



**INVESTIGATION OF RISKS AND ENHANCED
OPPORTUNITIES FOR GREATER ENGAGEMENT
WITH WHOLESAL AND RETAIL PRIVATE
SECTOR INVESTORS IN REDUCING FOOD
WASTE AND SPOILAGE IN AFRICA**

FINAL REPORT

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List of acronyms

AAFEX	Association Afrique Agro Export
AFGEAN	Association of Fresh Produce Growers and Exporters Association of Nigeria
AGRA	Alliance for a Green Revolution in Africa
BMZ	German Federal Ministry for Economic Cooperation and Development
CAIT	Complexe Agroindustriel de Touba
CSR	Corporate Social Responsibility
DADTCO	Dutch Agricultural Development and Trading Company
ECX	Ethiopian Commodity Exchange
ESRF	Economic and Social Research Foundation
ETG	Export Trading Group
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
FPEAK	Fresh Produce Exporters Association of Kenya
GDP	Gross Domestic Product
GIZ	German Federal Enterprise for International Cooperation
GSS	Global Sourcing and Supply
HCDA	Horticulture Crops Development Authority
HQCF	High Quality Cassava Flour
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Center
KACE	Kenya Agriculture Commodity Exchange
KM	Kilimo Markets
METL	Mohammed Enterprise Tanzania Ltd
MT	Metric Tonnes
NFRA	National Food Reserve Agency
NGO	Non-governmental organization
NPCB	National Cereals Produce Board
RF	The Rockefeller Foundation
SNV	Netherlands Development Organisation
TA	Technical Assistance
VAT	Value-added Tax
WFP	World Food Programme
WRS	Warehouse Receipt System

Executive summary

INTRODUCTION

The Alliance for a Green Revolution in Africa (AGRA) and the Rockefeller Foundation have commissioned five studies to address food loss in Africa – a major challenge to food security and farmer livelihoods. This report focuses on smallholder farmer (SHF) engagement with private sector wholesalers and retailers, based on analyses from seven countries (*Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Senegal, and Tanzania*) across a selection of crops (*beans, cassava, groundnut, maize, onion, sesame, teff and tomato*).

KEY LEARNINGS

Knowledge and technology gaps as well as supply chain inefficiencies are the two major drivers of food loss among SHFs. Lack of know-how in appropriate methods of handling and storing produce create food loss at the farm level and numerous supply chain inefficiencies drive losses further up the value chain. These most commonly relate to inadequate supporting infrastructure (e.g., poor transportation) and mismatches between supply and demand due to limited market information or interaction between producer and final off-taker. Supply chain inefficiencies cause particularly acute losses for perishable crops and can compound losses occurring due to knowledge and technology gaps. When farmers do not find markets for their produce, they store it on-farm or at home, where improper handling and storage then becomes the immediate cause of loss.

Closer integration between SHFs and wholesalers/retailers can effectively address both these issues and is therefore key in reducing food loss. When farmers are integrated into wholesaler/retailer supply chains (and not obscured by middlemen), guaranteed markets and clear price signals create incentives for farmers and farmer organisations to adopt improved technologies and techniques that can reduce on-farm, primary storage and transport losses. In addition, wholesalers/retailers often have a vested interest in providing their suppliers with extension services that result in improved yields and quality, while reducing losses. Table A overleaf illustrates how non-integrated supply chains can compound food loss and how integrated supply chains can alleviate food loss at different stages of the value chain.

Table A: Benefits of supply chain integration to reduce food loss

	Impact on food loss	
	Non-integrated sourcing through informal intermediaries	Integrated sourcing with wholesalers/retailers
Production and harvest	<ul style="list-style-type: none"> • Farmers may harvest early or simply plant crops with no clear end market in mind (beyond what is kept for subsistence consumption) and ultimately lose produce due to lack of market. 	<ul style="list-style-type: none"> • Farmers can make seasonal decisions about land allocation and cropping to balance supply and demand dynamics with subsistence needs. • Losses due to early or late harvest and quantities of unsaleable goods are reduced because of market-driven planting decisions.
On-farm processing	<ul style="list-style-type: none"> • Market structure with no or limited rewards for quality, and poor price signals provides no incentive for farmers to invest in technologies or processes that reduce loss and improve quality. • Support that farmers receive on post-harvest issues is ad hoc and usually very limited due to over-stretched government extension programs. 	<ul style="list-style-type: none"> • Some companies invest in infrastructure such as transport and storage networks that directly reduce losses for smallholders. • SHFs receive training (typically funded by donors or end buyers) in production methods including use of improved inputs, quality standards, grading, and proper processing, packing and storage methods.
Final wholesale buyer	<ul style="list-style-type: none"> • Off-takers remain anonymous with no interaction with farmers. • Multiple layers of aggregations do not allow produce traceability and increase loss risks (via informal channels) before reaching wholesalers. 	<ul style="list-style-type: none"> • Sale in bulk at harvest means minimal on-farm processing and storage is required. • With guaranteed markets, farmers have the incentive to invest in technologies that reduce loss and improve quality of produce.

Despite the clear benefits to food loss reduction, direct sourcing from SHFs is limited among the crops and countries we analysed. By and large, wholesalers/retailers source the bulk of their produce through open markets or from their own production. The most established SHF sourcing models were found for tomato in Senegal, cassava in Nigeria, sesame in Ethiopia, and beans in Mozambique. Elsewhere informal markets still dominate, with small-scale traders and aggregators accounting for the majority of trade in nearly all crops.

However, there is growing potential for SHFs to benefit from long-term engagement with wholesalers and retailers as a result of the emerging ‘retail revolution’. Despite the limited scale of direct sourcing, consultations with private sector actors revealed significant interest in engaging more directly with farmers. In fact across many African countries large supermarket chains are expanding rapidly, replacing informal markets for a growing class of wealthy urban consumers. Many sell imported fruits and vegetables while vast quantities of fresh produce grown by domestic farmers are lost due to market inefficiency, poor logistics and inadequate transport networks. Supermarkets chains such as Spar in Nigeria, Melcom in Ghana, Nakumatt and Fresh an Juici in Kenya expressed interest in sourcing locally and reducing their reliance on imports which are susceptible to price and quantity variability.

Wholesalers and retailers identified three main advantages for integrating SHFs into their supply chain:

- **Need to limit supply risks:** Closer partnerships with SHFs can give wholesalers/retailers better control in the sourcing market, which is particularly advantageous when conditions are competitive. In addition, direct links with SHFs provide an opportunity to customise supply by setting quality norms or specifying varieties. For instance, to better control groundnut supplies, Suneor, the leading groundnut oil producer in Senegal plans to establish its own buying centers across key production zones, by-passing traditional intermediaries on which it had previously relied.
- **Policy considerations:** Wholesalers/retailers may source from SHFs to comply with regulatory requirements. For example, SABMiller in South Africa sources from local cassava farmers to meet black empowerment policy guidelines.
- **New market prospects:** The growing market for certified products such as Fairtrade creates an opportunity for further engagement with SHFs. Marks & Spencer for example converted all its tea and coffee (and subsequently other products) to Fairtrade-certified in response to growing consumer demand, bringing SHFs directly into its supply chain¹.

In addition, direct sourcing can generate positive returns for both SHFs and wholesalers/retailers. The benefits of direct sourcing to SHFs fall into three categories: **1) Income growth.** A study of vegetable farmers incorporated into supermarket supply chains in Kenya for example, showed per capita income growth of up to 50 percent, driven by selling directly to the supermarket. **2) Income stability.** Farmers' value reduced income uncertainty. In Ghana, cassava producers supplying to DADTCO's mobile processing facility are sometimes willing to sell at a price below what they could get from informal traders simply to ensure they develop a stable relationship with the company. **3) Investments in equipment and extension.** Buyers often have an incentive to ensure that their suppliers produce and harvest with maximum efficiency without compromising on quality. These actions reduce food loss at the farm level.

