1 Hectare of Land (US\$ per Hectare, table 6.3).** The cost of hiring a tractor in Rwanda is about four times higher than in Kenya—\$163 per hectare compared to \$50 per hectare. This disparity in cost can be attributed mainly to the tractor density, and the availability of the tractor hire services to nonowners. Even in countries with strong incentives for farmers and entrepreneurs to import tractors, such as Ghana and

Tanzania, most private sector tractor hire services are not economically viable. Countries with lower tractor density include Nigeria and Ethiopia that have the highest tractor hiring costs, \$93/ha and \$81/ha, compared to countries with higher tractor densities such as Kenya (\$50/ha), Burkina Faso (\$51/ha), Mozambique (\$62/ha), and Tanzania (\$68/ha). Nigeria, Rwanda, and Mozambique have high tractor hire rates but also have the lowest tractor densities among the pilot countries. Zambia is the exception to this rule, which may be the result of high tariffs rates and fuel costs.

**Tractor Imports by Private Sector as a Percentage of Total Imports (figure 6.4).** In Ethiopia, Zambia, and Kenya, all tractors were imported by the private sector. In Tanzania, Ghana, and Mozambique, there are spikes in imports of tractors that often reflect the availability of subsidized credit from foreign suppliers and/or cheap tractors. Time series data for tractor imports disaggregated by private and public sectors were largely unavailable, however, the overall trend appears to show that tractor imports have started gathering momentum and that the private sector is beginning to show more interest due to the deregulation of this sector by most governments in ABI countries.

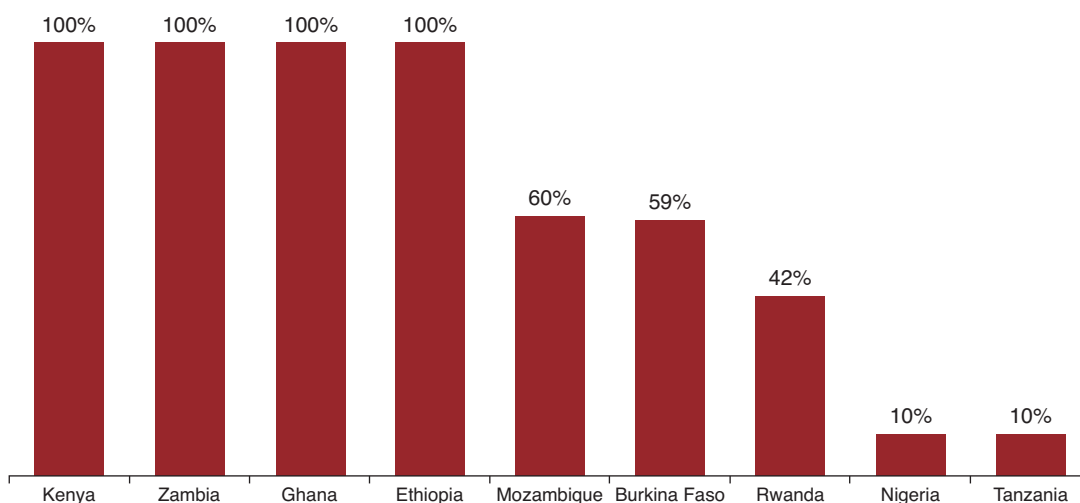
**Duties and Tariffs on Tractor Imports as a Percentage of CIF Prices.** While Tanzania and Zambia are VAT exempt, all countries except for Burkina Faso and Mozambique are zero rated (item is taxable but input

**FIGURE 6.3. AVERAGE HORSEPOWER PER HECTARE OF ARABLE LAND**



Source: Field surveys, FAO 2008, FAO and UNIDO 2011.

**FIGURE 6.4.** PERCENTAGE (%) OF TRACTORS IMPORTED BY THE PRIVATE SECTOR, 2011-12



Source: ABI Country Reports.

supply tax rate is nil). The ways the tax exemptions are administered vary, and they are not always administered efficiently. Tractor imports and other agricultural investment goods are exempt from import duties in all countries, with the exceptions of Burkina Faso and Mozambique. Actual import duties plus additional tax payments are higher than what is on the books. (This implies that customs agents use their own discretion in applying these import charges.) In Ethiopia, tractors are exempt from taxes and other excise duties, on the condition they are bought and cleared by customers within six months.

**Duties and Tariffs on Spare Parts as a Percentage of CIF Prices.** High duties are charged on the imports of tractor spare parts and completely knock-down (CKD) parts in all of the ABI pilot countries. Tractor parts are necessary to maximize the national tractor fleet's operational life. This policy conflict between tractor imports being zero rated and tractor spare parts attracting (sometimes quite high) duties will contribute to the relatively short life span compared to other tractors in Africa.

**Effectiveness of Mechanization Strategies.** The ABI pilot countries are at various stages in drafting mechanization strategies. In the past, their strategies of subsidizing tractors and their services have not achieved the desired results despite heavy public investment.

Small farms typically do not have access to mechanization services, although the provision of contract machinery services is seen as a way that the benefits of mechanization can be delivered to smallholder farmers. Mechanization is increasingly becoming an important means of expanding cultivated areas and is improving the timeliness of farm operations. Use of machinery also offsets labor shortages resulting from youth migration. There are varying degrees of government participation in the tractor markets in the pilot countries. In some countries the government is designing public-private partnerships that could devolve tractor acquisition and distributions to the private sector. In some countries, however, the government is "innovating" other methods of distributing and renting tractors to certain segments of the farming population, particularly smallholders.

In Burkina Faso, a government agency has imported tractors from India (in a government-to-government export-import [EXIM] deal) and provided them to a variety of users with a subsidy. In Mozambique, the government has imported tractors from China on easy terms, and although these appear to compete with private sector suppliers, most, if not all, of the government tractors appear to be destined for use on parastatal operated land. The government of Rwanda (GoR) was negotiating a joint venture with a Korean supplier of power tillers, though the deal was not completed as of mid-2013.

## BOX 6.1. GHANA'S MECHANIZATION SCHEME: AN EXAMPLE OF PUBLIC MECHANIZATION PROGRAM

In Ghana, the government has embarked on a program of mechanization to relieve labor shortages. In the five years between 2004 and 2008, the government imported about 3,000 tractors, mostly 30- to 50-kW tractors from India, China, Japan, and the Czech Republic. They are being sold to farmers on a full-cost recovery basis with a 50 percent down payment and term payments, without interest, over three years (although evidence suggests that the credit recovery rate is very low and particularly worrisome for the government).

To qualify for the scheme, farmers have to convince the district agricultural authorities that they have the necessary land and business skills to justify the addition of a tractor. In addition to providing subsidized agricultural machines, the government has assisted private enterprises to establish specialized Agricultural Mechanization Services Enterprise Centers

(AMSECs) to offer tractor-hire services to small-scale farmers across the country. Current demand in the country is primarily focused on land preparation services, especially plowing. Experience elsewhere shows that soil cultivation alone, being seasonal, is insufficient to provide enough hired tractor hours to cover costs.

This AMSEC program evaluation was undertaken by the International Food Policy Research Institute (IFPRI) to ascertain whether AMSEC enterprises are viable business models that are attractive to private investors. It has shown the program to be ineffective, even with the current level of subsidy. One of the drawbacks to the program is the low capacity utilization, which is the most important constraint to the profitability of investment in specialized agricultural mechanization service provision (IFPRI 2013).

**TABLE 6.4. NATIONAL STRATEGIES FOR AGRICULTURAL MECHANIZATION**

Country	Year Launched	Effective	Issues/Status
<b>Kenya</b>	1994	No	No political will despite privatization agenda
<b>Ghana</b>	2004; revised 2008	No	Inefficient and unprofitable despite heavy subsidies
<b>Tanzania</b>	2006	In progress but no visible impact	
<b>Rwanda</b>	To be launched	Draft	To be ratified
<b>Nigeria</b>	2011	Draft	To be ratified and adopted
<b>Ethiopia</b>	None	No strategy as of 2011	
<b>Burkina Faso</b>	N/A	N/A	N/A
<b>Zambia</b>	2004–15, under the National Agriculture Policy	No	
<b>Côte d'Ivoire</b>	2006	Ongoing	
<b>Sierra Leone</b>	2006	No	To be implemented
<b>Uganda</b>	2008	No	Draft only

Source: Tokida 2011.

(The government was asking the Korean investor to put up more money, but with less than 50 percent managerial control.)

**Private Sector Perception.** The score on private sector perception of the business environment in the tractor industry (including procurement and service provision) was highest in Kenya (5.0) and Ethiopia (5.0), where

there was no visible government presence. It was lowest in Nigeria (1.0) and Burkina Faso (1.0), where there is a significant government crowding out of the private sector service providers. This is consistent with earlier findings that direct government interventions may be crowding out the private sector and preventing the emergence of an economically sustainable system for delivering the benefits of farm mechanization.

## CHAPTER SEVEN

# AGRICULTURAL FINANCE

Most of the ABI countries have been experiencing high rates of growth in financial assets, as well as in the numbers of loans, depositors, and lending institutions. Although there does not appear to be any particular policy that prevented the growth of financial sector services to agriculture, agricultural lending, nevertheless, is found to be lagging when compared to nonagriculture lending. For the agriculture sector to be competitive, capital investments are needed to promote the uptake of improved technologies, such as hybrid seed, fertilizer, and machines to raise production and feed an expanding population. Investments are also required to finance storage, transport, and other postharvest activities that are essential for transforming subsistence production into the commercial production of agricultural commodities. The limited access that many farmers and agribusinesses have to these financial resources is a serious constraint to agricultural development. The key findings of the ABI studies of finance can be summarized as follows (see also table 7.1):

- » Access to and availability of finance for agriculture was poor. Only 2.3 percent of rural households in Mozambique had access to formal finance. Similarly, in Ethiopia only 1 percent of rural households had access to formal credit.
- » Commercial banks' coverage is low as there was only one bank branch per 100,000 of the rural adult population in countries like Ethiopia. Except for Ghana, all countries had less than two bank branches providing services per 100,000 adults in rural areas.
- » Agricultural credit is costly. Banks charge nominal interest rates of more than 20 percent, with real rates well over 10 percent to agricultural borrowers. This discourages borrowing and does not lead to investments in the sector. In addition, interest rate spreads in commercial bank lending were found to be high, reflecting inefficiency in the banking sector.
- » There is growth in the supply of financial services (that is, commercial banks) in the countries studied, but their lending to agriculture is quite low. In six out of nine countries, commercial bank lending to agriculture is less than 10 percent. Even within the small proportion of commercial lending that goes to agriculture, primary farm activities in production and marketing receive very little attention.

- » Financial service providers state that agricultural loans are considered riskier than urban-based, non-agricultural lending. Other factors contributing to limited lending are a general absence of registered, titled land with secure tenure, an absence of valuable fixed assets on the land (such as buildings or storage structures), the limited financial assets of borrowers, their inability to put together business plans with bankable loan applications (with cash flow projections), and the hesitancy of banks in some countries to accept movable collateral as a guarantee.
- » Nonbank financial institutions like microfinance institutions (MFIs) and savings and credit cooperatives exist and are an important source of credit in some countries, but due to the lack of data, their contribution to the agriculture sector is difficult to assess.
- » There have been some positive initiatives in recent years in some of the study countries that have introduced institutional mechanisms to address credit risks—establishment of credit reference bureaus, credit guarantee schemes, warehouse receipt systems, and collateral registries for movable assets. These are examples of instruments and innovative practices that facilitate agriculture financing, and it would be worthwhile to monitor their impact on agriculture lending over time.

Since the early 1990s, several of the ABI pilot countries, including Ghana, Tanzania, Zambia, Rwanda, and Mozambique, have liberalized their financial sectors and have lifted barriers to entry for private banks, both domestic and foreign. Removal of minimum balance requirements, licensing for deposit-taking MFIs, and liberalization of exchange rates are a few examples of measures that have facilitated the entry of financial institutions into the banking sector. As a result, in 2011 Ghana had 26 commercial banks, 135 rural development banks, followed by many nonbank financial institutions such as credit unions, finance companies, and MFIs operating in the market. Similarly, since the 1990s, the banking network in Mozambique grew rapidly from two state banks and one private bank to the current 18 private commercial and investment banks, with the majority having an initial infusion of significant foreign capital. Zambia's financial

sector consists of banks and nonbank financial institutions and has also seen steady growth in recent years.

Ethiopia still has one of the strictest regulatory frameworks, which prohibits the entry of foreign banks into the financial market. In addition, it has strict requirements for the import of foreign currency. Foreign exchange accounts, payments, and currency transfers are still subject to significant controls and restrictions. These measures are believed to have seriously affected inflows of foreign direct investment (FDI) and have potentially negative implications for credit availability and the cost of credit in the long run.

Given the importance of the rural economy and the agriculture sector for economic growth and poverty reduction, rural and agricultural finance is now widely acknowledged as one of the main frontiers for financial systems development (table 7.2). Going forward, improved access to finance in both rural and urban areas will be critical in enabling the commercialization of agriculture in response to (i) increased demand for agriculture commodities due to population increases and changes in dietary habits, particularly in urban areas; (ii) climate change impacts that are affecting the supply of agricultural commodities; and (iii) the emergence of new markets for higher value, often certified and niche commodities that are increasingly demanded by urban consumers (International Finance Corporation 2012, p. 18).

## KEY FINDINGS

**Commercial Bank Lending to the Agriculture Sector (figure 7.1).** A variety of banks, MFIs, savings and credit associations, and other nonbank financial institutions finance agriculture in addition to commercial banks. Many of these are unregulated, and it is difficult to collect useful data from them. Although they are not the only source of agricultural loans, formal sector commercial banks play an important role in the agricultural finance market, and the proportion of their overall lending portfolios that goes to farmers and agribusinesses is an important indicator of credit availability in the sector. In Ghana and Kenya, banks channeled about 6 percent of their total lending in 2010–11 to the agriculture sector. (Although commercial banks in Kenya are legally required

**TABLE 7.1. FINANCIAL LANDSCAPE OF THE ABI PILOT COUNTRIES**

	Burkina Faso								
	Ghana	Mozambique	Ethiopia	Tanzania	Tanzania	Faso	Zambia	Nigeria	Rwanda
<b>Population (millions)</b>	24.9	23.9	84.7	46.2	46.2	16.9	13.5	162.5	11.2
<b>Types of Financial Institutions</b>									
<b>Commercial banks</b>	26	13	14	47	47	12	19	24	9
<b>Rural and community banks</b>	135							821 <sup>a</sup>	
<b>MFIs</b>	NA	30	30	NA	NA	263	32	NA	NA
<b>Savings and credit unions/cooperatives/banks</b>	500	7	5,900	5,000	5,000	NA	1	NA	416

Source: World Development Indicators (WDI), ABI Country Reports.

Note: NA = not available.

<sup>a</sup> Includes microfinance bank.

**TABLE 7.2. RURAL FINANCE INDICATORS**

Indicators	Mean	Burkina Faso								
		Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
<b>Finance</b>										
Number of bank branches per 100,000 adult population	1.9	1.2	NA	1.6	0.8	2.0	1.4	NA	5.0	
Percentage of commercial banks lending to Ag (3 years)	7	9	3	6	11	14	6	9	5	
Average lending rates for Ag loans (real rates)	11	10	12	19	-9	5	8	17	22	
Percentage of nonperforming Ag loans	20	NA	16	NA	NA	58 <sup>c</sup>	9	10	21	
Evidence of credit reference (0–5) <sup>a</sup>	1.6	0.0	1.5	1.5	0.0	1.5	3.0	3.0	2.0	
Presence of collateral registry agency for loans	2Y, 5N	N	N	N	N	N	Y	N	Y	
Existence of warehouse receipts (0–5) <sup>b</sup>	1.4	1.5	0.0	0.0	3.0	4.0	0.0	1.0	3.0	

Source: ABI Country Reports.

<sup>a</sup> Evidence of credit reference:

0 = Credit reference bureau (CRB) does not exist;

1 = CRB planned, under design;

2 = CRB underway, but used by small number of financial institutions with limited number of farms/firms covered;

3 = most commercial banks participate;

4 = widespread use with point-of-sale additions (stores/suppliers that sell goods on credit);

5 = most commercial farms and firms covered in reporting system on bank credit histories and point-of-sale on credit.