Loss reduction is an important outcome of these models, but not a direct return. Rather, reduced losses contribute to income growth and stability. Other benefits to SHFs were also observed in terms of infrastructure provision by the private sector. Although private sector investment is not feasible in all cases (e.g., provision of electricity for processing and cold storage), interviews with formal private buyers did reveal some commercially viable private sector contributions to infrastructure development. These include operation of village and district-level warehouses for storage of durable crops (as part of a warehouse receipts system model or simply as a standalone service), and investments in small to medium-scale processing plants (at the village or district level) to transform crops like tomato and cassava into more stable forms.

The returns to companies from direct sourcing also fall into three categories: **1) Reduced input costs.** In Nigeria for example, estimates for the grain value chain suggest that by-passing middlemen and avoiding market charges by sourcing directly from farmers can save companies 8 to 12 percent of total input costs. **2) Better control of supply.** The supermarket chain Shoprite in Nigeria has been able to ensure that fresh produce they buy from a cooperative, AFGEAN is not improperly treated with potentially harmful pesticides; and **3) Improved public image and relations.** Sourcing directly from SHFs creates positive

¹ OXFAM [May 2010] - Adapting business models to incorporate smallholders into supply chains.

brand value, as evidenced by the willingness of a supermarket chain in Ghana to pay a premium for sourcing directly from farmers.

However, expanding direct sourcing also presents significant risks. While many of the risks are specific to individual crop and country environments, general risks include:

- **Non-compliance:** Non-compliance on agreements from both sides may create an environment lacking in trust and undermine the prospects for long-term partnerships. In Kenya for instance, Promasidor, a major soybean processor piloted a direct sourcing approach with farmers, providing them with an integrated finance package for inputs. However, due to side-selling challenges it resorted to importing its raw material.
- **Political challenges to interventions:** Policymakers interviewed in this study were broadly supportive of private investment and integration with smallholders. However certain crops such as maize in Tanzania and teff in Ethiopia are important for food security and therefore subject to government motivated price adjustments and periodic export bans. These interventions create a difficult investment environment for wholesalers/retailers.
- **Farmer resistance to behavioural change:** Perhaps most frequently cited by wholesalers/retailers is the risk that farmers will be resistant to the changes in production, harvest, and post-harvest behaviour required to support greater integration with their supply chain.

STRATEGIC OPPORTUNITIES

An overarching finding of this study is that long-term direct sourcing partnerships between SHFs and wholesalers/retailers have high potential to reduce food loss. Accordingly, interventions should aim at further integrating SHFs into wholesalers/retailers' supply chains. Two main strategic approaches can be adopted, with the suitability of each varying according to market conditions and the current level of engagement between SHFs and formal private sector players in the value chain:

1. **Shorten and improve domestic linkages:** For some crops and in certain countries a sizeable number of private buyers are already sourcing from SHFs, but through long chains of intermediaries. Here, the strategy is to increase the feasibility and attractiveness of more integrated sourcing, intermediated where necessary by specialized aggregators like farmer organisations. At the same time, interventions to improve the functioning of value chains which specifically target loss reduction losses can be considered:
 - a. Organising and developing the managerial and technical capacity of farmer groups
 - b. Supporting better access to credit to finance commodity trade activities (e.g., produce aggregation by cooperatives)
 - c. Improving market norms (e.g., enforcement of contracts by both buyers and sellers) and access to price information, and creating transparent pricing schemes linked to quality which result in price signals that drive behaviour change
 - d. Providing initial coordination to bring farmer organisations, buyers, logistics providers, and banks together.

- 2. Create domestic value-addition:** For other crops and countries, there is a large volume of smallholder produce but limited procurement from the formal private sector. Where procurement does exist, it is often confined to raw produce with little value addition. In some cases there may also be substantial imports of processed forms of the same or similar crop, creating a natural opportunity to integrate smallholders and formal private buyers. Here, the strategy is to stimulate (by technical, regulatory, or financial means) value-adding activities by the private sector and simultaneously organise, equip and train smallholders to supply the required raw materials. Specific interventions can include:
- Local content policies and marketing support for local substitutes
 - Industry development through finance and technology provision
 - Research dissemination on post-harvest technologies.

In line with the above strategic approaches, we summarize the country- and crop-specific interventions in Figure A. Details on each are provided in the main body of the report.

Figure A: Overview of potential interventions per crop/countries

		Expanding and improving the sourcing relationships between SHFs and wholesalers/retailers				Creating domestic value addition		
		Organization and development of FOs	Financial support	Market norms and information access	Coordination	Local content policies	Industry development	Research dissemination
Ethiopia	Teff							
	Sesame					✓		✓
Ghana	Beans/Pulses	✓		✓	✓			
	Tomato					✓	✓	✓
	Cassava					✓	✓	
Nigeria	Tomato	✓		✓	✓			
	Cassava					✓	✓	
	Onion	✓		✓	✓			
Senegal	Groundnuts		✓					
	Tomato							
	Cassava							
Tanzania	Maize				✓			
	Bean/pulses				✓			
	Onion	✓		✓	✓			
Mozambique	Cassava						✓	✓
	Bean/pulses						✓	✓
	Groundnuts						✓	✓
	Sesame						✓	✓
Kenya	Maize			✓	✓			
	Tomato					✓	✓	
	Beans/Pulses							

An additional set of issues affecting the viability of potential interventions should also be considered:

- **Access:** Many of the most promising interventions identified in this study relate to improved organisation of production and harvest, supplemented by relatively low-tech infrastructure investments such as village-level storage. As no specialized technology or advanced infrastructure is required, accessibility of the interventions is high provided awareness barriers can be overcome.
- **Affordability:** Expanding direct sourcing may pose a financial burden in some cases. The largest investments would be required from processors, especially those involved in cassava or tomato. Fortunately, experts we spoke with noted that the minimum efficient scale for processing plants is not as high as once thought, and small or medium-scale plants may be viable in certain environments.
- **Adoption:** The successful expansion of integrated sourcing is complex but effective smallholder-wholesalers/retailers relationship models can be adopted if consistent effort is put into farmer education, buyer recruitment and sensitisation, and creation of a conducive policy environment.
- **Awareness:** Expanding stakeholder awareness requires effort in two areas. First, on-the-ground organising and sensitising of smallholders is crucial as changes in farmer behaviour are required for nearly every crop. Second, continued communication and outreach to government officials and representatives of wholesalers/retailers emphasising the strong alignment in incentives of shorter supply chains is necessary to maintain the momentum of change.
- **Innovation:** The main forms of “innovation” uncovered in this study involve new forms of organisation in production and sourcing. Several large private buyers have found innovative means of interacting with farmers. For example, investing in extremely small-scale transport (a 300kg capacity tricycle rather than a 30MT truck) and storage to bring procurement as close to the farm gate as possible, funding agronomists, supporting management training for farmer organisations, and providing salary subsidies and motorcycles to government extension agents.
- **Scale:** The scale of opportunity for smallholder engagement varies dramatically by crop and by the type of buyer. In countries we studied, the main supermarket chains have no more than one or two dozen stores each. All their produce needs could be met by only a few hundred or thousand smallholders. As a result, opportunities for serving the modern retail market, while offering substantial potential income gains would be limited to a relatively small set of farmers. On the other hand, processing markets, especially those backed by market-creating policies such as the High Quality Cassava Floor policy in Nigeria have potential for expanding farmer-wholesaler/retailer partnerships if appropriately implemented. This report identifies several opportunities, in each of the seven focus countries to increase wholesalers/retailers’ engagement with SHFs and prioritises potential high-value interventions. It is intended to serve as a reference point for future investment, research, and advocacy work.

To conclude, this report identified several opportunities – in each of the seven focus countries – to increase wholesalers/retailers’ engagement with SHFs and prioritizes potential high-value interventions. It is intended to serve as a reference point for guiding future investment, research, and advocacy work.

1. Introduction and context

FOOD LOSS IN AFRICA

Global food waste and spoilage (collectively referred to in this document as “food loss”) constitutes a major challenge to food security and farmer livelihoods across the world. Current global food loss reduces income by at least 15 percent for 470 million smallholder farmers (SHF) and upstream value chain players, aggravating issues of food insecurity, price volatility, and inadequate yields.² These losses contribute to critical global food shortages, impacting the 1.2 billion people in the developing world who are food insecure.³ Food losses in the value chain prior to consumption—which account for 90 percent of total losses in developing countries—negatively affect food availability and drive prices up.⁴

By volume, food crops (e.g., cereals, fruits and vegetables, roots and tubers, pulses) account for the majority of losses, and fruits and vegetables have the highest rate of loss, at an estimated 46 percent of total global production.⁵

The problems of food loss in Africa are particularly acute due to the severity of food insecurity, as outlined in Figure 1 below. Nearly 240 million people in Sub-Saharan Africa (SSA) lack access to sufficient food, and the problems of hunger and food insecurity will continue to grow rapidly as the region’s population is expected to more than double by 2050.⁶ Losses in grain value chains in the region alone are estimated to be worth \$4 billion per year.⁷

² “Waste and Spoilage in the Food Chain,” Decision Intelligence Document, Dalberg, May 2013

³ Calculation of 1.2 billion people comes from FAO food inadequacy indicators listing 22.5 percent of developing country population as food inadequate multiplied by 2011 population data provided by the World Bank World Development Indicators.

⁴ “Global Food Losses and Food Waste,” FAO, <http://www.fao.org/docrep/014/mb060e/mb060e.pdf>, 2011.

⁵ Ibid.

⁶ Bremner, Jason, “Population and Food Security: Africa’s Challenge,” Population Reference Bureau, <http://www.prb.org/Publications/Reports/2012/population-food-security-africa-part1.aspx>, February 2012

⁷ “MISSING FOOD: The Case of Postharvest Grain Losses in Sub-Saharan Africa,” The World Bank, http://siteresources.worldbank.org/INTARD/Resources/MissingFoods10_web.pdf, April 2011.

Figure 1: Intensity of food insecurity in lower income countries, 2012

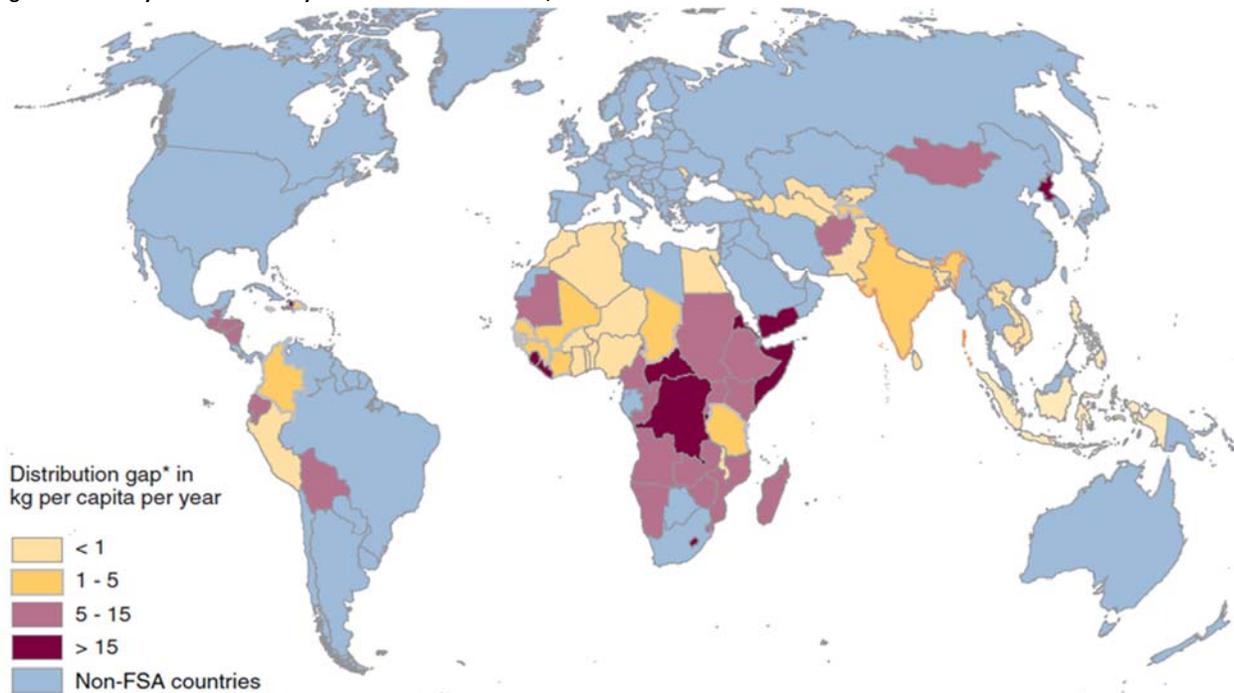
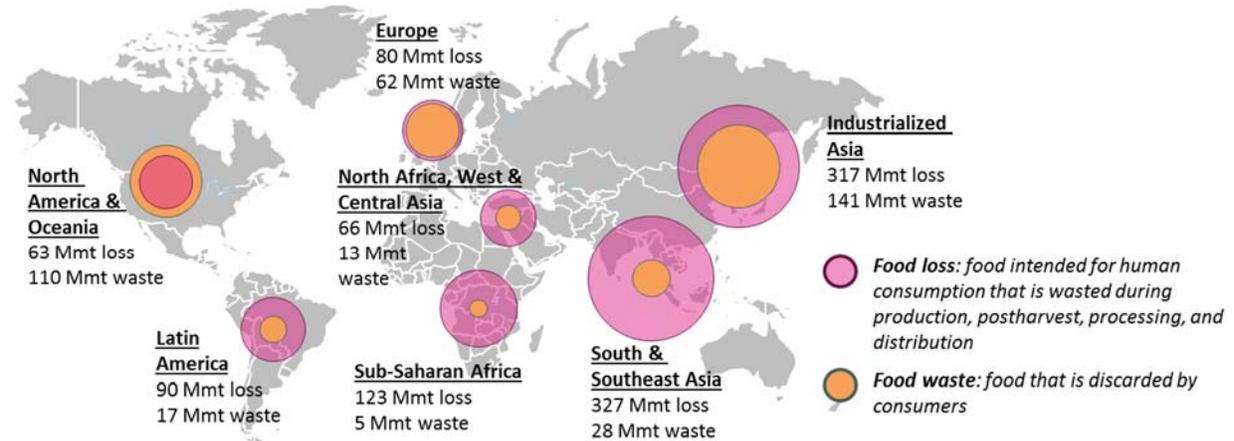


Figure shows the difference between projected food availability and the food needed to increase consumption in food-deficit income groups within individual countries to meet the recommended nutritional target.