<sup>b</sup> Existence of warehouse receipts:

0 = no warehouse receipt system (WRS) in place;

1 = WRS under development;

2 = warehouse receipts laws/regulations developed and passed/approved;

3 = warehouse receipts laws/regulations implemented by commercial banks;

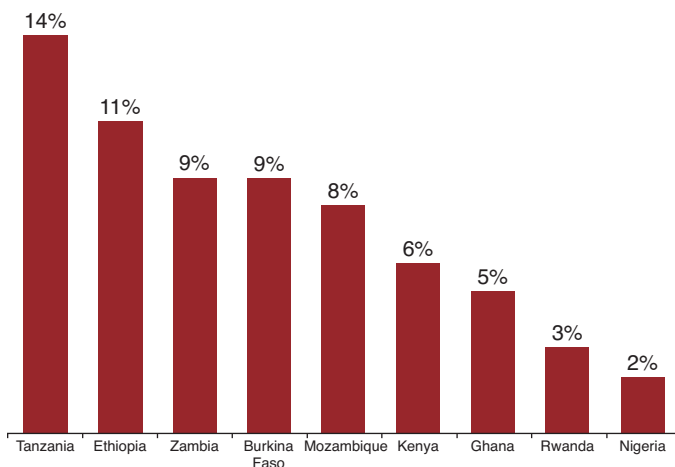
4 = warehouse receipts accepted by commercial banks (farmers/traders able to use as collateral);

5 = WRS expands (increased number of banks and certified warehouses, increased grain stored in certified warehouse against receipts issued and used as collateral);

<sup>c</sup> The 58 percent NPL in Tanzania warrants qualification as an outlier, neither representative nor typical of the indicator over time, but rather a reflection of a particularly bad year in terms of price volatility of key commodities in the wake of the financial crisis and severe drought throughout much of the country.



**FIGURE 7.1. PROPORTION OF COMMERCIAL BANK LENDING TO AGRICULTURE**



Source: ABI Country Reports.

to invest between 17 and 20 percent of their loan portfolio in the agriculture sector, this law is not enforced.) In Nigeria, where agriculture accounts for 40 percent of GDP, just 2 percent of commercial bank lending went to agriculture in 2011. In Ethiopia, where agriculture accounts for 45 percent of GDP, commercial banks' agricultural lending represented just 11 percent of their overall lending portfolios between 2009 and 2011—about a quarter of what it would be if it were proportionate to agriculture's role in the economy. Even within the small proportion of the commercial lending that goes to agriculture, primary farm activities in production and marketing receive very little attention. Much of this is directed to off-farm agribusiness functions (such as processing, trading, retail establishments, and warehousing) and upstream agribusiness lending (input supply, importation, and distribution).

**Access to Financial Services (figure 7.2).** Despite the growth of commercial banks and other financial institutions in Africa, access to and availability of finance remain notable constraints for businesses, particularly for farmers and small businesses in the agriculture sector. Countries like Ghana are doing better than others in addressing the challenges by increasing the number of commercial bank branches and offering credit products suitable for the sector. There are five branches of commercial banks per 100,000 of the rural adult population in Ghana. Kenya has also been able to expand financial services with the use of mobile phones that have been shown to increase the number of rural people with access to at least some formal financial and banking services. However, in many

areas, formal financial service providers are either not available in rural areas or offer only limited services.

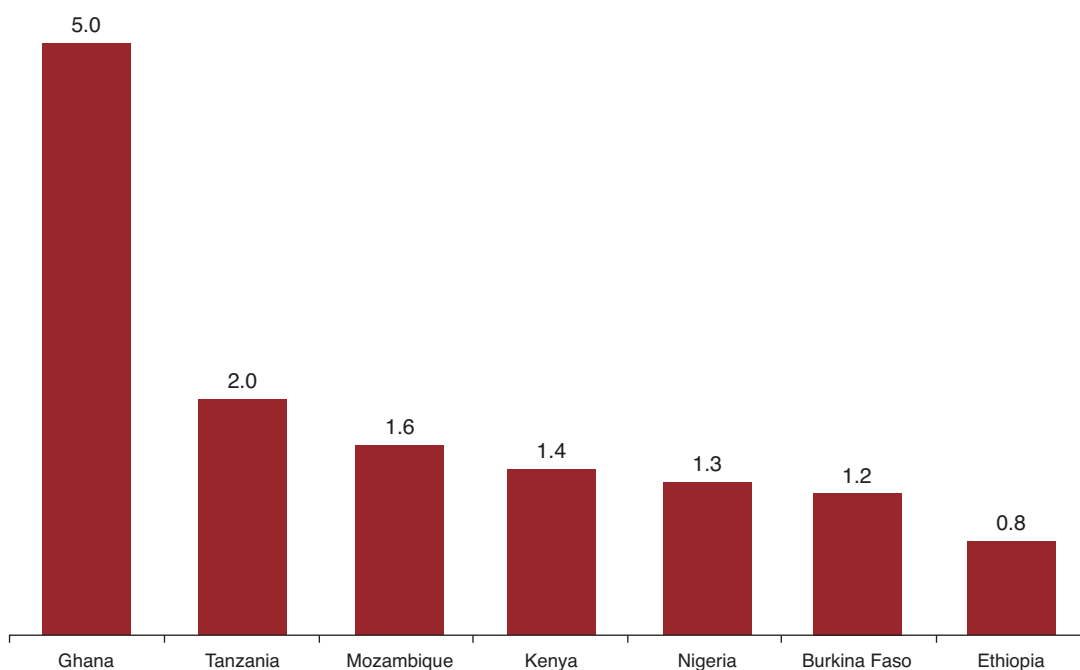
Much of the credit that is available for agriculture-related investment goes to input supply, trading, and agroprocessing—activities that are largely urban in location and typically not classified as “agricultural loans.” In Mozambique, only 2.3 percent of rural households had access to finance for agriculture according to an agriculture census conducted in 2010. Further disaggregation showed that proportionally larger farms had better access to finance than smaller farms. In Ethiopia and Nigeria, only 1 and 2 percent of rural households, respectively, had access to credit. In Ghana, 8 percent of rural households had access to agricultural finance (Ghana Statistical Service 2008).

In terms of the sources of formal credit, out of the households that received credit in rural areas of Mozambique, 14 percent came from financial institutions like commercial banks, agriculture development banks, and cooperatives, while input suppliers provided 42 percent (with a number of individual crops, agribusiness firms such as the British-American Tobacco Company provide input credit, raising the proportion of producers who receive credit from their suppliers). Informal sources (self-help groups, relatives and friends, and others) were important and accounted for 29 percent of credit. In Ghana, informal sources provided loans to 50 percent of rural households, while state banks and private commercial banks advanced loans to 16 percent of households.

Agriculture's inability to attract formal finance generally, and finance from commercial banks in particular, relates in considerable measure to how prospective lenders perceive risks that are seen as endemic to the sector. Among these are risks relating to land tenure, weather variability, and nonrepayment of loans, to name just a few.<sup>9</sup> In some of the ABI countries, the agriculture sector has often been affected by government intervention in agricultural input and output markets. Unpredictable export and import bans on certain commodities have led to uncertainties in the supply of, and demand for, agricultural products. There are also inconsistencies and unpredictability

<sup>9</sup> The various mechanisms described in this section are further elaborated under the Benchmarking the Business of Agriculture (BBA) project.

**FIGURE 7.2.** BANK BRANCHES PER 100,000 OF THE RURAL ADULT POPULATION



Source: ABI Country Reports 2012; data for Zambia and Rwanda were not available.

regarding tariffs, with unpredictable changes having a negative impact on the credit market.

**Cost of Agricultural Credit (figure 7.3).** Commercial credit to the agriculture sector in the countries studied was found to have high interest rates, especially in Ghana and Mozambique. In 2010, the average nominal interest rate for agriculture loans in Ghana was found to be 33 percent, followed by Mozambique at 29 percent.<sup>10</sup> In a country like Kenya, which has a relatively advanced agricultural sector, loans to the agricultural sector attracted higher interest rates of 20 to 25 percent. Four out of the seven countries had nominal interest rates that were higher than 20 percent, rendering agriculture loans unaffordable for most borrowers. Even when adjusted for inflation (using the consumer price index),<sup>11</sup> real interest rates for most of the countries are high. Ethiopia has a negative real interest rate for 2011,

<sup>10</sup> The rates referred to here are average rates. In most of the countries, farmer organizations and small-scale traders tend to be charged the highest rates, while rates are lower for bigger firms. Rates are also lower when there is some kind of guarantee, and they are influenced by the loan amount.

<sup>11</sup> The inflation rate for all countries was calculated for 2011, except for Ghana, where data were from 2010.

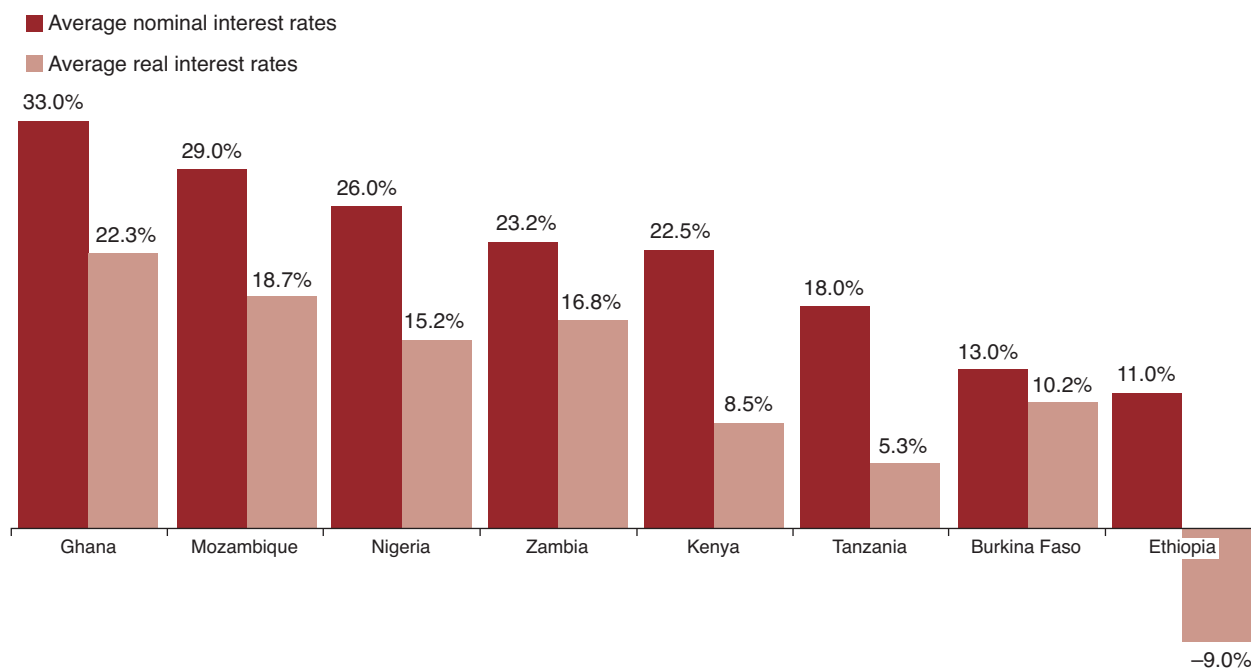
with an inflation rate of 33 percent<sup>12</sup> that shows that their commercial lending rates must be subsidized.

In addition to levying high interest rates, banks in most of the countries require borrowers to be able to provide 100 percent collateral (usually in the form of “urban” land or “titled” land), several years of audited financial records, and cash flow statements—all backed up by a host of documents whose preparation may require paid service providers. Smallholders rarely have formal land tenure and usually are unable to provide the required background documents, which makes it very difficult to access finance. There are also additional fees that banks can charge for loan applications as well as for granting a loan, which adds costs to already expensive credit for most farmers and agro-enterprises.

The basis for high interest rates charged by commercial banks is the result of many factors, one of which is high

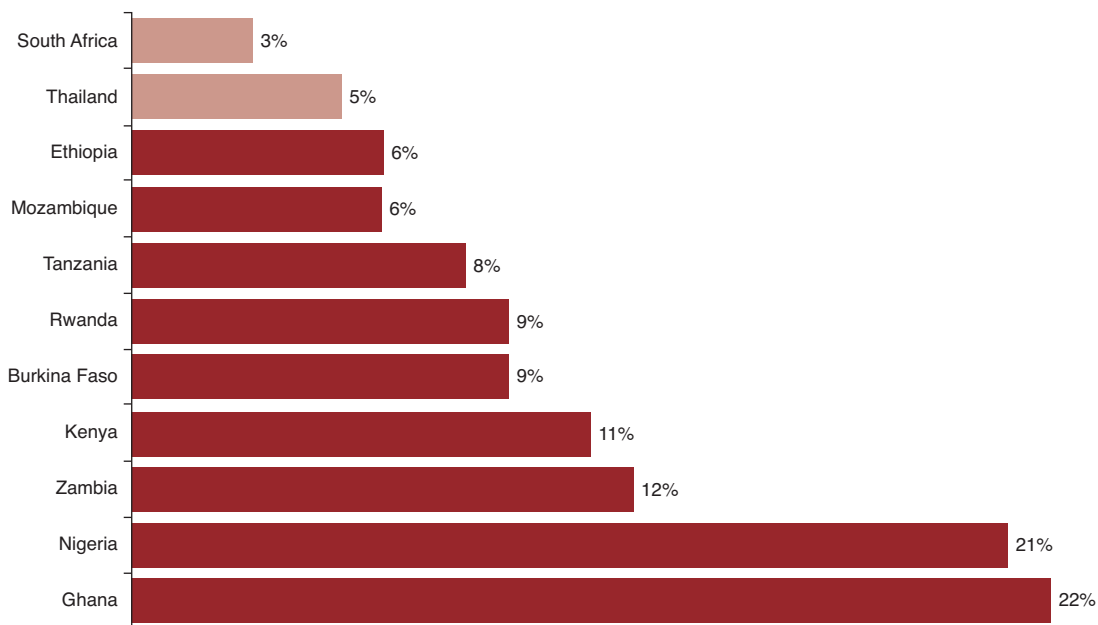
<sup>12</sup> This was a one-time high, however, with lower inflation rates of previous years at 8.5 percent (2009) and 8.1 percent (2010). The devaluation of the Ethiopian currency in late 2010 contributed to the high inflation rate.

**FIGURE 7.3. AVERAGE INTEREST RATES ON LENDING FOR AGRICULTURE THROUGH COMMERCIAL BANKS IN 2010**



Source: ABI Country Reports; WDI.

**FIGURE 7.4. LENDING-DEPOSIT SPREAD**



Source: FinStats 2012 (except for Ghana and Nigeria, for which the source was the Bank of Ghana and Central Bank of Nigeria, respectively).

interest rate spreads. Lending-deposit spread (also called *interest rate spread*) measures the gap between the average deposit and average lending rates (one of the ABI indicators). In Ghana, the interest rate spread in 2010 was exceptionally high at 22 percent. Similarly, in Nigeria, it

was 21 percent. Other ABI countries have lower spreads of 8.2 percent (Tanzania), 9.4 percent (Kenya), 11.5 percent (Zambia), and 6 percent (Ethiopia). In comparison with South Africa (3.4 percent) and Thailand (4.9 percent), these rates are still high (figure 7.4). Such high interest rate

## BOX 7.1. ESTABLISHMENT OF A CREDIT REFERENCE BUREAU IN GHANA

The government of Ghana enacted the Credit Reporting Law (Act 726) in 2007. As a result, the first license was awarded to a private company named XDS Data Ghana to operate as a credit reference bureau. The bureau started operation in April 2010 and collects credit information on borrowers, making it available for banks and nonbank financial institutions. Two new companies are currently in the process of getting licenses. All commercial banks and about 25 nonbank financial institutions in Ghana have signed up for the services of XDS Data. The company currently is discussing service fees and payment modalities with commercial banks. In June 2011, about 8,000 enquiries were recorded. So far, banks are only sharing negative information. It is hoped that in the future, the amount of information shared about clients with good credit histories will increase. In a market where the banks are hesitant to lend to new borrowers, this mechanism will help reduce information asymmetries by providing the lending institutions with credit history information about borrowers.

*Source:* Ghana ABI Study 2011.

spreads reflect inefficiency in the banking sector, as well as a smaller depositor base. They also discourage borrowing from the banks.

**Nonperforming Loans.** The proportion of nonperforming loans (NPLs) for agriculture-related financing in the ABI countries varied from as low as 0.2 percent for commercial banks in Ethiopia to as high as 58 percent in Tanzania in 2011. This was an exceptionally bad year for agriculture with an unusually high level of NPLs that apparently was not representative of the years before (but for which data could not be obtained). During this period, (i) companies defaulted on their loans when agriculture exports suffered due to the global financial crisis, (ii) there was significant price volatility for key commodities such as coffee, and (iii) drought was a problem in some areas in Tanzania. Ghana's agriculture portfolio was also faced with high NPLs at 21 percent (2010), followed by 10.4 percent in Zambia (2011), and 8.5 percent (2011) in Kenya. The remaining countries did not have NPL data for agriculture loans. The lower proportion of NPLs among Kenyan and Nigerian banks results from the benefits of having well-trained staff who are knowledgeable about

the agriculture sector, are able to design products that are well suited to the realities of the sector, and are capable of effectively appraising and evaluating loan applications.