Source: (1) Figure and explanation from USDA International Food Security Assessment 2012-2022

As outlined in Figure 2 below, food losses in SSA are concentrated in upstream segments of the value chain where they are most harmful to producers, especially smallholder farmers. Losses prior to consumption directly impact farmers by reducing the quantity of produce they can sell, lowering the value of their goods, or thinning already low margins. All these factors result directly in lost income for smallholder households, many of which suffer from severe poverty already.

Figure 2: Food waste and food loss around the World, Millions of Metric Tons



Mmt = million metric tonnes

Source: (1) FAO "Global Food Losses and Food Waste," 2011; Dalberg analysis

CONTEXT AND OBJECTIVES

In the context of these enormous challenges, AGRA and the Rockefeller Foundation seek to address problems of food loss in SSA through a new initiative. To design this initiative to maximize impact, the organizations have commissioned five separate studies to inform its strategy and approach.⁸ Each study seeks to deepen the organizations' understanding of a specific component of the problems of loss.

This report focuses on opportunities for enhanced private sector engagement to reduce the problems of food loss in the value chain. Specifically, it seeks to identify opportunities to improve relationships between private sector actors – which in this report means formal-sector wholesale and retail market participants - and smallholder farmers in ways that reduce losses. At a high level, questions guiding the study included:

- What role can the private sector play in addressing investment gaps in postharvest infrastructure and market linkages?
- What is the role of produce aggregation in increasing farmers' access to markets, and what kind of interventions would enable farmer organizations to play a larger role in reducing losses?
- What incentives exist or need to be created for the private sector to invest in postharvest infrastructure targeted at smallholder farmers? What are the incentives for smallholders to sell to formal private buyers?

With these questions in mind, our investigation began by exploring two possible approaches to expanding the role of private companies in reducing food losses. The first examined ways to **enhance market access for smallholders** through the promotion of mechanisms and business models that integrate smallholders into the supply chains of private companies that are not yet sourcing directly from these farmers. The second sought to identify approaches to **improve existing relationships** between smallholder farmers and formal private off-takers in ways that reduce food losses. The learning outcomes of the study include prioritized strategies and interventions for enhancing benefits to smallholders in alternative models of engagement with the large scale private sector.

This report aims to synthesize the findings of this wide-reaching investigation into challenges and opportunities to reducing food loss. Simultaneously, it seeks to capture the nuances and details of specific challenges in the countries and crops of focus to provide AGRA and the Rockefeller Foundation with actionable information about current market conditions and opportunities. To this end, the report is structured as follows:

- **Section 3** provides a brief overview of our *methodology and approach* to research and interviews.
- **Section 4** focuses on *key learnings from the field*, including a synthesis of the primary causes of post-harvest losses in the value chains we examined and an overview of existing sourcing

⁸ The other four studies are as follows: (i) Investigation of AGRA's In-House Stock of Knowledge on Reducing Food Waste and Spoilage in Africa; (ii) Investigation of the role of Innovative Finance in Creating Conditions of Scale for Waste and Spoilage Reducing Technologies and Initiatives in Africa; (iii) Investigation of Issues and Challenges Facing African Smallholder Farmers and Highest Potential Intervention Points in Reducing Waste and Spoilage in African Food Systems; and (iv) Investigation of Policy And Regulatory Requirements and Interventions for Reducing Waste and Spoilage in Africa's Food Systems

relationships between wholesalers/retailers and smallholders in crops and countries of focus. Section 4 also contains an analysis of market conditions that may drive the growth of direct sourcing relationships in future and the incentives for increased engagement between smallholders and formal private buyers in each crop.

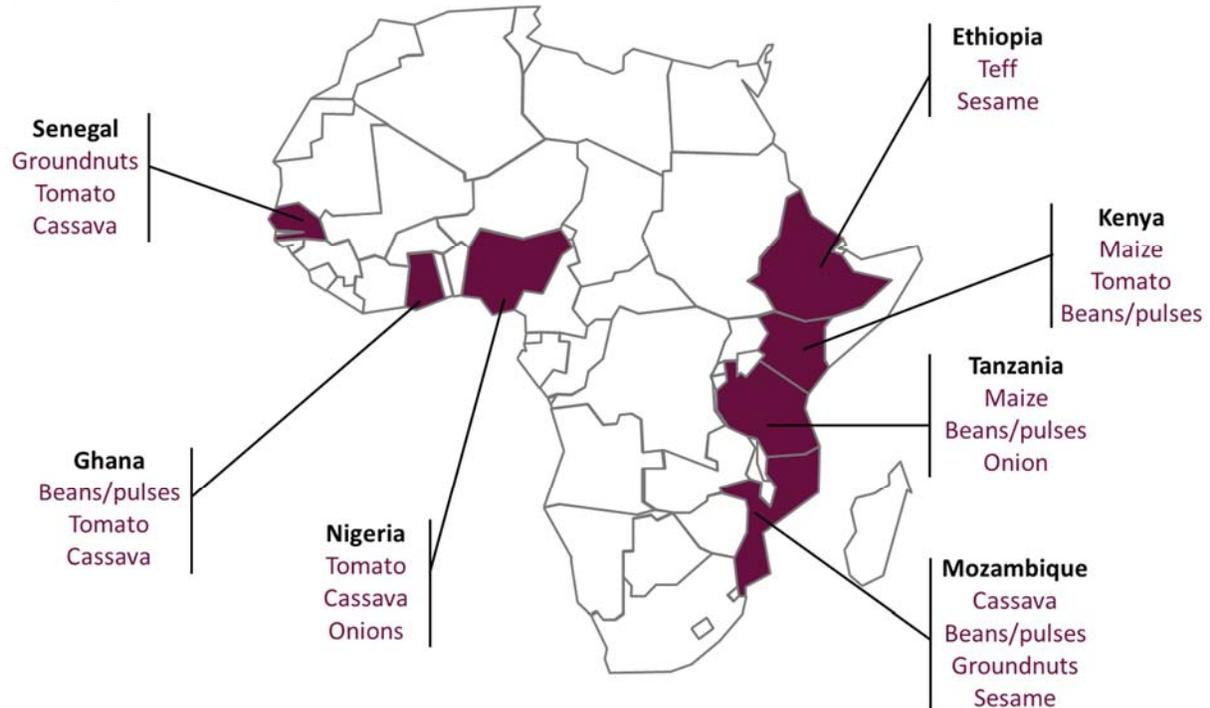
- **Section 5** focuses on *strategic implications for Rockefeller and AGRA*. It builds on Section 4 to summarize the potential impacts on post-harvest loss of moving towards more direct sourcing models and synthesizes country- and crop-specific findings on economic incentives, risks, and challenges.
- **Section 6** breaks down *strategic implications for targeted crops and countries*, focusing on potential interventions to expand private-sector sourcing from smallholders in specific value chains. Section 6 concludes with a high-level prioritization of intervention opportunities based on qualitative impact and feasibility considerations.
- **Annexes 1 and 2** contain details of the best-practice models of smallholder and large buyer interactions that were observed during the study, as well as enabling environment interventions, and are intended to serve as a reference for AGRA and RF in understanding what factors make smallholder-private sector interactions successful and economically viable.
- **Annex 3** presents a list of all stakeholders consulted during country visits.

2. Methodology, approach, and definitions

STUDY SCOPE

The study focused on a range of crop value chains across seven countries in East and West Africa as outlined in Figure 3 below. Crops were selected to include a balance of staple and cash crops that are both important to smallholders—in terms of food security and income—and also at risk of significant losses.

Figure 3: Geographic and commodity focus of the study



INITIAL HYPOTHESES

The investigation was driven by hypotheses about natural overlaps between private-sector economic incentives and key sources of loss for farmers. We began by identifying three categories of private buyers of produce (further detail on this categorization is presented in Section 4). For each category, we made hypotheses about the needs and challenges that would drive them to interact with smallholders. For example, a supermarket that sells fresh tomatoes faces a different set of requirements than a tomato paste processor—while the supermarket likely cares most about a tomato’s colour and shelf life, a paste processor is more likely to care about other technical qualities like water content and weight. We hypothesized that some buyers would have strong incentives to work directly with smallholders to ensure reliability of quantity and quality in sourcing certain commodities, while in certain value chains these incentives would be relatively weak. These hypotheses were used to select targeted interviewees in each focus country, to prepare interview questionnaires, and to guide extensive desk research.

RESEARCH SOURCES

Research for this study made use of four types of primary and secondary research. Existing literature on both the global and regional problems of food loss and also country- and crop-specific papers and

overviews were reviewed and synthesized. Specific sources included: FAO publications, the African Journal of Agricultural Research, internal Dalberg resources, government websites and publications, AGRA reports, donor project overviews and report, and other relevant papers and reports. Following this literature review was an expert consultation that drew upon internal Dalberg team experts, outside experts from institutions like the FAO, WFP and FARA, and relevant AGRA grantees from across Africa.

The majority of primary research took the form of in-country stakeholder interviews as part of visits to each of the seven target countries. In each country, interviews were conducted with a minimum of ~10-12 policy-makers, private companies, development partners, NGOs, and representatives from producer and other industry groups. In certain countries, where feasible, focus groups and interviews were also conducted with smallholder farmers or farmer organizations. See Annex 3 for a full list of interviewees in each country.

INTERVIEW METHODOLOGY

In-country interviews were designed to test initial hypotheses and understand a degree of detail not available in secondary research sources regarding specific constraints and opportunities in each value chain. Interviews with each category of stakeholder had a distinct purpose, driven by questions that included:

For wholesalers/retailers:

- *What is the structure of existing supply chains and to what degree are companies currently sourcing from smallholders?*
- *Are the hypothesized economic incentives for companies to source from smallholders in place?*
- *What do direct sourcing relationships look like and how were they formed?*
- *What policy, financial or enabling environment obstacles exist that prevent certain types of actors from direct sourcing?*
- *What are the biggest concerns that companies have about engaging farmers directly?*
- *Are companies aware of post-harvest loss problems, and are there incentives to support their suppliers in reducing losses?*

For smallholders and farmer organization:

- *How significant are current losses, and what are the causes?*
- *What is the appetite of farmers to engage with formal private sector buyers?*
- *For those engaged in sourcing relationships, how are they working and what are the benefits?*
- *What concerns do farmers have about dealing with commercial buyers? What are the risks?*

For experts (including policy makers, donors, and academics):

- *What market trends and structural issues impact the ability of formal-sector private companies to source directly from smallholders?*
- *What are the emerging opportunities and how can private players take advantage of them in ways that support loss reduction for smallholders?*
- *What enabling environment factors can be leveraged to help expand sourcing relationships?*

3. Key learnings

Given the nature of this study, it is critical to begin with an understanding of the main drivers of food loss at farmer level. In our work, we identified two major drivers of food loss among smallholder farmers. The first is supply chain inefficiencies and the second, knowledge and technology/equipment gaps:

- **Supply chain inefficiencies** can take many forms. Most common, however, are supply and demand mismatches that result from highly fragmented markets and limited or no interaction between the producer and final off-taker. For large companies, these breakdowns can create costly inconsistencies that reduce throughput and revenue. Inefficiencies can drive losses for smallholders when they produce in the absence of adequate market information. For perishable crops like tomato, this situation results in losses simply when the produce spoils due to lack of market. For durable crops, losses may not result immediately from lack of market. But the longer the produce remains in informal channels or on the farm, the higher the risk of loss due to disease, rot, or pest infestation. In cassava, for example, a production glut may not appear problematic at first glance because farmers can simply leave roots in the ground. But doing so increases the risk of loss due to flood or other natural occurrence and also has an opportunity cost for the farmer who is unable to use the occupied land.
- **Knowledge and technology gaps** can result in losses at the farm level when farmers do not know appropriate methods for handling and storing produce or do not have access to the best technologies that reduce losses. These gaps can be compounded by supply chain inefficiencies, because when farmers do not find markets for their produce and are forced to keep it on-farm, improper handling and storage techniques and equipment can become the immediate causes of losses. For example, in grains and cereal crops, major sources of loss are pest infestations or rot during storage. These losses can usually be prevented with relatively simple and cheap technologies like hermetic bags or chemical treatments, but such solutions are not accessible to farmers in many places. In addition, farmers often lack the financial incentive or capacity to invest in such solutions even when they are available, given the inefficient market conditions that limit their ability to sell produce.

Losses driven by these two factors create a feedback loop that contributes to widespread poverty. Farmers who are unable to access markets for their produce or who are forced to sell at low prices do not earn sufficient income to invest in appropriate equipment for their farms. Without these investments, on-farm losses continue to be a problem. External financing is unavailable to the majority of farmers, and investing in upgrades is risky without proper market incentives.

Many of these causes of smallholder food losses are consistent across crops. But some factors are specific to crops or crop categories. It is important to understand these different features and the varying severity of the common causes across value chains in order to clearly understand the root causes of loss in a given value chain and properly design interventions. Table 1 below outlines primary causes of on-farm losses in commodities of focus.

Table 1: Crop-specific loss drivers⁹

	On-farm causes of loss
Beans/pulses	<ul style="list-style-type: none"> • Grain shattering due to dryness or improper handling. • Introduction of impurities that lower the value of the product or expose grains to contaminants. • Insufficient drying or inconsistent moisture content during grain threshing. • Improper threshing resulting in grain breakage and other losses in quality. • Poor storage conditions (including bags used, heat and humidity, exposure to light, and pests) leading to degradation (e.g., weight loss) and deterioration that result in partial or sometimes complete losses.
Maize	<ul style="list-style-type: none"> • Diseases and pests attacking mature cobs and causing losses prior to harvest • Grain breakage or other damage due to handling during and after harvest • Damage during de-husking and threshing • Aflatoxin contamination • Insects, rodents, and weevils leading to degradation and losses in storage
Groundnuts	<ul style="list-style-type: none"> • Seed shattering due to dryness or improper handling • Introduction of impurities that lower the value of the product or expose grains to contaminants • Insufficient drying or inconsistent moisture content during shelling • Poor storage conditions (including bags used, heat and humidity, exposure to light, and pests) leading to degradation (e.g., weight loss) and deterioration that result in partial or sometimes complete losses
Sesame	<ul style="list-style-type: none"> • Shattering due to over-maturation and dryness (and because many farmers grow a shattering variety). • Sesame seed bug infestation in field and during storage. • Introduction of impurities that lower the value of the product or expose grains to contaminants. • Poor storage conditions (including bags used, heat and humidity, exposure to light, and pests) leading to degradation (e.g., weight loss) and deterioration that result in partial or sometimes complete losses.
Teff	<ul style="list-style-type: none"> • Lodging (the wilting and breaking of grain stems while in the field) causing in-field losses due to inability to harvest or introduction of impurities. • Grain shattering from improper harvesting or handling.
Onions	<ul style="list-style-type: none"> • Pests (including onion fly, thrips, and leafminers) and diseases (including different rots, rusts, and blights) causing losses during production (after maturation but prior to harvest) and post-harvest.
Cassava	<ul style="list-style-type: none"> • Disease infestation while still in-field. • Rot following maturation and prior to harvest due to floods or rains. • Quality loss (reduced starch content or hardening of roots) if roots are left in the ground for too long following maturation.