**Loan Duration.** Even where they are available, agricultural loans were found to have short repayment periods that usually do not exceed one year. Such terms do not make capital expenditure attractive to agro-enterprises and commercial farms, where investments have to be made for a longer time with payback over an extended period. Those that cultivate tree crops, for instance, have little interest in a loan that must be repaid in less than a year, given that their investment will take several years to yield returns. Access to loans is dependent upon the size of the firms. International agribusiness firms are able to raise capital offshore. Many domestic small and medium-sized enterprises raise capital internally or from family, friends, or others. This slows the rate of capital formation and constricts the growth of agro-enterprises.

## POLICIES AND INSTRUMENTS TO ENCOURAGE AGRICULTURAL FINANCE

The ABI pilot countries have introduced a variety of measures intended to redress the lack of finance that is available to farmers and agribusinesses, which are currently at various phases of development. A number of indicators were conceived to capture these reforms, and to demonstrate how effective these policies and instruments are in encouraging agricultural lending and borrowing. These indicators will be highly useful to reformers who advocate for these measures in their dialogues with high-level policy makers, making their arguments more persuasive with firm empirical bases. (These indicators are being further elaborated in the larger Benchmarking the Business of Agriculture project.)

**Credit Reference Bureaus.** Financial institutions are concerned about a general lack of information about the credit history of the prospective borrowers. With the exception of Burkina Faso and Ethiopia, all the ABI countries have established credit reference bureaus to address the issue of lenders' confidence. The existence of these bureaus is therefore one of the agribusiness indicators.

**Warehouse Receipt Systems.** Another mechanism that has received attention in many African countries is

the establishment of a warehouse receipt system (WRS), which some countries are promoting as a means for banks to shift their risk from the borrowers to the assets (mainly grains) that are stored in the warehouses. Such an approach was recently introduced in Ethiopia, where 16 warehouses in the country are electronically linked to the central depository of the Ethiopian Commodity Exchange (ECX). Ghana has also established a warehouse receipt system recently that has been promoted by the Ghana Grains Council (GGC), and the first grains receipt was issued in January 2013. The GGC Warehouse Receipts System allows members of the council, including farmers and traders, to deposit grains in a GGC-certified warehouse and be issued a receipt that can be transferred to other members of the council or used as collateral against loans from GGC partner financial institutions. In Tanzania, a warehouse receipt system has been in place since 2007, and as many as 30 warehouses have been given licenses so far. However, experience in Tanzania has been mixed. For some cash crops, the system is working relatively well. For staple crops like maize, producers are benefiting less due to government restrictions on exports and interventions in domestic trade. These actions can undercut incentives and normal seasonal price patterns in staple food crop prices. Management and operation of warehouses have also been problematic due to the low management capacity of warehouse operators.

Findings show that Ethiopia, Ghana, and Tanzania have WRS, but their experiences are mixed. Ethiopia is considered a best practice for the region, in Tanzania WRS does not work well for staple crops like maize due to government restrictions and interventions. Management and operation of warehouses are also problematic due to the low management capacity of warehouse operators. Ethiopia has 16 warehouses that are electronically

linked to the central depository of the Ethiopian Commodity Exchange (ECX). In Ghana, the Ghana Grains Council warehouse receipt system allows members of the council, including farmers and traders, to deposit grains in a GGC-certified warehouse and be issued a receipt that can be transferred to other members of the council, or used as collateral against loans from GGC partner financial institutions.<sup>13</sup> Unlike other countries, Tanzania has 30 warehouses.

**Leasing.** Separate leasing laws are in effect in a number of ABI pilot countries, including Ghana, Mozambique, and Tanzania. In other countries, such as Zambia, banking laws consider leasing as one of the financial services. Overall, the leasing of agricultural equipment was not found to be a common practice. Bigger agroprocessing companies have leased a few machines, but this practice is not yet extended fully to the financing of agricultural machines like tractors, which would benefit the agriculture sector.

**Subsidies and Guarantees.** Subsidized loans are available in some countries where agriculture credit is provided by government-owned banks. In Mozambique, lending rates for subsidized credit for agriculture are 10 percent, while in Ghana, the Agriculture Development Bank offered loans to maize farmers in 2010 at 19 percent, and 22 percent to the rest of the agriculture sector. Usually such government-operated banks are not efficiently run, and loans are not provided based on clear and transparent rules. As a result, such banks do not perform optimally, and the government is required to intervene from time to time to cover the cost of bad loans. Guarantee schemes funded by the government or donors have been used, but these instruments, which are in essence indirect subsidies, are not sustainable over the long run.

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<sup>13</sup>“Bold Step to Help Grain Farmers.” 2013, January 21. GhanaWeb. <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=262689>.

## CHAPTER EIGHT

# RURAL TRANSPORT

Transport accounts for a major proportion of overall agricultural costs in Sub-Saharan Africa, both for the shipment of farm inputs and the marketing of agricultural produce. The high cost of transport adds to the costs of doing business and is a source of competitive disadvantage for African farm exports. It is attributable to a number of factors including low population density throughout much of rural Africa, limited access to all-weather roads, unmaintained and poor-quality roads, and aging trucking fleets:

- » Government investment in transport in the ABI pilot countries has increased significantly in recent years, and much of this investment has been augmented by international donors and development agencies. Much of this investment has gone into expanding road networks and building bridges, of which the majority has focused on primary “trunk” roads, to the neglect of construction and maintenance of secondary rural roads that tend to be especially important for the transport of agricultural inputs and outputs. The ABI country studies found the price of shipping 1 ton, 1 km on secondary rural roads to be double or more the cost of shipping on trunk roads.
- » The transport costs paid by businesses in Africa are among the highest in the world. Roads are the most widely used form of transport in ABI countries. In Kenya, 96 percent of the passenger and goods traffic is by road. In Ghana, roads account for 94 percent of freight, and 97 percent of all traffic movement in the country. In Tanzania, roads account for 80 percent of passenger traffic, and over 70 percent of freight traffic. Agricultural commodities are mainly transported from rural areas to secondary towns by smaller 3- to 5-ton trucks, pickup trucks, or vans that operate informally. The poor condition of many of these roads increases shipping costs dramatically and can substantially offset the apparent advantages of countries like Rwanda, where a high proportion of rural people have access to roads, but where 69 percent of the road network is classified as being in poor condition.
- » Trucking market structures and regulations differ widely among subregions in Sub-Saharan Africa. Many of the transport prices along African corridors seem to depend on the political economy of freight logistics. Transport prices (but not necessarily transport costs) differ widely across subregions and corridors. Most

of the ABI countries in East and Southern Africa have competitive and only lightly regulated national trucking industries. Market entry is easy in most of the countries. Getting registered and obtaining an operating license for a truck takes less than seven days in six of the nine countries. However, limited access to finance among smaller trucking countries imposes a de facto barrier to entry, and the existence of trucking cartels in some countries restricts access to some popular routes.

In more sparsely populated countries like Mozambique and Zambia, the per capita costs of investing in roads can be very high. This can impose a major financial burden on the country. This is characteristic of Sub-Saharan Africa as a whole, where population density is 34 people per square kilometer, compared to East Asia and the Pacific where it is 131 people. Africa also has a large number of landlocked countries that are distant from the nearest seaports which is a major structural impediment to transport throughout much of the region. Inadequate seaport capacity relative to demand for shipping services and nonimplementation of regional trade and transport agreements likewise increase the cost of providing road access.

## KEY FINDINGS (TABLE 8.1)

**Number of Days to Register a Truck and Obtain an Operating License.** It takes seven days or less to register and obtain an operating license for a truck in Ghana (5), Mozambique (5), Tanzania (6), Ethiopia (7), and Rwanda (7). In Kenya it takes 29 days, the longest wait period among the ABI countries. Cartels along the most profitable major routes require prospective transporters to make informal payments in order to operate.<sup>14</sup>

### COST OF TRANSPORTATION.

Transport prices along the main trunk roads were more similar between the ABI countries than transport on secondary roads, which varied more widely. The cost of transportation is measured in terms of the U.S. dollar price of moving 1 ton, 1 km. In Burkina Faso and Nigeria this cost

## BOX 8.1. REGISTRATION AS A TRUCKING ASSOCIATION IN ETHIOPIA

The Ethiopian Road Transport Authority issues guidelines for the registration of the trucking associations and for the regulation of the trucking industry. To be registered as a trucking association, the association must have a minimum of 20 trucks of 40 tons each and must establish its legality as a purely business entity. On average, it takes about seven days to register a truck and about 21 days to register a trucking association from the time an application is submitted for registration. Once operational, the association must submit monthly reports of its activities to the government or the license to operate will be revoked. Notwithstanding these regulations and requirements, interviewees believe that there is freedom of entry and exit into the trucking market, although one major external barrier is the prohibitive custom tariffs and taxes on imported trucks and spare parts.

On imported trucks, these impositions consist of custom duties, excise tax, transaction taxes, surtaxes, value-added tax (VAT), and in some cases, withholding taxes. It is estimated that these taxes can add up to more than 70 percent of the CIF price of the imported trucks and parts depending on the model. As a result, a good percentage of the freight-carrying vehicles in Ethiopia are not in very good condition, a situation that in part accounts for the high transportation cost in the country.

*Source:* Ethiopia ABI study 2012.

was 5¢ and 6¢, respectively—the lowest price among the ABI countries. In Kenya the price was 15¢. Nigeria has the highest freight rates from primary to secondary markets and secondary to terminal markets. Global comparisons show that on average, transport prices along major transport corridors are more than two thirds less in Pakistan than in major corridors in Africa. The cost of transporting goods along the Tema-Ouagadougou corridor is 35 percent higher than the average for other African and Asian corridors, such as Dacca-Chittagong, Laem Chabang-Vientiane, Durban-Nelspruit, and Maputo-Nelspruit.<sup>15</sup>

Transport price differences were more pronounced among rates for secondary roads. In Nigeria and Ghana,

<sup>14</sup> The ABI study did not focus on barriers to entry in intraregional trucking, where borders are crossed.

<sup>15</sup> Analyzed by Nathan Associates and the USAID 2011.

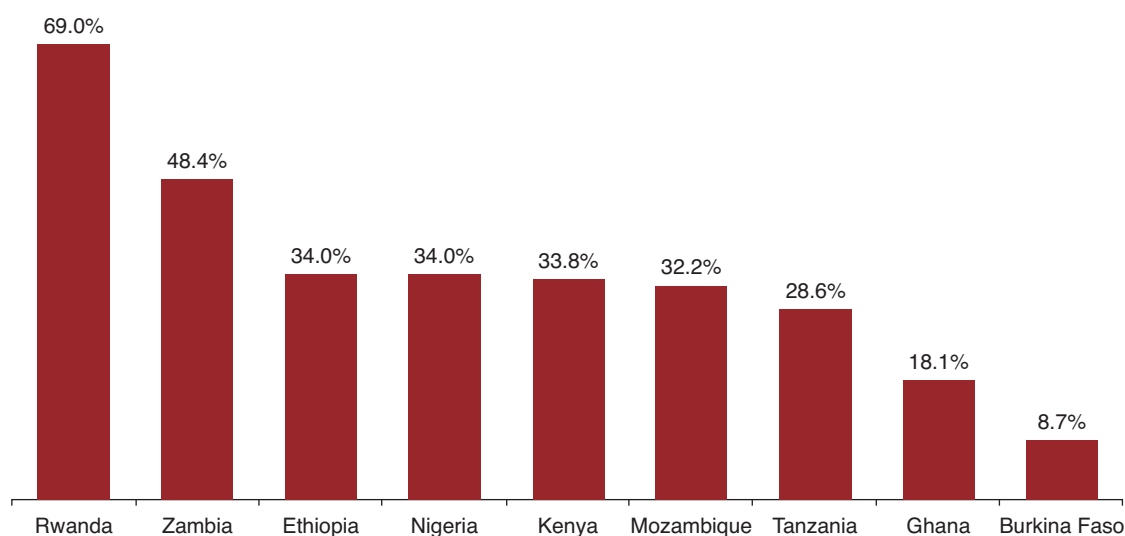
**TABLE 8.1. RURAL TRANSPORT INDICATORS**

Indicators	Burkina Faso									
	Mean	Faso	Rwanda	Mozambique	Ethiopia	Tanzania	Nigeria	Kenya	Zambia	Ghana
<b>Rural transport</b>										
Rural Access Index (%)	23	24	<b>36</b>	24	10	24	20	32	17	24
Percentage of road network in poor condition	34	<b>9</b>	69	32	34	29	34	34	48	18
Logistic Performance Index infrastructure quality (0–5)	2.14	<b>2.40</b>	1.88	2.04	2.22	2.41	2.27	2.16	1.83	2.05
Cost of transportation (\$/MT/KM)—main routes	0.10	<b>0.05</b>	0.09	0.10	0.11	0.10	0.06	0.15	0.11	0.10
Cost of transportation (\$/MT/KM)—secondary routes	0.26	0.14	0.37	0.23	0.24	0.13	0.47	0.24	<b>0.13</b>	0.35
Time (days) to get truck registered/operating license	13	6	7	<b>5</b>	7	6	28	29	21	<b>5</b>
Ease of entry into trucking (0–5)	3.7	3.5	<b>4.0</b>	<b>4.0</b>	<b>4.0</b>	3.6	3.5	2.5	<b>4.0</b>	<b>4.0</b>

Source: ABI Country Reports.



**FIGURE 8.1.** PERCENTAGE OF THE ROAD CLASSIFIED AS BEING IN POOR CONDITION



Source: World Bank 2011.

the rates were as high as 47¢ and 35¢ per ton per kilometer, respectively, while in Zambia, rates were much lower at 13¢. In the case of Ghana, the transport along secondary roads is dominated by old 5- to 10-metric-ton capacity trucks that each carry between 50- and 125-kg bags, which raises per unit shipping costs. Poor-quality roads lead to high operating and maintenance costs which then makes transportation very costly for traders and for agribusinesses.

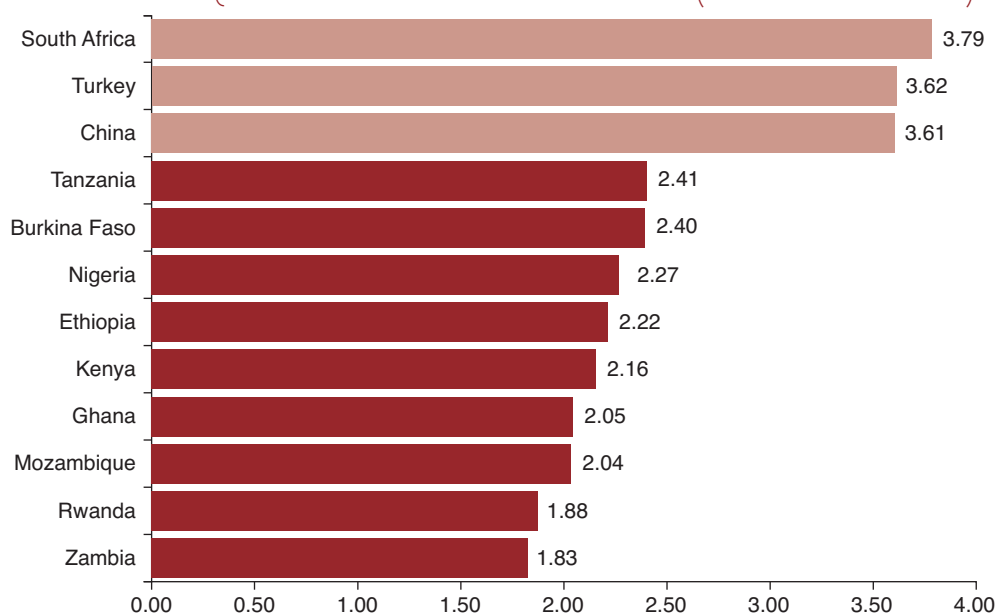
**Rural Access Index.** This indicator measures the percentage of rural people living within 2 km—typically a walk of between 20 and 25 minutes—of an all-season road as a proportion of total rural population. It does not account for population density. Countries in which this proportion is higher typically have transport networks that effectively enable farmers to sell the commodities they produce in local markets, which is an essential element of agricultural commercialization. In ABI countries the access to rural roads in Rwanda (36 percent) and Kenya (32 percent) is better than in Zambia (17 percent) and Ethiopia (10 percent).

**Percent of Road Network Classified as Being in Poor Condition (figure 8.1).** The quality of existing roads is a major concern for the agriculture sector through-

out much of Africa. Poor-quality roads discourage transport and transportation services from expanding into rural areas and make delivering commodities from the farm gate to the market slow and costly. This is often the result of a lack of resources invested in periodic maintenance. The ABI pilot countries varied widely in terms of this indicator. Burkina Faso has the lowest proportion of its road network classified as poor at 8.7 percent, followed by Ghana at 18.1 percent. Rwanda has the highest at 69 percent, despite having good road access as a result of its relatively high population density. Rwanda is followed by Zambia at 48.4 percent, and Tanzania with 28.6 percent of its roads rated as poor.

**Logistics Performance Index.** The Logistics Performance Index (LPI) is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance (World Bank 2012b). The LPI 2012 allows for comparisons across 155 countries. The LPI is the weighted average of the country scores on six key dimensions: (i) efficiency of the clearance process (that is, speed, simplicity, and predictability of formalities) by border control agencies, including customs; (ii) quality of trade- and transport-related infrastructure (for example, ports, railroads, roads,

**FIGURE 8.2.** FIGURE COMPARISONS ACROSS COUNTRIES:  
QUALITY OF INFRASTRUCTURE (SCALE OF 0 TO 5)



Source: World Bank 2012b.

information technology); (iii) ease of arranging competitively priced shipments; (iv) competence and quality of logistics services (for example, transport operators, customs brokers); (v) ability to track and trace consignments; and (vi) timeliness of shipments in reaching destination

within the scheduled or expected delivery time. In comparing quality of transport infrastructure, most of the ABI countries perform poorly (figure 8.2). Ratings for all countries are below 2.5 on a five-point scale. In comparison, South Africa rates 3.79, higher than Turkey or China.



## CHAPTER NINE

# SUMMARY AND CONCLUSION

## COUNTRY RESULTS

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### GHANA

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**Access to and Availability of Certified Seed.** Relatively few farmers who cultivate field crops have access to improved seeds, and seeds of high-yielding hybrid crops in particular. Seed supply is constrained by inadequate production of both breeder and foundation seed. A number of recent government initiatives are promising. Seed imports are now open to private companies, although only a few of them have begun to import hybrid maize seed. The number of certified seed growers is increasing, and private sector firms are exploring the possibility of producing hybrids and open-pollinated varieties for domestic use and for export to regional markets as well.

**Availability of and Access to Fertilizer.** In the five-year period from 2006 to 2010, Ghana's fertilizer imports increased from 189,878 to 308,786 metric tons, an increase of more than 60 percent. Fertilizer consumption has also increased to 40 kg/ha, which is just 10 kg/ha short of meeting the Abuja Declaration on fertilizer. The nutrient output ratio of 2.6 indicates that fertilizer use is profitable for Ghanaian farmers, particularly as the grains they produce command higher prices in local markets. In the 1990s, the government monopoly over fertilizer imports and distribution was abolished, and the resulting liberalized environment made market entry relatively easy for importers, distributors, and retailers, who are able to obtain a license in a short period of time. With eight major importers, between 35 and 50 distributors, and as many as 4,000 retailers, the market is already quite robust, and the density of agrodealers in some regions is high.

**Access to Farm Machinery.** Agricultural production in Ghana is labor intensive, with little use of machinery. In recent years, however, the demand for tractors has been on the rise, owing to an expansion in the amount of land that is cultivated by large commercial farms. As a result, a number of importers and distributors of well-known tractor brands have come into operation. Tractor services are utilized for land preparation and for other agricultural activities such as planting, postharvest processing,

and hauling. This trend toward mechanization has generally not applied to smallholders, who are unable to afford the purchase of tractors that have high financing requirements. The timely availability of spare parts has also been problematic. Some are concerned that the government's involvement in the agriculture machinery market could crowd out the private sector.

**Access to Agricultural and Agro-enterprise Finance.** Agricultural finance in Ghana is difficult to obtain, and where it is available, it is expensive. Agriculture receives substantially less commercial bank lending than other sectors—barely 6 percent. Interest rates of commercial bank loans are typically in the range of 25 to 40 percent. Many providers of financial services are hesitant to provide loans for agricultural purposes owing to land tenure issues, a history of nonrepayment of subsidized loans, and the overall riskiness of investing in rain-fed agriculture. Loan guarantee funds are being designed and implemented, and insurance products are being tested. A warehouse receipt system is being developed, and more financial institutions are becoming members of the credit registry bureau for increased transparency and information sharing.

**Cost and Efficiency of Transport.** Though Ghana's transport sector is relatively well developed according to the country's Rural Access Index, rural and feeder roads that are important for agriculture are not always in good operating condition. Despite increases in funding for road maintenance, a number of serious challenges need to be overcome. One of them is overloading among commercial vehicles, a practice that has caused road quality to deteriorate, adding to the cost of transporting agricultural goods.

**Agribusiness Policy Environment.** Changes in agricultural and private sector development policy in Ghana have made for a more enabling environment for the private sector and market development, although some in the private sector express concerns over specific policies such as the subsidy on fertilizer and mechanization. The new Private Sector Development Strategy (PSDS II) emphasizes the need to foster public-private dialogues. Many associations focusing either on specific commodities or subsectors advocating the interests of the private

sector exist. Budget allocations fall short of the CAADP compact that set targets for allocating at least 10 percent of government expenditure on agriculture.

## KENYA

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### **Access to and Availability of Certified Seed.**

Kenya's farmers obtain seed of most commodities (except maize and rice) from the informal sector. About 40 percent of farmers' maize seed comes from the formal public seed companies, and another 20 percent is supplied by private seed companies. The vast majority of hybrid maize seed used in the country—90 percent—comes from the Kenya Seed Company. Although Kenya's seed laws are under review, among African countries Kenya has one of the most advanced seed laws in place to guide and regulate the use of certified seed. Because the Seeds and Plant Varieties Act incorporates the International Seed Testing Association's rules of seed testing and the OECD's seed certification schemes, Kenya can trade seed with most other countries in the world that belong to these international seed certification organizations. This privilege has enabled Kenya to import seed in areas where domestic supplies are insufficient. For maize, although adoption estimates vary by year and ecological zone, the use of hybrid and improved seed has increased over the years. While most farmers in Kenya used hybrid seed, farm survey results showed that only about 25 percent of the land area was planted to retained hybrid seed. Based on a weighted average of all adopters by ecological zone, it is estimated that the adoption of hybrid maize could be as high as about 82 percent, one of the highest in Sub-Saharan Africa. It is further estimated that on average certified and improved seed is used on about 70 percent of the land under maize and 54 percent of the land under wheat. This was made possible (particularly hybrid maize adoption) by an extensive network of agrodealers, developed through the Citizens Network for Foreign Affairs (CNFA) and the Alliance for a Green Revolution in Africa, which reduced the distances that farmers had to travel to obtain seed.

**Fertilizer.** In the past decade, fertilizer application rates in Kenya have gone up significantly. This increase has been attributed to the liberalization of the fertilizer market, which essentially eliminated price controls and import licensing quotas, removed foreign exchange controls,

and phased out external fertilizer donations, which had disrupted commercial operations. Another significant factor in Kenya's greatly enhanced fertilizer consumption was the development of a private agrodealer network through a program by CNFA and Agricultural Market Development (AGMARK). The program provided training and helped dealers obtain credit for the private commercial provision of agro-inputs to farmers. The greater accessibility of agrodealers made it far easier for farmers to obtain a bulky input such as fertilizer. Of particular interest is the fact that fertilizer consumption has grown among Kenya's smallholders, who account for more than 70 percent of the agricultural output in the country. Government importation and distribution of fertilizer invariably undercuts the agrodealers and could once again result in market distortions and failures.

**Mechanization.** Small-scale farmers in Kenya, unlike their counterparts in most other African countries, have as a matter of necessity embraced the use of tractors for land preparation. Use of tractor-drawn implements is particularly high in the high-potential agricultural areas of the Rift Valley and Western Lowlands, where heavy rains sometimes result in waterlogged and caked soils, which are difficult and labor intensive to prepare for planting using simple hand implements. The present level of agricultural mechanization in Kenya ranges from 95 percent on large farms to as little as about 4 percent on some small holdings. On the whole, it is estimated that only about 30 percent of the operations on small farms are done using tractors and motorized equipment.

Tractor importation is duty free in Kenya, but imports of spare parts are subject to duties and a value-added tax of about 16 percent, which has serious implications for the life span of tractors and accounts in part for the fact that at any time about half of the tractors in Kenya are out of commission. The market for tractors is largely in the hands of private tractor dealers and is very competitive. Stakeholders confirmed the absence of the public sector in buying and selling tractors in the country.

**Finance.** The financial sector in Kenya consists of a large number of formal, semiformal, and informal financial service providers. Formal provision of agricultural credit to farmers is dominated by a specialized agricultural bank—

the Agricultural Finance Cooperation (AFC). The AFC is now the leading government institution mandated to provide credit for the sole purpose of developing agriculture. Only a small proportion of loans from commercial banks are allocated to agriculture (about 5.3 percent in 2010 and 5.6 percent in 2011), far below what the government has mandated, indicating serious underfinancing of the agricultural sector. However, government efforts to increase the accessibility of formal financial services have started to yield dividends. The expansion of commercial banking networks since 2005, following enactment of a government policy mandating banks to improve their services in rural areas, has been highly significant. Lack of collateral remains an issue in agricultural lending, particularly for smallholders. Despite having the necessary infrastructure—a large network of warehouses—Kenya has yet to establish warehouse receipt financing, so this potential mechanism for farmers to use stored commodities as collateral for loans is yet to be harnessed.

**Transport.** Approximately 96 percent of the passenger and goods traffic in Kenya is through the road network, and only about 4 percent is by rail, air, sea, or lake. About 70 percent of Kenya's classified road network is estimated to be in good or fair condition and maintainable; the remaining 30 percent requires rehabilitation or reconstruction. Yet very few rural routes (about 5 percent) are judged to be in good condition. High taxes and tariffs continue to deter transporters from importing new trucks. During the study period, it was estimated that the numerous taxes on a newly imported truck could add up to more than 50 percent of the CIF price. Although the government has built more roads and improved the Rural Access Index, Kenya's high transport costs account for about 35 percent of the total logistics cost along the Northern Corridor in Kenya.

## TANZANIA

**Seed.** Since the liberalization of the seed sector in Tanzania, there has been an increase in availability of improved seed for farmers. Tanzania enacted a new Seeds Act in 2003, repealing the Seeds Regulation of Standards Act of 1973. The 2003 Act encourages private sector seed production and distribution in the country and has introduced measures to ensure that the seed produced and imported

meet a set of required standards. As a result, there has been growth in the number of private companies operating in the market, and during the 2010–11 season, nearly 80 percent of the total commercial seed was supplied from the private sector. On the demand side, however, farmers lack awareness about how the use of improved seed leads to higher yields. The seed-to-grain price ratio for maize crop using hybrid seed is 10:1, which is considered high. As a result, many farmers cannot afford to buy seeds.

**Fertilizer.** Similar to the seeds sector, the supply and distribution of fertilizer in Tanzania is primarily in the hands of the private sector. The government's National Agriculture Input Voucher Program (NAIVS) has been instrumental in building the capacity of the dealers and in facilitating their expansion into rural areas. The private sector finds the policy environment quite conducive to doing business, and over the years, fertilizer imports with zero-rated duties have increased. Yet very few farmers in Tanzania have access to fertilizer. Even with the NAIVS program, significant numbers of farmers have difficulty paying for the cost of fertilizer that is subsidized. Another factor contributing to low use is limited practical information among farmers about the proper agronomic uses of fertilizer. This is also a result of poor extension. Despite the increase in the number of agro-input dealers, many farmers still need to travel long distances to buy fertilizer because dealers are mainly based in district headquarters.

**Mechanization.** The Mechanization Department of the Ministry of Agriculture, Food Security, and Cooperatives (MAFC) estimated that in 2010, there were 8,466 tractors in use in Tanzania, in a country with 11.5 million hectares of arable land. Based on this estimate, there are only seven tractors per 100 km<sup>2</sup> of arable land in Tanzania. In Tanzania, 92 percent of farmers still use hand hoes and farm a few acres of land, with just 5 percent of farm households using tractors. Starting in 2009, there has been an upward trend in the number of tractors being imported. Since the sector opened up, private companies have set up distributorships of various tractor brands, and there are 10 or 12 major importers of tractors in Tanzania. Large farms are their main clientele, in addition to farmer groups or savings and credit cooperatives that have access to subsidized financing from public banks or donor-financed programs.

**Finance.** In 2011, 15.4 percent of the commercial bank lending portfolio consisted of agriculture-related loans. Although competition has driven some financial providers to be more efficient, the supply of credit remains limited, especially in rural areas. The National Panel Survey (2008) found that only 6.5 percent of rural households have access to credit. Bank interest rates on loans to agriculture are high, and the commonly offered short-term loans are not attractive for farmers or agribusinesses. Further, in the absence of titles to land, smallholders have little if any collateral to offer. The warehouse receipt system and a variety of credit guarantee programs have been introduced to address these constraints, though with limited reported success to date. Initiatives are also underway to establish a credit reference bureau and collateral registries for movable assets.

**Transport.** Over the years, government investments in Tanzania's road network have increased substantially. Yet, in 2010, only 24 percent of rural people had access to an all-season road. Poor connectivity of rural roads to regional and trunk roads and limited maintenance of rural road networks have been serious constraints for the agriculture sector. Only about 43 percent of trunk roads are paved, while less than 2 percent of district and feeder roads are paved. This has resulted in higher marketing costs for agricultural inputs and outputs. The policy environment for transport business is favorable with an open market and relatively easy entry into the sector. Transporters find the cost of credit to be one of the major constraints for their businesses.

**Policy Environment for Agribusinesses.** The private sector generally has a positive view of the policy environment for agribusinesses in Tanzania. Incentives for agriculture investors that include zero-rated duty on farm inputs including fertilizer, seeds, and tractors, and zero-rated VAT on agricultural exports are encouraging. Tanzania is a signatory of the CAADP compact that calls for the government to allocate at least 10 percent of the total annual budget to agricultural development. Tanzania has not met this target so far, but over the years, the agriculture budget has been growing in both nominal and real terms. Nonetheless, policies for the sector are not always consistent. Periodic export bans on a number of crops, chiefly maize, have led to

major disincentives for producers and businesses. Duties on imports and exports that affect the agriculture sector also change from time to time, with inadequate information available to private firms on which to base planning or investment decisions.

## ZAMBIA

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**Seed.** It is estimated that around two thirds of the maize area is planted with certified seed (specifically, hybrid seed), whereas an estimated 20 to 30 percent of the wheat and soybean area is planted to certified seed. Zambia's seed sector is fully liberalized. The private sector plays a major role in seed production and exports. Zambia is one of the largest seed exporters in Africa; aside from the domestic market, it exported a recorded total of 17,891 tons of certified seed to other African countries in 2011. Despite the positive policy environment and growth for the sector, fewer than 40 percent of small- and medium-scale maize farmers used hybrid seed during the 2009–10 season. If a company wants to introduce a new variety of seed in Zambia, it can still take up to two years to obtain official approval. Another issue of current concern to the private sector is the presence of counterfeit seed in the market.

**Fertilizer.** In 2010–11, total fertilizer use in Zambia was 300,414 tons, which has increased steadily from the preceding years. The government-financed Farmer Input Support Programme (FISP) has contributed to this growth by financing 61 percent of the fertilizer used in the country. There is also steady growth in the commercial farm sector, equal to about 15 percent per year between 2007 and 2011. Fertilizer companies selling to commercial farmers point to the large increases in commercial wheat, soybean, sugar, barley, and maize production as drivers of increased demand for their product. On a national level, despite the expansion of FISP and increase in total fertilizer use, only 39 percent of smallholders use inorganic fertilizer. There are nine major importers, but domestic fertilizer distribution is handled mainly by district governments and cooperatives. The limited competition has led to complaints from firms excluded from the program, but with the introduction of the e-voucher program, they are hopeful that the role of the private sector may increase, not only in importing but in distributing fertilizer in rural areas.

**Mechanization.** Tractor use remains low, despite Zambia's relatively well-developed agribusiness industry, the positive enabling environment for the private sector, and some promising initiatives linking smallholders to agribusiness firms through vertically integrated outgrower programs. There is no reliable figure for the total number of working tractors in Zambia, but it is estimated to be around 6,000, or about 21 tractors per 100 km<sup>2</sup> of arable land. In comparison to other pilot countries, this number seems high, but tractors are used mainly by large and corporate farms, while smallholders' access to mechanization services is still extremely limited in most parts of the country. Small- and medium-scale farmers mainly use hand hoes and animal traction. All tractors in Zambia are imported. Due to the country's landlocked geography, retail prices can be higher than in other countries.

**Finance.** Zambia has a sizable number of private commercial banks and nonbank financial institutions operating in the market. Total agricultural lending as of March 2012 amounted to \$415.8 million or 16.5 percent of all credit from commercial banks and microfinance institutions combined. Private firms in Zambia still do not borrow from banks and instead rely on retained earnings or informal financing for long-term investments. Banks admitted they generally do not loan for greenfield investments in agriculture and usually deal only with trade-related businesses. Banks also state that a culture of nonpayment in Zambia, coupled with the risks associated with financing agriculture, do not incentivize the banks to offer services to the sector. As a result, agribusinesses have difficulty accessing commercial credit.