⁹ Information on crop-specific drivers of loss was drawn from a comprehensive literature review across focus crops and included technical research papers, value chain analyses, and academic studies. Causes that emerged as common to multiple crops were synthesized and generalized for consistency.

On-farm causes of loss	
Tomatoes	<ul style="list-style-type: none"> • Pests (including mites, worms, and leafminers) and diseases (including blight, wilt, and spotted wilt virus) during production (after maturation but prior to harvest) and also post-harvest. • Damage to produce during and after harvest from poor handling. • Over-ripeness leading to rot or quality loss. • Decayed produce spreading diseases to healthy crops. • Exposure to high temperatures driving water loss that lowers value or causes spoilage. • Poor packaging leads to bruising or other damage.

While on-farm losses may directly result from limited knowledge or poor technology, a sizeable share of loss can be addressed through improvements in the supply chain by allowing farmers to sell produce more quickly after harvest through formal market channels. In this regard, wholesalers/retailers through their offtake capabilities can provide stable markets for farmers produce and help address inefficiencies in the supply chain, thus reducing overall losses. The section that follows gives an overview of the different types of private players considered in this study, discusses the motivations (factors) driving their sourcing approach and the implications in terms of future SHF engagement.

TYPOLOGIES OF SHF ENGAGEMENTS

Formal private-sector companies of various sizes are playing an increasingly important role in agriculture and food value chains across Africa, as seed and input manufacturers, service providers, and off-takers. While different types of companies can impact food loss, this study’s focus is on large buyers (wholesalers/retailers). We have identified three categories of relevant companies that buy produce: 1) **wholesalers and exporters**; 2) **food processors and manufacturers**; and 3) **supermarkets and retailers**.

- **Wholesalers and exporters:** These companies buy and aggregate produce for sale in local or export markets and tend to operate with low-margin, high-volume business models.
- **Food processors and manufacturers:** These companies transform raw commodities into finished goods like tomato paste and beer. Because most of these businesses are capital intensive or have high start-up costs, they require a steady supply of raw materials in order to be economically viable.
- **Supermarkets and retailers:** These companies sell commodities—typically fresh produce—in their stores. Because they interact directly with individual consumers, supermarkets tend to put in place strict quality standards. Due to historic challenges in African agriculture, many such stores rely on imports of produce to ensure they sell only the highest quality products. However, importing is becoming increasingly expensive, and price volatility on global markets are increasingly making local sourcing more attractive for these companies.

These companies source raw materials in a number of different ways. Looking at the different sourcing options that wholesalers/retailers can potentially use, we have identified three main typologies with varying degrees of SHF engagement, outlined in Table 2 below.

Table 2: Typologies of SHF engagement based on wholesalers/retailers' sourcing options

Typologies of SHF engagement	Key characteristics	Level of SHF engagement	When does it apply (why do companies use this approach?)
<p>1. Commodity sourcing through long term strategic partnerships with SHFs.</p>	<ul style="list-style-type: none"> In this approach, buyers establish sourcing arrangements with SHFs through options such as forward delivery contracts, out grower schemes or open agreements. This approach typically requires aggregation points through farmer organizations/cooperatives, but new models with private aggregators – or specialized intermediaries are also emerging. 	<ul style="list-style-type: none"> High – active long term partnerships with SHFs. 	<ul style="list-style-type: none"> Our research suggests that there are three reasons leading companies to adopt this sourcing approach: <ul style="list-style-type: none"> Need to limit supply risks: Closer partnership with farmers can give companies better control in the sourcing market—particularly when it is competitive—and the opportunity to customize their supply by setting quality norms or requiring specific varieties. As an example, to better control groundnut supplies, Suneor (the leading groundnut oil producer) in Senegal is currently planning to establish its own operated groundnut buying centers across key production zones and bypass traditional intermediaries on which it relied thus far. Policy considerations: Buyers may source from SHFs to meet various policy requirements (e.g. SABMiller in South Africa to comply with black empowerment policies). New market prospects: The growing market for certified products such as Fairtrade create an opportunity for further engagement with SHFs. For example, Marks & Spencer converted 100 percent of its tea and coffee (and subsequently other products) sourcing to Fairtrade-certified products in response to growing consumer demand¹⁰.

¹⁰ OXFAM - Adapting business models to incorporate smallholders into supply chains.

Typologies of SHF engagement	Key characteristics	Level of SHF engagement	When does it apply (why do companies use this approach?)
2. Commodity sourcing from open markets.	<ul style="list-style-type: none"> Wholesalers/retailers under this model do not engage in any form of sourcing partnership with SHFs – commodities are purchased through various intermediaries or imported. 	<ul style="list-style-type: none"> Medium to Low – Does not involve direct engagement with SHFs. 	<ul style="list-style-type: none"> Our research suggests that buyers resort to this sourcing approach when they have less stringent traceability requirements and when target commodities are readily available from various sources within the country or can be competitively imported.
3. Production of own commodities.	<ul style="list-style-type: none"> This is a vertically integrated sourcing approach where companies produce their own commodity supplies. 	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> When feasible, e.g. easy access to land, companies may opt for producing their own supplies.

As will be discussed in Section 4, the first typology ‘long term strategic partnerships with SHFs’ is the one with the highest potential to impact SHF and reduce food loss since it addresses supply chain inefficiencies through farmer integration into secured markets. It is therefore necessary to better understand the current levels of smallholder integration in formal private sector supply chains across our target crops.

COMMODITY SOURCING THROUGH LONG TERM STRATEGIC PARTNERSHIPS WITH SHFs

The following tables give an overview of existing sourcing arrangements in crops and countries of focus, based on desk research and interviews with companies and experts during country visits. Additional information about many of the companies cited can be found in Annex 1.

Ghana			
Crop	Engagement level	Overview	Key players
Cassava	 <p><i>Few examples of direct sourcing; limited scale</i></p>	A few medium and large scale processors source directly to supply breweries; no existing market for other processed cassava products (e.g., HQCF) or formalized market for traditional food products (e.g., <i>gari</i>).	<ul style="list-style-type: none"> DADTCO – supplies to SABMiller/Accra Breweries Ltd. Ayensu Starch Company – supplies to Guinness, cassava sourced by Export Trading Group (ETG).
Beans/pulses	 <p><i>No examples of direct sourcing</i></p>	Limited direct sourcing of beans in any formal channels.	<ul style="list-style-type: none"> Savannah Farmers Marketing Company (soy, maize, and rice)—<i>not currently active in beans/pulses of interest.</i>

Ghana			
Crop	Engagement level	Overview	Key players
Tomato	 <p><i>Few examples of direct sourcing; limited scale</i></p>	Nearly all trade is informal, with complex market structure dominated by traders (“market queens”); one food supply company piloting direct sourcing and three defunct tomato paste factories.	<ul style="list-style-type: none"> • Global Sourcing and Supply – provides food and catering services, sourcing tomatoes from smallholders through project with iDE. • TEPCO & Northern Star – <i>defunct tomato factories.</i> • <i>Many supermarkets selling produce but no direct sourcing.</i>

Nigeria			
Crop	Engagement level	Overview	Key players
Cassava	 <p><i>Number of direct sourcing examples; moderate scale</i></p>	Several medium- and large scale processors source directly from SHFs and farmer groups to supply growing demand for cassava flour (HQCF) driven by government-mandated replacement policy.	<ul style="list-style-type: none"> • DADTCO – mills HQCF and supplies wet cake to other millers. • Thai Farms – mills HQCF, sourcing partly from SHF and from own-farm. • MATNA Foods – starch manufacturer.
Onion	 <p><i>No examples of direct sourcing</i></p>	Market is dominated by traditional traders, with no formal marketing or processing.	<ul style="list-style-type: none"> • None.
Tomato	 <p><i>Few examples of direct sourcing; limited scale</i></p>	Most trading is informal, but some retailers are beginning to work with farmer organizations, and some processors are exploring SHF sourcing.	<ul style="list-style-type: none"> • City Fresh Produce Markets – formal aggregator for fresh produce. • Shoprite/AFGEAN – AFGEAN (farmer organization) aggregates and supplies fresh produce to supermarket, working closely with a few SHF. • Dansa Foods – constructing major tomato processing plant in North with plans to source directly.