**Transport.** Because Zambia is landlocked, costs of hauling agricultural inputs and goods are high. These high costs in turn raise production costs and reduce competitiveness in foreign markets. It has made major progress in constructing a network of trunk roads and in linking the provincial capitals to Lusaka and Lusaka to main international border crossings. The country has also successfully operated a road fund that provides stable allocations of resources to the sector. It is one of the few countries in the region with a road sector budget surpassing what is needed to maintain the main road network and adequate to address the rehabilitation backlog. Regardless of increased investments in the transport sector, access



to roads is poor, with only 17 percent of people in rural areas living within 2 km of an all-season road. Trucking firms say that police interference is not a major problem and point to the fact that many roadblocks have recently been removed, making it easy to move goods around the country. There are few barriers to entry in the trucking industry. Government registration and licensing are not major obstacles, though the process can take time.

**Policy Environment for Agribusinesses.** Economic reforms of the early 1990s have improved the business climate for the agricultural sector in Zambia. The privatization of several parastatals made agriculture relatively free of major policy distortions and increased private sector participation in input supply, finance, and transport services. Some private firms admit that the policy environment can be unpredictable when there is a change in government, but these companies still consider that government has done a commendable job of consulting the private sector, even if it could sometimes do a better job of listening and taking private sector concerns into account. With respect to the consultative process between the private sector and the government, no single apex body for agribusiness exists in Zambia. As in other countries where apex organizations do not exist, commodity associations have been effective, focusing more narrowly on representing the interests of the participants in specific value chains. In Zambia, the national farmers union (ZANFU) is seen as having been influential in this capacity. With respect to the government budget, Zambia is a signatory to the Comprehensive Africa Agriculture Development Program Compact and has been spending just about 6 percent of its total budget on agriculture. This level is below the 10 percent target agreed upon under the 2003 Maputo Declaration, but it has been quite constant over the years.

## MOZAMBIQUE

### **Seed supply is constrained by inadequate production of breeder seed and foundation seed.**

The low use of certified seed for basic grains, particularly maize and rice, causes yields of rain-fed crops such as maize to be lower than yields in most other countries in Sub-Saharan Africa. Improved seed was used only on an estimated 14 percent of the 2010–11 rice area, largely in irrigated production zones.

Private sector seed multiplication is expanding, though slowly. The Basic Seed Production Unit (USEBA), which is a parastatal subsidiary of the national agricultural research institute (IIAM), produces most basic seed (except for rice seed), but volumes are typically too low for sufficient multiplication and wide-scale distribution to farmers. Many assert that demand for improved seed of maize and a wide range of other field crops is very limited. Seed costs are reportedly high (five times or more than the cost of the grain produced), and improved seed is often distributed through donor- or government-funded projects and programs.

**Fertilizer.** The vast majority of fertilizer was applied to leaf tobacco (51 percent) and sugarcane (42 percent) in the 2010–11 cropping season in Mozambique, with vegetables grown in peri-urban areas perhaps receiving more fertilizer in the aggregate than other food crops. Knowledgeable observers report that applying fertilizer (urea, NPK) to maize is unprofitable for most smallholders in most rural areas of Mozambique. Nutrient output ratios are one measure of the feasibility of using fertilizer on maize. They were 8 to 14 in the postharvest period of 2011, which means that fertilizer is too expensive to buy and apply relative to the low maize prices prevailing in maize surplus zones.

**Agricultural Mechanization.** Some animal traction is used in the south but is virtually nonexistent in the northern half of the country, partly because of trypanosomiasis and also because cattle were decimated during many years of civil war. As with the provision of other productivity-enhancing inputs in Mozambique, the provision of farm equipment is often subsidized. Mozambique had an estimated 12.6 to 14.2 tractors per 100 km<sup>2</sup> of arable land from 2000 through 2010. The demand for tractors has increased on medium to large farms that are strongly commercially oriented. Expansion of agricultural production should drive a vibrant agricultural sector led by the private sector, but government intervention in importing and distributing tractors on subsidized terms with non-transparent selection criteria bodes ill for the emergence of a private sector-led agricultural machinery servicing, maintenance, and custom-hire capability.

**Agricultural Finance.** In Mozambique, access to agricultural finance is difficult. Even when loans are available,

they are expensive. Agriculture receives much less attention than other economic sectors from commercial banks; lending to agriculture was a mere 6.5 percent in 2010, down from 9.4 percent in 2008. Many financial service providers hesitate to lend to the agricultural sector due to a long history of nonrepayment of subsidized loans, thorny land tenure issues, and the risky nature of rain-fed agriculture. Warehouse receipt systems essentially do not exist. Several banks do allow agricultural machinery (that is, movable assets) to be used as collateral, but at deep discounts to their estimated value. Many foreign-owned agribusinesses and Mozambican/foreign joint ventures access finance offshore in South Africa, Europe, or Asia, so they are less constrained by the shallow Mozambican financial sector, which is slow to lend to agribusiness through domestic financial intermediaries.

**Transport.** Along trunk roads in the Beira Corridor, transport is efficient, competitive, and reasonably low cost, but transport beyond trunk roads is costly. The Rural Access Index for Mozambique is between 24 and 32 percent. The numerous rivers, tributaries, and streams cutting east to west make rural transport costly and render some rural roads impassable (often flooded) during certain months of the rainy season. Field surveys suggest that transport costs are a major component of delivered input costs in rural areas and in marketing of agricultural produce. Rural and feeder roads that are important for agriculture are often not in good operating condition. Despite increases in funding for road maintenance, several challenges need to be overcome. The overloading of commercial vehicles has caused road quality to deteriorate and raised the cost of transporting agricultural goods. Flooding in many low-lying areas near rivers leads to major damage to roads as well. Domestic transporter unions complain of unfair competition from foreign trucking fleets, which operate in Mozambique with few controls, but knowledgeable observers argue that fostering regional competition in transport is the best policy.

**Agribusiness Policy Environment.** This is considered reasonably conducive to private sector investment, although much investment in commercial agriculture remains foreign. The government's announcement of foreign exchange controls in mid-2011 was unexpected as the private sector was not consulted about the change in

policy. Government regulation and taxes are considered excessive. The legal and regulatory framework affecting agriculture is perceived as not fully transparent. Some private firms fear that the government's interventions in input markets and tractor distribution, along with signs that it may reenter cereal markets, could undercut private sector competitiveness. Mozambique's budget for agriculture as a percentage of total budgetary expenditure ranged from 5.4 to 5.7 percent from 2007 to 2009 and included half of district development funds. Producers' modest share of the cashew export price (39 percent from 2006 to 2009) is a disincentive to replant the aging stock of cashew trees. Mozambique currently exhibits a reasonably strong investment climate for foreign investors but limited support for the vast majority of domestic producers and rural agro-enterprises.

## BURKINA FASO

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**Seed.** INERA, the Agricultural Research Institute in Burkina Faso, has developed improved varieties of cereal crops, pulses and oilseeds, and cotton. The multiplication of improved staple crops for seed has increased markedly over the past decade so that the use of improved seeds by smallholder farmers who do not grow cotton remains limited. Only half of the demand for improved maize seed is satisfied (through local multiplication), while only a quarter of the demand of improved varieties is satisfied. It should be noted that most of the maize seed multiplied and almost all seeds of improved rice are distributed with heavy government subsidies and donor programs. The government controls the production of basic seed, the six private seed companies and many seed producers (approximately 3,000, organized in seven cooperatives) who take charge of all the multiplication of certified seed. The seed supply does not meet demand. Some seed imports are allowed, but most (except rice seed) seem of an informal nature from neighboring countries and thus are not controlled. Also, imported varieties are not subject to a screening or routine testing. The medium-term trends in national yields are stagnant, and expected increases in performance from the use of improved seeds and subsidized fertilizers imported have not materialized.

**Fertilizer.** During the 1990s and much of the 2000s, fertilizers were distributed using subsidized credit to

cotton farmers. The use of fertilizers on cotton was clearly linked to a system of input supply and marketing of a business culture in which the parastatal cotton (SOFITEX) and, thereafter, two other cotton companies can recover the credit when the seed cotton is purchased from producers. Fertilizer suppliers estimate that at least 85 percent of fertilizer in Burkina Faso was imported and distributed to cotton farmers before the introduction of the fertilizer subsidy program in 2008. In 2010–11, almost a third of all fertilizer was applied on crops other than cotton. Taking into account the diversion of fertilizer cotton to corn (for which there are no reliable estimates), this proportion has probably climbed. The poor quality of roads and strong illegal taxes imposed along trade corridors also serve to increase the cost of fertilizer distribution. Fertilizers were subsidized up to 28 percent of the cost of urea and 23 percent of the cost of NPK in 2011, although the grant is officially 50 percent. There is an active and growing association of agro-input dealers, many of them turning away fertilizer to further specialize in the trade of agrochemicals and vegetable seed where prices are not subsidized or controlled. The subsidy program appears to have contributed to increased use of fertilizers since low levels of use in 2008 and 2009, but cereal yields have not increased between the pre-grant (2005–07) and the grant period (2008–11). Subsidized fertilizers are delivered late through regional and provincial authorities in the Ministry of Agriculture, Hydrology and Fisheries (MAHRH). These long delays do not appear to be a problem with regard to imported fertilizers for cotton production where the supply chain is managed more effectively.

**Mechanization.** Promoting mechanization in an environment with limited resources, dominated by smallholders, is a challenge in most countries of sub-Saharan Africa. Burkina Faso is no exception, and it is only recently that the government, through the FEER (Water Fund and Rural Equipment), has promoted tractor use in a project funded by the government of India called TEAM 9. Imports by the government of a large volume of tractors give little incentive to the private sector to import tractors for private distribution. In addition, there is a rental market of agricultural machinery in which the owners of tractors charge the user for field preparation and transportation.

**Access to Financing for Agriculture.** In Burkina Faso, agricultural loans are discouraged by the fact that only a small part of agricultural production is irrigated, and there is only one long growing season, characterized by variability. Total loans to agriculture include 9.2 percent (2009), 10.2 percent (2010), and 7.7 percent (2011) of the total outstanding to agribusiness, including production activities (agriculture, hunting, forestry and logging, fishing) and the manufacture of food products. The total agricultural production has received less than half—4, 3.1, and 3.7 percent, respectively. The nominal interest rate for short-term credit is 12 to 14 percent in the stable monetary environment of Burkina Faso where inflation was 2.8 percent in 2011. Credit to the cotton sector has never exceeded 8 percent (nominal) per annum, and this probably influenced the perceptions of farmers and companies regarding reasonable interest rates. Rural areas of Burkina Faso are not well served by the banking system because there are only 1.16 commercial banks to 100,000 rural residents. Most people in rural areas have no access to financial services, although there are several institutions or MFIs (COR, PAMF, URC-Nazinon, URCCOM) that target customers with more rural bank business. A warehouse receipt system is increasingly used in Burkina Faso by producer organizations that store dry grain for five to six months after harvest to take advantage of seasonal price increases. But such programs are not a means of granting loans to producers. There is no registry of movable collateral although such a registry exists for nonmovable property. There are no credit reference bureaus in Burkina Faso.

**Transport.** Burkina Faso is separated by long, distant seaports. The roads leading to these ports are of uneven quality and carriers face difficulties crossing borders where they are exposed to official harassment as well as “rent-seeking” behavior by uniformed officers. In addition, delays in ports, roadblocks, and border controls are all factors explaining high transport costs. Truckers report that they cannot make timely deliveries from Burkina Faso to the seaports, where there is a long waiting time for vehicles and slow rotation of ships in ports. In addition, the rail system has only a limited capacity, and a large number of products must travel by road, so a large number of exporters and traders prefer shipments through Tema or Lome. Carriers indicate that vehicle registration and licensing are not expensive procedures. They tend to

complain more about informal roadblocks along major highways and border crossings. Carriers have also indicated that the state of roads should be improved while the main roads are generally in good condition and are regularly maintained. Like most countries of the ABI study, rural access to transport is mixed. The Rural Access Index of 24 to 25 percent is low. Road access is better in the more populated central region of Burkina Faso and is limited in the drier Sahelian regions that have low population density.

**Policies and Public Spending on Agriculture.** The private sector rates the favorable context of agribusiness at 3 on a scale of 5, recognizing the efforts made by the government of Burkina Faso to promote the agricultural sector but not entirely satisfied with the measures to stimulate increased production of improved inputs use. Consistent and rigorous application of policies remains a thorny issue, as evidenced by seasonal bans on the export of cereals, implemented in 2007–08 to 2011–12. The ability of private sector organizations to effectively represent their members in discussions on these policies is not rated very favorably, and there is no umbrella organization in the field of agribusiness. Various interprofessional associations have not yet had a lot of influence but are seeking to strengthen their analytical and advocacy skills policies with the help of programs funded by donors. Public sector spending for agriculture, according to the government of Burkina Faso, is higher than for most other countries in sub-Saharan Africa, about 14.5 percent in 2008, above the target New Partnership for Africa's Development (NEPAD)/CAADP 10 percent.

## RWANDA

**Seeds.** Use of improved seed is limited in Rwanda other than access to improved maize and wheat seed in production zones where crop intensification program has been most heavily implemented. Most farmers retain their own seed for other crops, using open-pollinated varieties (OPVs), often well beyond their three to four recommended years of efficacy. Two foreign companies are doing trials and hope to gain approval to produce hybrid maize seed in Rwanda. The Rwanda Agricultural Board (RAB) controls almost all foundation seed production for OPVs, which leads to an inadequate supply for private seed producers and companies to

multiply. The government-dominated system does not appear to be demand driven. As a result, many Rwandan farmers do not have access to improved, certified seed of high quality, available in the right quantities and at the right time with complementary inputs.

**Fertilizer Use.** Fertilizer use is rising but remains lower than the Abuja Declaration goal of applying 50 kg/ha of fertilizer nutrients to arable land. Gross estimated fertilizer consumption increased from 14.3 kg/ha in 2008 to 34.0 kg/ha in 2011 (which in nutrient terms is about half those levels). Fertilizer use on staple food crops, particularly dry-land cropped cereals, is limited in many African countries, unless there is a well-funded subsidy program. Rwanda's fertilizer subsidy program, combined with hybrid maize seed imports, has led to large increases in fertilizer use on maize and significant average yield increases. Private participants in input distribution systems rated the business environment for dealing in fertilizer as quite mixed in Rwanda. The recently abandoned system of preselecting 10 to 15 wholesale fertilizer dealers who bid for government-supplied fertilizer each year at auction was criticized by the private sector. In early 2013, the government authorized three fertilizer trading enterprises to import fertilizer for wholesale distribution.

**Agricultural Mechanization.** Rwanda's density of 1.3 tractors per 100 km<sup>2</sup> is by far the lowest of the ABI study countries. Although tractor imports are very low, they are duty free. From 2008 to 2012, only 156 tractors were imported, with 58 percent imported by government agencies. In Rwanda, imports of spare parts carry a 15 percent duty and 15 percent VAT, which together make for higher import taxes on spares than in other ABI countries. Provision of tractors to Village Mechanization Service Centers (VMSC) and a few cooperatives has been subsidized at 50 percent of the import cost. This undercuts the emergence of any private sector capacity to sell tractors and provide tractor hire services. Public sector initiatives that subsidize acquisition of tractors and power tillers by VMSC and cooperatives tend to undercut incentives for private sector importers, distributors, maintenance shops, and private providers of tractor hire services. Hence, the enabling environment in Rwanda does not yet appear conducive for the emergence of a private sector-led network of tractor distribution, service, and custom hire providers.

**Agricultural Finance.** In Rwanda, several initiatives in the financial sector are helping to expand access to agribusiness finance, including the creation of a private credit reference bureau, limiting use of movable assets as collateral, some leasing of agricultural machinery, introduction of agricultural loan portfolio guarantees, and a government-run rural finance facility. Even though commercial banks remain the major source of funding for agribusiness in Rwanda outside of informal sources, savings and credit cooperatives (SACCOs) and microfinance institutions (MFIs) are expanding their agricultural lending, given greater reach than commercial banks in rural areas. Yet agricultural lending is a very small proportion of commercial bank operations (3.4 percent as of June 2012 in Rwanda).

**Road Transport.** Entry into the market is straightforward. The trucking industry in Rwanda is composed of many small players and is therefore fragmented. Transport prices (per metric ton per km) on secondary roads are usually double (or more) the rates on major trunk roads in African countries. Rwanda is no exception, with rates over primarily major roads that average \$0.19/mt/km and \$0.37/mt/km over largely secondary roads. Trucking prices over tertiary rural roads are even higher. Agricultural commodities are mainly transported by smaller 3- to 5-ton trucks or pickups and vans that operate informally and haul goods from rural areas to secondary towns. Investing in improved roads and other infrastructure is a priority for government. Despite government expenditure on infrastructure, only 38.1 percent of the entire national road system was considered in good condition in 2011.

**Policy Environment.** Private sector perceptions of the overall agribusiness policy and enabling environment are improving but not unequivocally positive. The government regulatory and policy environment is consistent, even if private actors do not like all the government rules and interventions. Government policy making is quite transparent, although greater consultation prior to decrees and interventions would be welcome. Although there is no explicit umbrella organization for the agribusiness system in Rwanda, there is an agribusiness chamber within the Private Sector Federation with some influence. Farmer organizations appear weaker than in most other ABI countries, with cooperative creation driven by

government. Although most African governments have not reached the NEPAD target requiring 10 percent of total budget commitments to be allocated to agriculture, Rwanda achieved 10.2 percent in 2011. This uses the classification of functions of government [COFOG] method, which accounts for expenditure on agriculture across the government (beyond expenditures by MINAGRI alone).

## ETHIOPIA

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**Seed.** In the seed subsector, perennial shortages of both basic and certified seeds have limited agricultural productivity in Ethiopia. With less than 5 percent of the total land area planted with improved certified seed, Ethiopia is well behind its peer countries, such as Zimbabwe, Zambia, and Kenya, where commercial maize seed use exceeds 70 percent of total maize seeds. Ethiopia's Ministry of Agriculture (MoA) continues to intervene in the production, marketing, and distribution of certified seeds. Although there are about 34 registered private seed companies in the country, their total share of the certified seed market is only about 12 percent.

**Fertilizer.** The main actors in the fertilizer input market are the Agricultural Input Supply Enterprise, which has a monopoly to import fertilizers, and the cooperative unions, which are the primary wholesale and retail outlets for farmers in the country. Private sector dealers and retailers appear to be generally absent in the fertilizer market. Although the intensity of fertilizer use is on the increase, rates still remain low at 17 kg of nutrients and 29 kg/ha compared to 200 kg/ha that is generally recommended as optimal for crop production in the country. Foreign exchange constraints continue to be a limiting factor to the liberalization in the market for this input.

**Mechanization.** The mechanized input market in Ethiopia can be described as competitive with no government direct involvement in the import and distribution of tractors, and the free entry and exit of firms from the market. There was no apparent collusion among the importers and suppliers of tractors, who instead are in stiff competition with one another. Although tractors are exempt from import duties, most prospective buyers are unable to capitalize on this savings because of the six-month time limit that tractors can be bought tax free once in the port of

Djibouti. The result is that tractors remain expensive and scarce, with high rental costs and long queuing periods. This also has the tendency of delaying land preparation and other farm activities.

**Access to Finance** from commercial banks and the availability of good road transport were also investigated as enablers of private sector involvement in the agribusiness industry. In Ethiopia, commercial banks account for more than 60 percent of the loans and credit to businesses, and therefore play a pivotal role in leveraging agribusiness. The findings of this study, however, suggest that commercial banks in Ethiopia remain reluctant to provide credit services to agribusinesses, and smallholder agribusinesses in particular. The proportion of the total loan portfolio of commercial banks that is directed to agriculture increased only marginally, from 8 percent a decade ago to 9.6 percent in 2010. Yet contrary to expectations, loans to the agriculture sector performed as well as loans to the other core sectors of the economy. Collection rates for outstanding loans from the agriculture sector were no different from sectors like industry and international and domestic trade sectors. Other major players in agricultural finance in Ethiopia are MFIs and rural saving and credit cooperatives (RUSACCOs).

**Rural Transport.** Access to good and reliable road transport continues to militate against agricultural transformation in Ethiopia. Most of the expansion in the country's network of roads has focused on highways in urban areas. Roads in rural areas, where most agricultural production takes place, remain in very poor condition. The cost of transportation is therefore much higher on rural routes than on urban routes and international corridors. Access to rural roads is measured by the Rural Access Index. While Ethiopia's Index of 27 percent is higher than the 21.7 percent average for all low-income countries, only 53 percent of the country's rural roads are classified as being in good condition, compared to a 57.6 percent average for low-income countries generally. (In Ghana for instance, 74 percent of rural roads are in good condition.) Prohibitive taxes on new trucks and spare parts continue to retard the replacement and maintenance of old fleets. As a result, most trucks in the country are not in good condition.

**Policy Environment.** In the area of public policy, significant progress has been seen in government programs and institutions that encourage private sector agribusiness development. The government of Ethiopia (GoE) has surpassed the 10 percent budget allocation to the agriculture sector as mandated by the African Head of State and government within the CAADP framework. It has also established the Agricultural Investment Support Directorate (AISD) to facilitate the process of land acquisition and the provision of information for domestic and foreign investors interested in doing business in agriculture in the country. The ECX has accelerated the flow of timely market information, and greatly reduced delays in payments to coffee farmers. ECX also has the warehouse receipt financing program that links farmers to commercial banks. When fully developed, the program should enable farmers who lack immovable collateral to access loans. Above all the newly created Agricultural Transformation Agency (ATA) has been designed to address systemic bottlenecks in the agriculture sector by supporting and leveraging the capability of the MoA and other stakeholders.

And despite recent progress with the establishment of the ECX and ATA, direct government intervention persists with seed "crash" and ad hoc policies and price control mechanisms that distort the seed subsector. Policy change and more effective institutions will be needed to establish an enabling environment in which private Ethiopian agribusinesses can thrive.

## NIGERIA

**Seed.** Certified seed use in Nigeria is very low. Overall, only about 5 to 10 percent of cultivated land in Nigeria was planted with certified seeds, and about 10 percent of farmers use certified seeds. Nigerian farmers would require an estimated 1 million metric tons of improved seeds to cover each of these cereals and pulses, whereas the formal commercial seed industry currently supplies just 20,000 to 50,000 tons of seed annually covering all crops. This represents only 2 to 5 percent of farmers' actual seed needs and indicates a significant shortage in the supply of certified seeds in the country. The government dominates the production of foundation seeds, and its seed policy is currently tilted toward the government-owned ADPs in the production and marketing of seed.

This tends to crowd out private sector participation and is largely responsible for the shortages in certified seeds in the country.

**Fertilizer.** Although Nigeria has great potential for fertilizer production given its abundant phosphate deposits and natural gas reserves, almost all the fertilizer currently used in the country is imported. The two fertilizer manufacturing companies both went on to fail as the result of poor management on the part of the public sector. As a result, fertilizer consumption in the country is low, estimated at about 600,000 to 700,000 tons annually compared to the potential market size of about 10 to 12 million tons. The fertilizer industry has been characterized by heavy government interventions in the form of subsidies. Available information suggests that only 11 to 30 percent of subsidized fertilizer reaches smallholder farmers at the subsidized price. The parallel sales of “subsidized” and “market” fertilizer tend to create an avenue for the lower-priced subsidized fertilizer to be diverted for sale at higher market prices. This situation tended to crowd out the private sector and create opportunities for rent-seeking individuals. It is therefore not surprising that average fertilizer application rates are low and are estimated at 13 kg/ha, or just about 6 kg/ha in terms of nutrient content—much lower than in most other African countries. Overall, the value cost ratios (VCRs) for the main staples were calculated (at unsubsidized prices) to be 2.5 for maize, 2.5 for sorghum, 3.5 for cowpea/beans, and 3.4 for rice, respectively. These ratios indicate that the use of fertilizer is profitable for these crops, provided they are delivered to farmers in a timely manner.

**Farm Mechanization.** Farm power among small-scale farmers in most parts of Africa, including Nigeria, is largely human or animal driven, and relies largely on the use of the hoe and other hand tools. This low level of mechanization greatly limits the amount of land that can be cultivated, and limits the productivity of individual farmers. More than 70 percent of the Nigerian labor force is currently employed in agriculture. The estimated 45,000 tractors in the country translate to a density of 5.7 tractors per 100 km<sup>2</sup>. And although tractor imports are themselves duty free, high tariffs are charged on imported spare parts, leaving tractors with a short average life span of about six years, compared to other countries in which tractor life spans can be as long as 15 years.

**Rural Finance.** Like most African countries, agricultural credit in Nigeria comes from both formal and informal credit sources. Many Nigerian farmers are served by informal money lenders, who generally provide easy access to credit but at higher cost, charging poor borrowers nominal monthly effective interest rates that typically range from about 10 percent to more than 100 percent. Other forms of informal source include farmers’ associations and cooperative societies. Formal sources include credit from formal financial institutions such as commercial banks and microfinance enterprises and credit unions. Limited physical access to bank branches keeps investment in agriculture low, especially among smallholders despite the mandate by the federal government stipulating that a certain percentage of commercial banks branches must be in the rural sector. Despite the fact that the agricultural sector accounts for about 40 percent of the total GDP of the country, its share of credit from the commercial bank responsible is only 2 percent. High interest rates charged by commercial banks on agricultural loans were also identified as an important barrier to investment.

**Rural Transport.** In Nigeria, this consists mainly of road transport, and while the country has an extensive network of roads, most of its rural roads are in disrepair. Limited rail service, poor road conditions, frequent bottlenecks, and informal checkpoints have all been identified as causes of inefficiency and contributing factors to the slow pace of agricultural commercialization in Nigeria. The Port of Lagos experiences severe congestion that may cause ships to be docked for up to 20 days, and containers to be delayed for as long as 35 days. This has been identified as one source of delay in getting fertilizer to the farmers. The country’s unpaved roads are in particularly poor condition. The local government road network, which is responsible for transporting farm produce from the farm to the first point of sale, is described as highly dilapidated with more than 70 percent impassable. This poor state of rural roads increases travel time, postharvest losses, and transport prices.

**Policy.** Public sector investment in agriculture is low and has been declining in recent years. It averaged just 3 percent of public spending between 2006 and 2012, well below the 10 percent goal set by African leaders in

the Maputo Agreement. Budgetary allocations by state governments are lower still and can reasonably be considered indicative of the relatively low priority that public officials assign to agriculture in Nigeria, in spite of the sector's proportionately large contribution to overall GDP. The ratio of public expenditure on agriculture to the sector's share of GDP between 2005 and 2012 was 0.04—a ratio of 1 would indicate that public spending is commensurate with agriculture's contribution to the country's economy. The Apex Farmers' Association of Nigeria, which is the umbrella of all farmers' organi-

zations in the country, is often perceived as a creation of the government, lacking any effective voice in policy dialogue. A number of organizations receive financial support from the government and are therefore seen as lacking the independence necessary to represent their members or to be critical or to demand an audience with public officials. Seed and fertilizer supply was singled out by stakeholders as a problem area, with fertilizer suppliers in particular complaining of a lack of transparency in how tenders and contracts are awarded and payments made.





## CHAPTER TEN

# CONCLUSIONS AND DISCUSSION

Private sector perceptions of the environment for doing agribusiness in the nine ABI pilot countries show considerable consistency across the different inputs and services examined. The seed and fertilizer industries, the sales and service of agricultural machinery and tractor hire services, transport services, and other agribusinesses have all been subject to increased government intervention since the 2008 food price crisis, and this intervention has impinged heavily on investors' perspectives of their prospects. Much of this intervention, particularly where it entails direct provision or subsidization of farm inputs or government participation in product marketing, clearly either crowds out private investment or otherwise provides strong disincentives to investors. The government's role in different segments of the agricultural input system tends to be similar across input types. In some instances, this direct government engagement in the rural economy responds to very real market failures or to incomplete markets, but it more often appears to displace and substitute for investment on the part of private interests who are better placed than government to provide inputs and services. Yet awareness of these realities within the public sector appears to be increasing, and the need to provide more supportive policy environments is the matter of widening consensus. Where the public and private sectors enter into more constructive dialogue and partnership, the benefits are likely to become quickly apparent through the use of these agribusiness indicators, and in so doing provide advocates of similar change in countries that are slower to reform with considerable leverage in their policy dialogues. It will also afford the public sector greater selective discretion in determining which areas of the rural economy to engage in and how, saving governments the often exorbitant costs of direct public spending. And it will build into these economies greater responsiveness to the demands of farmers in supplying the specific kinds of inputs they need, when they need them—a responsiveness that generally only results from prices and other signals that relatively free markets can provide. Much of this market responsiveness is likely to consist of convenience and economy of access in matters such as the location of input dealerships. Farmers desperately need that as they attempt the transition from mainly subsistence to mainly commercial production, and are likely to respond positively to it themselves.

A number of such positive examples have already become clear during the course of the ABI pilot studies. Kenya, Tanzania, and Zambia, for instance, have seen real progress in productivity and commercialization as the result of increased and more effectively targeted government expenditure combined with more consistent and predictable policies. While agricultural productivity generally remains low and access to improved inputs remains uneven in the nine countries, these positive examples send powerful signals to public officials and policy makers.

The agribusiness indicators also provide reliable points of reference for specifically identifying the persistent problems that constrain productivity and the drive for commercialization. Some of the problems point to the need for direct engagement on the part of the public sector; for instance, the significant quantities of fraudulent inputs available in markets, including mislabeled seed and fertilizer that falsely claims to be certified, as well as expired or banned pesticides. Getting these products off the market is an important role for regulators and law enforcement officials who are most likely to be employed in the public sector. Other problems, like the failure to deliver the right inputs to farmers at the right time and in the right mixes, may be ones that public sector involvement appears to actively aggravate. In some cases, there are compelling reasons for the public sector to disengage and “get out of the way” in order for production to achieve the precision necessary to modernize. Better organization, management, and coordination of input supply and product marketing will generally improve an agricultural system. ABI studies found that in varying degrees, low yields in Kenya, Ethiopia, and Ghana are often the result of delays that are directly attributable to government involvement in fertilizer importation. When this entails tying fertilizer distribution to a subsidy program, the reimbursement promised to farmers, distributors, importers, and participating banks is often delivered too late for them to use. Stimulating competitive markets is implicated as a practical way to resolve this issue.

Agrodealer density emerged as an area of wide divergence between ABI pilot countries, and this too tended

to have a noteworthy effect on the amount of modern seed and chemical fertilizer used. Tractor density and the availability of tractor hire services are also major factors in determining levels of input use. Kenya and Zambia, which had the highest tractor densities at 27 and 21 per 100 hectares of arable land, also saw the highest rates of fertilizer application, at 100 and 70 kg/ha, respectively. In these settings, farm labor is released and becomes available for other operations.

Access to finance remains a key constraint facing fertilizer wholesalers and agro-input dealers, leading to late delivery of fertilizer and a lack of seasonal input credit. While fertilizer is a costly production input, farmers need short-term production loans to purchase inputs. Fertilizer needs to be provided on seasonal credit, with the input supplier (which could be an aggregator, processor, or marketing/trading company) recapturing the financial outlay at harvest. A survey undertaken in Ghana by the International Fertilizer Development Center and the International Food Policy Research Institute found that 79 percent of registered agrodealers lacked working capital to run their businesses (Fuentes et al. 2012). This constraint was often noted in structured informal interviews by agro-input dealers in other study countries.

ABI country studies found that good farmer access to inputs and markets is correlated with lower transport costs (and time/distance to market), better maintained rural roads, and denser networks of agrodealers (retail input suppliers). Road transport is very expensive in Africa because secondary and tertiary roads tend to be poorly maintained. Significant investments in building or upgrading of trunk roads have made long-distance trucking costs closer to international levels. But shipping agricultural inputs and products over nontrunk roads is costly, often unreliable, and slow, with a limited supply of vehicles plying rural roads. Information and communication technology (ICT) can improve timing and coordination in input supply and product assembly, but the underlying physical infrastructure needs to be in place. Rural roads in most African countries are poorly maintained, and access to them is often limited (as reflected in low Rural Access Index percentages).