Senegal			
Crop	Engagement level	Overview	Key players
Cassava	 <i>No examples of direct sourcing</i>	No private industry or formal markets for cassava outside of artisanal processing for traditional food products.	<ul style="list-style-type: none"> None.
Groundnut	 <i>Few examples of direct sourcing; limited scale</i>	Some formal marketing, but sourcing relationships between processors and farmers are mostly indirect, relying on intermediaries.	<ul style="list-style-type: none"> Suneor, CAIT – groundnut oil processors engaging in mostly indirect sourcing.
Tomato	 <i>Nearly all sourcing is direct, with demand for SHF produce exceeding supply</i>	Strong direct sourcing relationships between the three major tomato paste processors and smallholders farming tomatoes on a government irrigation project in the Senegal River Valley; market is effectively saturated, with processors unable to meet full need for fresh tomatoes (though still operating near capacity) and preparing to invest in their own farms to supplement SHF supply.	<ul style="list-style-type: none"> Takamul, SOCAS, Agroline – sourcing tomatoes from smallholders in the Senegal River Valley irrigation project.

Ethiopia			
Crop	Engagement level	Overview	Key players
Sesame	 <i>Few examples of direct sourcing; limited scale</i>	Outgrower strategies being pioneered by some private sector actors for hulling and export.	<ul style="list-style-type: none"> Selet Hulling – sesame exporter/processor engaging in direct sourcing. Ethiopia Commodity Exchange (ECX) – government-run commodity with almost full control of trade in all crops, making direct sourcing difficult.
Teff	 <i>Few examples of direct sourcing; limited scale</i>	Middlemen still very prominent in market, but some processors developing short (e.g., one intermediary) value chains.	<ul style="list-style-type: none"> Mama Fresh Injera – processor sourcing teff from SHF for baking injera. ECX – <i>see above</i>.

Kenya			
Crop	Engagement level	Overview	Key players
Beans/pulses	 <i>Few examples of direct sourcing; limited scale</i>	Some examples of direct sourcing relationships with smallholders in beans and pulses; Few wholesalers/retailers buying dry beans and pulses directly from farmers.	<ul style="list-style-type: none"> Frigoken – operating large scale outgrower scheme for fresh beans.

Kenya			
Crop	Engagement level	Overview	Key players
Maize	 <p><i>Few examples of direct sourcing; limited scale</i></p>	Differences in the maize market depending on whether sourcing is for wet maize or dry maize. Wet maize market is small and some companies source directly from farmers to package wet maize in cans and ready-to-eat foods. Dry maize market is the biggest in Kenya as it is the staple food in the country. Almost all dry maize is milled and millers source it mainly from wholesalers and traders with no direct sourcing from farmers.	<ul style="list-style-type: none"> • Trufoods – sources directly from farmers for their wet maize products. • ETG - provides inputs on credit to contracted growers.
Tomato	 <p><i>Number of direct sourcing examples; moderate scale</i></p>	Number of examples of supermarkets sourcing fresh produce directly from farmers, some utilizing an NGO intermediary.	<ul style="list-style-type: none"> • Nakumatt / Fresh an Juici: Most of the sourcing of fresh produce (including tomatoes) is directly from smallholders with Fresh an Juici providing technical assistance. • Tuskys – sourcing from certified smallholders. • Uchumi – sourcing 10 percent of fresh fruits and vegetables from small farmers.

Mozambique			
Crop	Engagement level	Overview	Key players
Beans/pulses	 <p><i>Number of direct sourcing examples; moderate scale</i></p>	Nascent contract farming strategies from major exporter/ conglomerate/ processor; limited direct-to-supermarket retailing in addition to sourcing through small traders.	<ul style="list-style-type: none"> • ETG – offers purchase contracts, providing inputs and mechanization services. • Maeva Agro – contract farming. • Shoprite – buying loose beans from single SHF but planning to grow.
Cassava	 <p><i>Few examples of direct sourcing; limited scale</i></p>	One processor-NGO partnership working with 1500 farmers but most grow for subsistence selling surplus through informal markets and small traders.	<ul style="list-style-type: none"> • DADTCO/IFDC – supplying cassava wet cake to SABMiller. • Maeva Agro – contract farming.
Groundnut	 <p><i>Number of direct sourcing examples; moderate scale</i></p>	Some direct-to-supermarket sourcing and nascent contract farming from minor processors but dominated by informal traders; some exporters buying at farm gate/aggregation points.	<ul style="list-style-type: none"> • Olam – partnering with SNV to pilot outgrower scheme.
Sesame	 <p><i>Number of direct sourcing examples; moderate scale</i></p>	Oligopolistic structure of many suppliers and a few buyers who export and engage with farmers directly through own agents or nascent contract farming arrangements.	<ul style="list-style-type: none"> • ETG – offers purchase contracts, providing inputs and mechanization services; also piloting sesame oil processing facility for export rejects. • Olam – partnering with SNV to pilot outgrower scheme.

Tanzania			
Crop	Engagement level	Overview	Key players
Beans/pulses	 <p>Number of direct sourcing examples; moderate scale</p>	Some major processors working with FOs, but most sourcing still through one or more small trader steps.	<ul style="list-style-type: none"> • ETG – large scale contract growing with significant farmer support. • Kilimo Markets – working with farmer organizations to source. • Mohammed Enterprise TZ– <i>only indirect sourcing through traditional middlemen.</i> • Shoprite – began sourcing from ~500 farmers through donor-funded project.
Maize	 <p>Few examples of direct sourcing; limited scale</p>	Some major millers working with FOs, but most sourcing still through informal channels or relying on small traders.	<ul style="list-style-type: none"> • ETG – large scale contract growing with significant farmer support. • Kilimo Markets – working with farmer organizations to source. • Mohammed Enterprise TZ and Bakhresa – <i>only indirect sourcing through traditional middlemen.</i>
Onion	 <p>Few examples of direct sourcing; limited scale</p>	Market dominated by informal traders, although more professionalized local SMEs are beginning to appear and organize farmers.	<ul style="list-style-type: none"> • Shoprite – began sourcing from ~500 farmers through donor-funded project, though current status is unknown.

From the previous findings, direct smallholder sourcing is currently limited in most value chains. The most established engagements are in tomato in Senegal and Kenya, cassava in Nigeria, sesame in Ethiopia, and beans in Mozambique. Informal markets still dominate, with small-scale traders and aggregators accounting for the majority of trade in nearly all crops.

Despite the limited scale of direct sourcing in most value chains, consultations with private sector actors revealed significant interest in engaging more directly with farmers, as they believe that this can lead to greater profits and reduced inefficiencies. In the following sections, we present findings from discussions with companies on their incentives to expand smallholder sourcing arrangements.