## APPENDIX A

# SELECTED COMPARATIVE COUNTRY STATISTICS RELATED TO THE AGRICULTURE SECTOR

### SELECTED COMPARATIVE ECONOMIC AND SECTORAL INDICATORS FOR ABI STUDY COUNTRIES

	Source	Year Used	Burkina Faso	Ethiopia	Ghana	Kenya	Mozambique	Nigeria	Rwanda	Tanzania	Zambia	Mean
<b>Indicators</b>												
Ag contribution to GDP (%)	WDI	2006	33.3	47.9	30.4	26.8	27.9	32.0	38.4	30.4	22.4	32.2
Agricultural raw materials exports as percentage of total merchandise exports, 2011	WDI	2011	51.7	8.6	4.9	10.9	5.1	6.1	4.0	5.6	1.9	na
Ag exports (as percentage of total export value)	ITC	2012	22.2	73.8	28.9	35.5	4.3	0.9	35.3	nd	6.6	na
Total land area	WDI	2010	273,600	1,000,000	227,540	569,140	786,380	910,770	24,670	885,800	743,390	602,366
Ag land (percentage of land area)	WDI	2009	43.7	35.0	68.1	48.1	62.7	81.8	81.1	40.1	31.5	54.7
Ag land (square kilometers)	WDI	2009	119,650	349,850	155,000	273,500	493,000	745,000	20,000	355,000	233,850	304,983
Arable land (square kilometers)	WDI	2009	59,000	139,480	44,000	54,000	50,500	340,000	13,000	100,000	33,500	92,609
Arable land as percentage of agricultural land	calc	2009	49%	40%	28%	20%	10%	46%	65%	28%	14%	30%

(Continued)

## SELECTED COMPARATIVE ECONOMIC AND SECTORAL INDICATORS FOR ABI STUDY COUNTRIES

	Source	Year Used	Burkina Faso	Ethiopia	Ghana	Kenya	Mozambique	Nigeria	Rwanda	Tanzania	Zambia	Mean
<b>Indicators</b>												
Ag land/rural population (hectares per person)	calc	2009	977.8	506.1	1,309.4	867.5	3,423.2	936.8	232.0	1,075.4	2,778.6	1,345.2
Arable land/rural population (hectares/person)	calc	2009	482.2	201.8	371.7	171.3	350.6	427.5	150.8	302.9	398.0	408.5
Arable land (percentage of land area)	WDI	2009	21.5	13.9	19.3	9.4	6.4	37.3	52.6	11.2	4.5	19.6
GDP/capita (constant \$2,000)	WDI	2010	\$283	\$221	\$360	\$469	\$384	\$540	\$337	\$459	\$432	\$387
GDP/capita growth rate	calc	2000-10	2.9	6.3	3.4	1.7	4.9	4.1	4.8	4.2	3.1	3.9
Net ODA/capita (current \$)	WDI	2010	\$64.51	\$42.50	\$69.39	\$40.20	\$83.43	\$13.02	\$97.16	\$65.97	\$70.74	\$60.77
Net ODA/GDP (using per capita data)	calc		23%	19%	19%	9%	22%	2%	29%	14%	16%	16%
Population (in thousands)	FAO	2010	16,469	82,950	24,392	40,513	23,391	158,423	10,624	44,841	13,089	30,398
Population density (population per square kilometer)	WDI	2010	60.2	82.9	107.2	71.2	29.7	173.9	430.6	50.6	17.4	113.8
Percentage of rural population	calc	2010	74%	83%	49%	78%	62%	50%	81%	74%	64%	68%
Rural population growth rate	calc	2000-10	1.9%	2.2%	1.0%	2.3%	1.3%	1.1%	2.1%	2.2%	2.4%	0.6%
Percentage of urban population	calc	2010	25.7	16.7	51.5	22.2	38.4	49.8	18.9	26.4	35.7	31.7
Urban Pop growth rate	calc	2000-10	6.8	3.5	4.1	3.8	4.9	4.1	5.7	4.5	2.8	4.5
Percentage of active population in agriculture	calc	2010	92.0	77.3	54.5	70.6	80.5	24.8	89.3	75.8	63.2	69.8

Source: Authors.

calc = calculation of data; FAO = Food and Agriculture Organization; WDI = World Development Indicators

## APPENDIX B

# ABI INDICATORS USED IN INITIAL AFRICAN COUNTRY STUDIES, 2011–12

	How Specified	How Calculated	Key Assumptions	Data Sources	Observations
<b>Agricultural Productivity Measures</b>					
<b>Certified Seed Access and Use</b>					
Improved seed use	Percentage of staple crop area planted to certified seed. Percentage of cereal seed that is improved/certified (estimated from seed production, import data)	Percentage of area planted to certified seed by key staple crop (maize, wheat, rice) relative to total cropped area	Percentage of cropped area estimates assume an optimal seeding rate per hectare; seed production and imports are all sold/used in year of production/import	MoA, agricultural research institutes Seed association Seed import data	Improved seed use tends to be higher for irrigated crops (rice), peri-urban crops (F&V) and traditional cash crops (cotton) than for cereals, oilseeds, legumes.
Improved seed access	Percentage of farmers using improved seed	Percentage of farmers, by farm size category	Imperfect measure as seed use and seeding rate per hectare may be suboptimal	HH surveys or agricultural census Special studies	HH surveys (and agricultural censuses) collect data on percentage of farmers using improved seed (but often not on the quantity of seed used per farm or per hectare)

(Continued)

	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Seed law	Existence of seed law and extent of implementation	0–5 scale	Law in place does not equal effective implementation	MoA, ag research institutes, seed association	Year and applicability of law and bylaws are important to gauge
Imported seed	Are imports of certified seed allowed?	Y/N Focus on key staples—cereals, oilseeds, legumes (not F&V, invariably allowed)	Focus on imported seed for direct sale and use as improved seed (not for multiplication)	MoA, ag research institutes Seed importers	Refinement could be length of time to get approval to import seed (case by case basis versus one-time approval; regional lists of approved seed in trade—across RECs)
Seed testing and registration	Steps, time, and costs required to register, test, and obtain approval for new domestic and imported seed varieties	Number of cropping seasons that tests are required	If rain-fed crops, each cropping season equals one year	MoA, ag research institutes, private seed companies	Some improved seeds in a subregion (of countries) are on an accepted within-region trade list
Private sector participation in seed production and distribution	Percentage of foundation seed provided by government organizations	Identify private sector production, if any, and calculate percentage of basic/foundation seed that is public	Government control over foundation seed production is very high in lower-income countries	MoA, agency for foundation seed production, researchers, seed producers' association	Foundation seed production is monopolized by government-run research institutes and parastatals in SSA, but allowed by the private sector in middle-income countries
	Number of private seed companies	Number of registered firms (that are seed association members)	Informal, unregistered seed producers or dealers are not fully accounted for	Seed association	Should number of firms be scaled to size of seed sector, agricultural sector, and so on?
	Volume and percentage of certified seed multiplied by private firms and farms versus government entities	Private share is a residual once public shares known; focus on key crops (maize, rice, and oilseed)	Public shares are small and declining as GDP/capita increases	MoA, seed producers' association, government agencies in seed multiplication and regulation	Government monopoly or control may not be efficient or desirable; government lacks resources to multiply enough seed to meet farmer demand

	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
ISTA (International Seed Testing Association) accreditation	Does the country have an ISTA-accredited laboratory?	Y/N (and note number of accredited labs)	Having an accredited lab assumes good in-country seed testing capacity	ISTA website	ISTA has 12 “scope of accreditation” criteria for labs; these could be used to develop a 0–5 scale
Yield gaps	Typical on-farm yields, potential yields, and yield gaps for one to two major food crops	Percentage gap (one-typical yield/potential yield) for maize and rice	Large yield gaps reflect major unrealized potential to expand food crop output	MoA, ag research institutes Sample surveys of farms	As major food crops in most countries, maize and rice have substantial unrealized potential
Seed-to-grain price ratio	Price of certified/improved seed relative to the price of grain for maize and rice	Price of certified seed divided by the average price of grain	If ratio is less than 5, improved seed use is considered high cost and risky	MoA, ag research institutes Seed association or seed dealers	This is a measure of the profitability and risk in producing and using certified seed

### **Fertilizer Access and Use**

Total fertilizer consumption	Total MT imported (and produced locally) by fertilizer type	MT of fertilizer imports and local production/mixing, differentiated by fertilizer type	Volumes imported and produced locally are all consumed within year (no carryover); net out exports of local production	FAO, AMITSA MoC, customs data Large importers Local producer or blender	Fertilizer imports are often misclassified/identified as to type; importers are typically reluctant to provide detailed import volume breakdowns
Fertilizer use rates	Fertilizer application rates in kilogram per hectare Application rates for nutrients (N, P, K)	Nutrient content is calculated by applying standard conversion factors to main fertilizer types	National fertilizer import data are available for recent years (often a challenge to get)	FAO (to 2008 or 2009); customs, MoA or MoC trade data; COMTRADE data	Importers reluctant to provide volume data and disaggregations by fertilizer type and prices
Allocation of fertilizer to different crop types	Percentage of breakdowns of fertilizer use by crop type: on food crops versus cash crops (traditional exportables)	Total fertilizer applied per crop type as percentage of total supply (which equals imports in most IDA countries)	Majority of fertilizer is used on cash crops in poorer countries; maize and rice are the key food grains in most countries	Importers, export crop parastatal or private firms with outgrowers; sample surveys (LSMS-ISA) for field verification	Typically difficult to establish with any precision unless very good fertilizer distribution data, coupled with farm-level survey data on fertilizer use

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	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Fertilizer access	Percentage of farmers using chemical fertilizer	Ideally disaggregated by farm size	Will not find fertilizer use per crop or per hectare in most rural HH surveys	National agricultural census or periodic farm HH surveys LSMS-ISA surveys	Farmers asked a Y/N question without providing details on quantities obtained, use by crop, or type of fertilizer applied
Fertilizer cost in rural areas	Cost of 50-kg bag of NPK, urea, and a third major fertilizer in two to three main agricultural production zones	Converted to U.S. dollars per mt and compared to cost of urea at port of entry	Prices are retail prices charged by agro-input dealers in market towns	IFDC surveys; some national MIS (market info systems)	Cost of moving fertilizer from a market town to a farm village may add significantly to fertilizer cost in rural areas
Agro-input dealer density	Number of agro-input dealers (denominator) and economically active people in agriculture (as the numerator)	Calculate per ten thousand farmers (not the number of farms)	Farmers are defined as those economically active in agriculture	IFDC, CNFA; AGRA/IFPRI fertilizer studies; Min commerce Rural/agricultural population data: WBG, FAO	Listings of dealers cover mainly formal firms and understate total numbers
Proximity of agro-input dealers	Average distance in kilometers of farmer to an agro-input dealer	Kilometers, if known, or walking time converted to approximate kilometers		Requires recent survey data: LSMS, LSMS-ISA, or other HH survey	Averages mask significant variability among farms; percentage of farms within, say, 7–8 km might be a better measure
Ease of private sector participation in fertilizer market	0 to 5 ordinal scale	Obtained from purposely chosen sample of fertilizer industry participants		Subsamples of importers, wholesalers, and retailers	Hard to get a sufficient sample without large players (importers) dominating
Nutrient/output price ratio (Pn/Po)	Calculate nitrogen price from urea price and use maize price during the postharvest period	Urea is 46% N; maize price as an average of weekly prices over several months postharvest	Maize prices in postharvest period of most sales volume influence farmers increase in prices at planting time	Urea retail price in market towns; maize price at rural market/first handler level	Calculating a range of ratios may be necessary, as both input and product (maize) prices vary across time and location

	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Profitability of using maize	Value cost ratio (marginal value product of maize produced over the marginal cost of using fertilizer)	Increase in maize output due to incremental fertilizer use	Assume can disaggregate increase in yield due to fertilizer response	Agricultural research institutes, CIMMYT, universities	Rely on research results; other factors—seed, water, management, timely operations— influence yields (and need to be controlled for)
Fertilizer subsidy	Percentage of annual federal government agriculture budget that goes to fertilizer subsidies	Need actual expenditure data from MoA and MoF	Actual outlays may not reflect planned expenditures	MoA, MAFAP PERs	This captures the cost of a fertilizer subsidy program in relative terms
Tariffs and taxes on fertilizer	Percentage of declared import value	Ad valorem tariffs as a percentage declared import value	Declared values are based on real import values	Customs, MoC	Tend to be low; distinguish between imports from region and international imports
Import cost of fertilizer	CIF price for two to three key fertilizers	\$ cost/mt of urea, NPK, and another commonly imported fertilizer	CIF price is the border price (not arrival at port price for landlocked countries)	Importers, customs and MoC	CIF cost of imported fertilizers varies significantly across countries (which may reflect decrease in competitive procurement)
Fertilizer distribution efficiency	Ratio of CIF price of fertilizer to rural market price	Arrival at border price as a percentage of the rural retail price; for landlocked countries this would be CIF price plus costs of port clearance and transport to border	Rural market price is a reasonable proxy for farmer cost	Customs data; international fertilizer databases; MoC	Using a border price rather than a classic CIF price (arrival at seaport) is preferred, though port and transport to border costs must be accounted for Note: getting CIF prices from importers is a challenge

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	How Specified	How Calculated	Key Assumptions	Data Sources	Observations
<b>Extent and Use of Agricultural Mechanization</b>					
Tractor use	Total number of tractors per 100 km <sup>2</sup> of arable land	Simple ratio. FAO definition of arable land	Need to assume an average useful life of tractors	FAO to 2007, 2008 Mechanization Department of MoA, customs	Take FAO numbers as base, add imports, and net out assumed number of tractors falling out of service to arrive at end-of-year stock
Tractor hire service cost	Cost of plowing 1 ha of land	Convert local currency cost to \$/ha	Size of hectare for plowing purposes is consistent across countries	Large farmers, service providers, FOs, tractor importers	Cost may vary across production zones with different soil types; differentiate plowing and disc harrowing
Tractor imports	Number of tractors imported by private sector as percentage of the total number of tractors imported	Simple ratio	Customs/trade data include public sector imports	Customs data, MoC, importers, MOA, parastatals	Public sector import programs are subsidized; need to make sure public imports are fully accounted for
Ease of private participation in the agricultural machinery market	Perception of participants (ranked on a scale of 0–5)	Average of responses	This is a complex composite across three different groups of firms; last two (next cell) hard to identify	Private importers, providers of hire services, machinery repair and maintenance providers	Subsidized government import and parastatal programs tend to undercut private sector
Tractor import taxation	Tariffs on new tractors and spare parts	Percentage specified in tariff codes	Import tariffs are actually applied	Customs, MoC, importers	Spares are subject to higher tariffs than new tractor imports; can extend to other agricultural equipment

	How Specified	How Calculated	Key Assumptions	Data Sources	Observations
<b>Measures of Access to and Availability of Key Agricultural Sector Services</b>					
<b>Access to and Availability of Agribusiness Finance</b>					
Credit allocation to agriculture	Percentage of commercial banks lending to agriculture	Percentage of loan portfolios of all commercial banks in country (not just those lending to agriculture)	Covers commercial banks and not MFIs or other sources of credit/finance	Central Bank Department of Supervision of Commercial Banks	Typically available for production agriculture and not agro-enterprise (classified under lending to industry or commerce); much harder to obtain loan data on agribusiness finance
Cost of credit	Nominal and real interest rates on commercial bank loans to agriculture and agribusiness	Nominal rates less inflation rates equals real interest rates	Best to present a range that includes rates paid by firms of different types/scales	Commercial banks Agro-enterprises	Real interest rates provide a better estimate of credit costs than do nominal rates
Density of financial services	Bank branches per 100,000 adult population	Bank branches divided by adult population	Adult population is defined as 15–59 years	Central Bank Commercial banks	Does not capture MFIs, NGOs, and rural projects with finance components
Rural access to credit	Percentage of rural HHs receiving credit for agriculture	Ideally disaggregated by farm size		Sample surveys Agriculture census	May not capture loans for RNFE (rural nonfarm employment)
Agribusiness access to credit	Percentage of agribusinesses with access to credit	Ideally disaggregated by firm size and type	Access of formal firms greater than for nonformal farms	Finscope or FINAP surveys/studies Special surveys ABI estimates	ABI estimates may not be representative, as ABI interviews larger, more accessible firms
Agricultural finance innovation	Existence of warehouse receipt system (WRS): 0–5 scale/ordinal index	Scale indicates stages of WRS development	Other innovations exist; this targets cereals and other storable commodities	Donors, banks, warehouse operators	Requires some digging and judgment to ascertain

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	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Law on leasing	Existence of a law on leasing (and extent of use of leasing)	Y/N	Leasing expands access to costly equipment	Central Bank Commercial banks	Existence of law does not reflect extent of use (value of leases of equipment used in agriculture and agribusiness)
Movable collateral	Evidence of use of movable assets as collateral	Y/N—Can also specify types	As many farms lack land title, this provides an alternative source of collateral	Commercial banks	Could be refined to estimate use of movable assets in lending (and percentage of valuations by type of movable asset used as collateral)
Collateral registry	Presence of a collateral registry	Y/N for immovable assets and Y/N for movable assets	Tracks repayment performance of firms and (larger) farms.	Central Bank Commercial banks	This is already an IFC/DB indicator; new dimension is to distinguish between immovable and movable assets
Credit rating and reporting	Existence of a privately run credit reporting system	Y/N with discussion of extent of databases and their use	Databases need to include agriculture sector & agribusiness firms	Credit rating bureau Central Bank Commercial banks	Could add a measure of the scale of any credit reporting databases and accessibility of this info to lenders and vendors
<b>Access to and Cost of Transport</b>					
Trucking prices	Prices paid in per mt/km grain or fertilizer along well-defined road itineraries	Local currency prices converted to \$/mt, differentiated by road type	Prices do not necessarily reflect full transport costs	Firms/traders/FOs using trucking services; trucking firms; WFP, NGOs	Hardest to get transport prices on secondary and tertiary roads in rural zones; highly variable

	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Sea freight costs	Maritime shipping costs for standard containers of 20' and 40' (loaded with inputs and outputs (\$ per ton)	Shipping quotes obtained from shippers or maritime shipping firms	Shipping costs can be quite different for exported and imported containers	Shippers (fertilizer importers, agriculture product exporters) International sea freight firms—MSA, Maersk, Delmas	Quotes from maritime shipping companies may be prices prior to negotiation; database already captures port handling and customs/ other agency processing costs
Entry into trucking	Ease of entry into trucking (of inputs and agricultural products) (Scale: 0–5)	Opinions of transport firms		Transporters, trucking associations	Ease of entry is not necessarily ease of operations
Access to trucking services	Opinions of users of trucking services (Scale: 0–5)	Opinions of traders, importers, other shippers	Ease of access to trucks and alternative price quotes ≈ competitiveness of trucking	Users of trucking services Trucking association	Need to ask informants not to focus solely on cost but rather on ease of access and availability of trucks for hire
Infrastructure and logistics services quality	Quality of trade and transport related infrastructure	LPI (logistics performance index); last rankings from 2010	Shipping infrastructure and logistics greatly matter for exports to be competitive	LPI rankings of WBG Trade Department (will they be continued?)	Based on a set of opinions and perception ratings of service providers and users
Rural access to roads	Percentage rural HHs within 2 km of a road	Rural Access Index	Proximity to an all-year practicable road equates to good access	RAI rankings of WBG based on HH surveys and GIS; few countries may produce estimates	HH survey based estimates are dated (2003 to 2006) and may not match GIS-generated estimates in some countries (for example, Ghana)

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	How Specified	How Calculated	Key Assumptions	Data Sources	Observations
<b>Enabling Environment Indicators</b>					
Private sector perception	Private sector perception of agribusiness enabling environment (0–5 scale)	Opinions of a cross section of agribusiness firms	Positive EE ≈ positive investment climate ≈ greater ease of agribusiness opportunities and higher probability of agribusiness investment	Purposive sample of firms (ABI developing key informant lists in pilot countries)	Expert interviewing and judgments are required to tease out rankings; need to ask a series of questions to arrive at a score (beware large firm bias)
Policy consistency	Private sector perception of consistency of agribusiness policy and regulatory environment (0–5 scale)	Opinions of a cross section of agribusiness firms (plus expert judgment)	The higher the perception of consistency, the greater the probability of private sector investment	Purposive sample of firms and knowledgeable observers	Composite measure for several policy domains—input subsidies, import policies, price/movement controls; could focus on recent policy events and shifts for key staples and inputs
Policy advocacy capacity of the private sector	Private sector advocacy group for agribusiness: existence and effectiveness of an apex agribusiness organization	Expert judgment on a 0–5 scale	Strong private sector policy advocacy keeps public sector honest and improves EE	Advocacy groups Policymakers and technocrats in government Knowledgeable observers	How handle countries with interprofessional organizations organized on value chains and without an apex agribusiness organization?
Public expenditure on agriculture (PER)	Federal government budget outlays on agriculture as percentage of total budget	Percentage of federal government budget; disaggregations along functional lines and for recurrent versus investment costs are very useful	Planned budgets do not necessarily equal actual expenditure patterns, which ABI must try to get	MoA, Ministry of Finance, WBG (recent PER), MAFAP program	PERs typically do not capture all donor-funded projects or NGO activities that are not accounted for in the federal budgetary process; note what some countries consider to be agricultural expenditure

	<b>How Specified</b>	<b>How Calculated</b>	<b>Key Assumptions</b>	<b>Data Sources</b>	<b>Observations</b>
Producer returns on export crops (to be dropped)	Proportion of a key cash crop's FOB export price paid to producers	Need producer prices and FOB export values		MoA, marketing parastatal, value chain studies (prices/costs along VCs)	Not recommended to compare percentage return to producers across commodities; transport costs a bigger share of FOB price (at seaports) for landlocked countries
Degree of value added to exports	Percentage of key export crop that is processed	Percentage value of commodity exports by forms in which they are shipped	Increasing degree of VA in exports increases export revenues	Customs data, MoC trade statistics; COMTRADE for import partner data	Customs data for exports may not be sufficiently disaggregated or properly coded
Export policy disincentives	Export taxes or quotas	Y/N		Customs tariff code; MoA and MoC for approvals, fees	Could develop a scale of 0–5 where higher numbers mean a greater number of disincentive policies or mechanisms
Export approvals and restrictions	Specify for key agricultural exportables: a staple grain, F&V, a traditional export cash crop	Steps/costs in process and time required to obtain approvals	High transactions costs discourage exports and increase export marketing costs (hence decrease in competitiveness)	Exporters of grain, F&V, a key traditional export crop	Cereals, as food security crops, are the most problematic; interdictions/bans on exports are common in SSA, despite regional agreements that do not permit them

*Note:* AGRA/IFPRI = Alliance for Green Revolution in Africa/International Food Policy Research Institute; AMITSA = Regional Agricultural Input Market Information and Transparency System; CIMMYT = The International Maize and Wheat Improvement Center; COMTRADE = Commodity Trade Statistics Database (of the United Nations); F&V = fruit and vegetable; FOB = free on board; HH = household; IDA = International Development Association of the World Bank Group; LSMS-ISA = Living Standards Measurement Study-Integrated Surveys on Agriculture; MoC = Ministry of Commerce; VCs = Voluntary Carbon Standards; WFP = World Food Programme.



## INCENTIVES/PROGRAMS FOR AGRICULTURAL MECHANIZATION IN PILOT COUNTRIES

Country	Incentives
<b>Kenya</b>	Import tariff exception on all agricultural tractors and equipment
<b>Ethiopia</b>	Import tariff exception within six months of import, otherwise full duties (more than 100 percent of FOB price must be paid thereafter)
<b>Nigeria</b>	Import tariff exception on all fully assembled tractors but excluding completely knocked down parts
<b>Burkina Faso</b>	India provided 700 tractors through a Burkina Faso government agency that subsidized distribution
<b>Tanzania</b>	20–50 percent shared by farmers, depending on the level of scale of operation, with smallholders receiving about 50 percent subsidies on tractor imports
<b>Rwanda</b>	Import tariff exemption 50 percent purchase subsidy
<b>Mozambique</b>	Tractors provided by donors or government have generous financial terms: low initial payments, below-market interest rates, and in some cases, grace periods of several years before interest due
<b>Ghana</b>	Procured by the government and sold to farmers at 50 percent down payment and the rest to be recovered without interest over a three-year period
<b>Zambia</b>	N/A
<b>Sierra Leone</b>	50 percent purchase subsidy
<b>Benin</b>	50 percent purchase subsidy
<b>Côte d'Ivoire</b>	Five-year loan

Source: Tokida 2011; Field Surveys, ABI 2011–12.

## IMPORT DUTIES AND TARIFFS ON TRACTOR AND SPARE PARTS IMPORTS IN PILOT COUNTRIES, 2011–12

Country	Duties/Tariffs on Tractors	Duties /Tariffs on Spare Parts	Issues/Comments
Tanzania	Zero rated, also exempt from VAT	Import duty of 10 percent; VAT exempt	
Kenya	Zero rated	Import duty plus VAT of 16 percent	
Burkina Faso	5 percent import duty and VAT exempt (official); in practice taxes plus VAT could add up to 16 percent	20 percent import duty; 18 percent VAT (official); actual could go as high as 34–38 percent	There are variations between what the custom books stipulated and what is actually paid
Zambia	Zero rated and exempt from VAT	15 percent import duty and 16 percent VAT for effective tax of 31 percent	
Ghana	Zero rated		
Ethiopia	Zero rated if buyers have import exemption papers; otherwise 10 percent import duty plus 15 percent VAT, if bought within six months of import	Zero rated if imported at the same time as tractors and if bought within six months of import, otherwise 10–15 percent duties plus VAT	Farmers complained of the time synchronization between import and loan disbursement; loans disbursed after government budget, which seems to fall well after the planting season
Mozambique	5 percent duty on imports of tractors for agriculture	7.5 percent duty plus 17 percent VAT	

## IMPORT DUTIES AND TARIFFS ON TRACTOR AND SPARE PARTS IMPORTS IN PILOT COUNTRIES, 2011–12

Country	Duties/Tariffs on Tractors	Duties /Tariffs on Spare Parts	Issues/Comments
Rwanda	Zero rated for agricultural tractors	15 percent import duty and 15 percent VAT for effective duty of 30 percent	
Nigeria	Zero rated for fully assembled tractors but there is a VAT of 5 percent on the importation of completely knocked down (CKD) parts		Federal government has been trying to promote tractor acquisition; tariffs on CKD were reduced from 25 to 5 percent in 2011

Source: Field Surveys, ABI 2011–12.



# BIBLIOGRAPHY

- Access Capital Research. 2012. Sector Review: Investing in Ethiopian Agriculture. Agribusiness Indicators: Burkina Faso. May 2013.
- Agribusiness Indicators: Ethiopia. Report Number 68237-ET. April 2012.
- Agribusiness Indicators: Ghana. Report Number 68163-GH. April 2012.
- Agribusiness Indicators: Kenya. January 2013.
- Agribusiness Indicators: Mozambique. Report Number 68241-MZ. April 2012.
- Agribusiness Indicators: Nigeria. July 2013.
- Agribusiness Indicators: Rwanda. July 2013.
- Agribusiness Indicators: Tanzania. November 2012.
- Agribusiness Indicators: Zambia. December 2012.
- Bank of Ghana. 2011. “Quarterly Bulletin January 2011.”
- Bumb, Balu, and Carlos A. Baanante. 1996. “World Trends in Fertilizer Use and Projections to 2020.” IFPRI, Washington, DC.
- Dorosh, Paul, Hyounghun Wang, You Liangzhi, and Emily Schmidt. 2012. “Road Connectivity, Population and Crop Production in Sub-Saharan Africa.” *Agricultural Economics* 43(1): 89–103.
- FAO and UNIDO. 2008. “Agricultural mechanization in Africa: Time for action: planning investment for enhanced agricultural productivity.” Report of an expert group meeting jointly held by FAO and UNIDO in Vienna on 29–30 November 2007.
- FAO and UNIDO. 2011. Investment in Agricultural Mechanization in Africa. Workshop organized and hosted by FAO and UNIDO, Centre for Agricultural Mechanization and Rural Technologies (CAMARTEC), 3–5 June 2009. Arusha, Tanzania.
- FAO. 2008. “Agricultural Mechanization in Africa: Time for Action, Planning Investment for Enhanced Agricultural Productivity.” Report on Expert Group Meeting, January 2008. Vienna, Austria.
- FAO. 2010. Agricultural Mechanization in Mali and Ghana: Strategies, Experiences and Lessons for Sustained Impacts. Agriculture and Food Engineering Working Document No. 8.
- FAO. 2012. *Current World Fertilizer Trends and Outlook to 2016*. Rome: FAO.
- FAO, MAFAP. Monitoring African Food and Agricultural Policies. <http://www.fao.org/mafap/>.
- Field Survey. 2011–12. Cropping Seasons. Washington, DC: World Bank.
- FinStats. 2012. *Tool to Benchmark Financial Sectors Across Countries and Time*. Washington, DC: World Bank.
- FMA & RD. 2011. National Policy on Agricultural Mechanization Development (draft). Abuja, Nigeria, May.
- Fuentes et al. 2012. IFDC and IFPRI, “Improving Fertilizer Markets in West Africa: The Fertilizer Supply Chain in Ghana,” Paper Series IFDC—P-40 December 2012.

- Gisselquist, David, and Carl E. Pray. 1999. “Deregulating Technology Transfer in Agriculture: Reform’s Impact on Turkey in the 1980s” (March 1999). World Bank Policy Research Working Paper No. 2086. Available at <http://ssrn.com/abstract=614976>
- IFDC. 2011. PRODIB (Projet de professionnalisation des distributeurs d'intrants agricoles du Burkina Faso), *Etude de géo-localisation et caractérisation des distributeurs d'intrants agricoles d'AGRODIA*. Ouagadougou, August 2011.
- IFPRI. 2013. *2012 Global Food Policy Report*. Washington, DC: IFPRI.
- IITA. 2011. “Research to Nourish Africa.” IITA Bulletin Issue No. 2095, 14–18 November.
- Improved Rice, Cowpea, and Maize Seeds in Nigeria: Policy Implications and Knowledge Gaps, Nigeria Strategy Support Program (NSSP)*. NSSP Working Paper No. 0016. Washington, DC: International Food Policy Research Institute (IFPRI).
- International Finance Corporation. 2012. “Innovative Agricultural SME Financing Models,” published in November 2012 by IFC as the lead technical advisor to the G-20 Global Partnership for Financial Inclusion.
- Kenya, MoA (Ministry of Agriculture). Various years. *Economic Review of Agriculture*. Central Planning and Project Monitoring. Nairobi: Kilimo House.
- Lopez-Pereira, M.A., and M.L. Morris. 1994. *Impacts of International Maize Breeding Research in the Developing World, 1966–1990*. CIMMYT Economics Program, Mexico. Updated in 2002 by Morris, Michael.
- Morris, M., V.A. Kelly, R.J. Kopicki, and D. Byerlee. 2007. *Fertilizer Use in African Agriculture: Lessons Learned and Good Practice Guidelines*. Washington, DC: World Bank.
- Nathan Associates. 2010. *West Africa Transport Logistics Analysis Using FastPath—Tema-Ouagadougou Corridor*. Washington, DC: USAID.
- Odame, H., and E. Muange. 2010. “Can Agro Dealers Deliver the Green Revolution in Kenya?” Working Paper No. 014. Future Agricultures, Sheahan, M.B. 2011. Analysis of Fertilizer Profitability and Use in Kenya. M.Sc. thesis, Michigan State University, East Lansing.
- O’Donoghue, T., and K. Punch. 2003. *Qualitative Educational Research in Action: Doing and Reflecting*. New York: Routledge. p.78.
- Raballand, Gael, Patricia Macchi, and Carly Petracco. 2010. *Rural Road Investment Efficiency*. Washington, DC: World Bank.
- Roberts, Peter, K.C. Shyam, and Cordula Rastogi. 2006. *Rural Access Index: A Key Development Indicator*. Transport Papers (TP-10). Washington, DC: World Bank.
- Smil, V. 2001. *Enriching the Earth: Fritz Haber, Carl Bosch and the Transformation of World Food Production*. Cambridge, MA: MIT Press.
- Sowing the Seeds of Food Security*. 2011. Paul Van Mele, Jeffery W. Bentley Bolivia, Robert G. Guéi, editors. Published by the Food and Agriculture Organization of the United Nations and the Africa Rice Center (AfricaRice) by arrangement with CAB International.
- Spielman, David J., D. Kelemework, and D. Alemu. 2011. “Seed, Fertilizer and Agricultural Extension.” Development and Governance Division, IFPRI, Ethiopia Strategy Support Program II (ESSP II). Working Paper 020, Addis Ababa, Ethiopia (IITA, 2011).

- Surface and Marine Transport Regulatory Authority (SUMATRA). 2011. Tanzania. "Report on Evaluation of Truck Freight Charges." November.
- Takeshima, H., A. Oyekale, S. Olatokun, and Sheu Salau. 2010. *Demand Characteristics for Improved Rice, Cowpea, and Maize seeds in Nigeria*. International Food Policy Research Institute, Series 16.
- Teravaninthorn, S., and G. Raballand. 2009. *Transport Prices and Costs in Africa: A Review of the Main Trade Corridors*. Washington, DC: World Bank.
- Tokida, K. 2011. "Public-Private Sector Models for Mechanization in SSA." Workshop on Boosting Agricultural Mechanization of Rice Cropping System in Sub-Saharan Africa, St. Louis, MO, 6–8 June.
- Van Mele, P., J.W. Bentley, and R.G. Guéi (eds.). 2011. *African Seed Enterprises Sowing the Seeds of Food Security*. Edited by Paul Van Mele Africa Rice Center (AfricaRice), Jeffery W. Bentley Bolivia, Robert G. Guéi Food and Agriculture Organization of the United Nations Italy. Published by the Food and Agriculture Organization of the United Nations and the Africa Rice Center (AfricaRice) by arrangement with CAB International (2011).
- Wiggins, Steve, and Sharada Keats. 2013. *Leaping and Learning: Linking smallholders to markets in Africa*. London: Agriculture for Impact, Imperial College and Overseas Development Institute.
- World Bank. 2011. *Africa Infrastructure Country Diagnostic*. Washington DC: World Bank.
- World Bank. 2012a. *Analytical Support for Agricultural Public Expenditure Scale-Up in Sub-Saharan Africa*. Presentation by Stephen Mink, Project Director. Washington, DC: World Bank.
- World Bank. 2012b. *Logistics Performance Index*. Washington, DC: World Bank.
- World Bank, Agriculture and Environmental Services. *Country Studies for Agribusiness Indicators*. Washington, DC: World Bank.
- World Bank, Agriculture and Rural Development Unit (AFTAR). 2009. "Eastern Africa: A Study of the Regional Maize Market and Marketing Costs." Report No. 49831 AFR, December. Washington, DC: World Bank.
- World Bank. 2013. *Strengthening National Comprehensive Agricultural Public Expenditure in Sub-Saharan Africa*. February. Washington, DC: World Bank.
- World Bank. 2009. *Project Information on Strengthening National Comprehensive Agricultural Public Expenditure in Sub-Saharan Africa*. Sustainable Development Department, Africa Region. Prepared by Stephen Mink, Project Director. November. Washington, DC: World Bank.





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