FUTURE PROSPECTS: PRIVATE SECTOR INTEREST IN EXPANDING SMALLHOLDER SOURCING

Interviews with private companies operating in target countries point to a number of opportunities for greater engagement with smallholders. Some companies already sourcing raw materials from smallholders are looking for opportunities to expand these engagements, driven by natural market incentives. Others are interested in piloting direct sourcing models to overcome challenges with supply chains. These companies indicated a number of benefits they can give to smallholders, including but not limited to: Guaranteed markets for produce, floor prices or price premiums, purchase contracts, provision of better extension services or technical assistance, transportation and logistical support, and access to

finance and/or improved inputs. Many, however, expressed the need for additional support to intermediate, finance, or jump-start these engagements.

The following paragraphs outline opportunities **(as expressed by companies)** for greater engagement with smallholders. They are drawn from conversations with companies and outline current market conditions and actions that companies suggest they are willing to take to expand smallholder sourcing.

Tomato paste processing – Ghana, Nigeria and Kenya: As of April 2014, no wholesalers/retailers are processing domestically-grown tomatoes in Nigeria or Ghana. In both countries, a number of state-owned factories have been sold to private bidders, but obstacles remain to resuming operations (more on this in section 6). From conversations with these companies and other experts involved in the tomato sector, there may be significant potential for direct sourcing from smallholders when these factories become operational. Investing in direct sourcing relationships with smallholders allows companies to reduce price volatility that is driven by the high seasonality of tomato production. These engagements also give companies greater control over the variety grown and quality of produce, to ensure that processed products meet consumer demands. Companies suggest they are likely to develop their own farms, both to support necessary volumes and also to serve as nucleus farms that act as aggregation and training centers for smallholder suppliers. Contractual arrangements and fixed prices (or price floors) may also be possible, which would significantly benefit farmers during the seasonal glut. Finally, companies suggest that they can offer a guaranteed market for smallholder produce, assuming farmers grow the proper varieties for paste processing.

Companies potentially interested:

- **Dansa Foods** – Nigeria
- **TEPCO** – Ghana
- **Trufoods** – Kenya

Fresh produce marketing – Ghana, Nigeria and Kenya: In Nigeria, Ghana, and across Africa, large supermarket chains are expanding rapidly, replacing informal markets for a growing class of wealthier urban consumers. Today, most of these stores do not sell locally grown produce but rather import fruits and vegetables from other parts of the continent or from overseas. At the same time, vast quantities of fresh produce grown by domestic farmers go to waste because of a lack of market or inefficient logistics and transport networks. Supermarkets express interest in correcting these inefficiencies to reduce their own reliance on imports, which are susceptible to price and quantity variability. Sourcing fresh produce locally also reduces the time from harvest to shelf, which cuts costs by lengthening shelf life and reducing throwaways. Quality is also particularly important for supermarkets, as they are directly consumer-facing, and direct sourcing allows for greater control over quality. Large supermarket chains are also very aware of their public image and see opportunities for positive reputational gains by sourcing locally and integrating smallholders into their supply chains. Some companies even suggest they would pay a price premium of a few percent over other sourcing channels to be able to purchase from smallholders. For farmers, these engagements offer opportunities to secure guaranteed markets for their produce and to receive training on grading and packing, reducing spoilage on-farm and throwaways at the time of sale.

Companies potentially interested:

- **Spar (supermarket chain)** – Nigeria
- **Melcom Ltd (supermarket chain)** – Ghana
- **Global Sourcing and Supply (caterer)** – Ghana
- **Nakumatt / Fresh an Juici (supermarket chain)** – Kenya

Groundnut processing – Senegal: Senegal is one of the world’s largest groundnut producers, with a significant and growing export market. After a production surplus in 2010, the government opened the sector to exports. But national production fell in the following years due to a drop in price (because of the 2010 surplus), creating a demand gap in recent years. 2012 production was approximately 700,000 MT, and domestic demand alone is estimated to be nearly 1 million MT. Exports continue to grow, though domestic processing remains limited, with most produce that enters formal channels only shelled before export. As prices rise again, production is expected to grow, and a number of companies are preparing to expand domestic processing capacity (specifically for oil milling). These companies expressed interest in sourcing directly from smallholders for a number of reasons. Most importantly, working with farmers is seen as one of the best ways to ensure a reliable supply of raw materials to operate factories at capacity, in light of supply constraints in recent years. With significant competition in the market from the export sector, companies see opportunities to develop trusting relationships with farmers and have expressed willingness to pay price premiums for quality nuts, provide improved harvesting tools to farmers, and support necessary infrastructure development like installing appropriate storage equipment to support aggregation at the village level. For farmers, these relationships represent opportunities to reduce storage losses by selling to a buyer immediately after harvest.

Companies potentially interested:

- **Suneor** – Senegal
- **Complexe Agroindustriel de Touba** – Senegal

Cassava processing – Ghana, Nigeria and Mozambique: Cassava is an important staple crop in Ghana, Nigeria and Mozambique. But production surpluses in peak seasons coupled with transport and logistical inefficiencies means there is significant spoilage of the crop in all three countries. Private industry for processing cassava has developed in recent years, in response to a number of trends. Cassava has high starch content, making it a valuable raw material for pharmaceutical, construction, and food and beverage industries. Cassava flour has also emerged as a possible wheat substitute, and Nigeria has enacted a policy mandating 10 percent HQCF in all flour. Across these opportunities, cassava products have significant potential to substitute for currently imported products. Processing cassava is challenging because of the crop’s high perishability; roots spoil between 24 and 48 hours following harvest. To mitigate this challenge, companies are increasingly interested in intermediary processing of roots into a more stable wet cake (*for more on this, see the case studies on DADTCO in Annex 1*), which can then be processed into any final product. To reliably fill orders from their off-takers and to reduce price volatility throughout the year, companies offer to purchase in bulk at farm gate and pay cash on the spot. For farmers, this system is significantly more convenient and reliable than the traditional market. Farmers have a guaranteed market and fixed price throughout the season, allowing them to sell immediately following harvest (when

prices are lowest) and began preparing their land for other uses (rather than leaving roots in the ground, which is the best form of “storage” but also exposes roots to risks of loss due to natural events such as flooding and disease).

Companies potentially interested:

- **DADTCO** – Ghana, Nigeria, and Mozambique
- **Thai Farm International** - Nigeria
- **ETG** – Ghana

Beans and groundnut sourcing – Mozambique: Increasing export opportunities and growth of domestic value-addition sectors are driving demand for groundnuts and a number of bean crops in Mozambique. Wholesale companies express interest in expanding their sourcing to include beans and groundnuts, for supplying both domestic and export markets. These companies already have widespread logistics networks for sourcing products like cotton and suggest that they could easily expand to beans and groundnuts utilizing existing infrastructure. These crops represent new business opportunities that lower companies’ marginal costs and improve supply chain efficiency. Companies may also be able to support farmers by signing purchase contracts and providing extension services. For farmers, these relationships represent opportunities to reduce storage losses by selling to a buyer immediately after harvest and to expand on-farm investment in future seasons with supplemental income.

Companies potentially interested:

- **ETG** – Mozambique
- **Olam** – Mozambique

Maize and beans sourcing – Tanzania and Kenya: Maize and beans are grown largely for subsistence in Tanzania, but there is also a significant export trade in various types of pulses. Several large commercial integrated traders/millers/exporters are active in sourcing smallholder produce, although primarily through informal rural traders and middlemen, a situation widely described as sub-optimal by end buyers. Large trading and export companies say that they are interested in expanding their direct sourcing from smallholders, primarily to improve the efficiency of their supply chains and remove middlemen who drive quality downward and damage the ability of both farmers and traders to invest in long-term loss reduction strategies (due to both parties’ lack of leverage and transparency). The more forward-thinking companies suggest they are willing to offer floor price guarantees to farmers and possibly provide technical assistance to farmer organizations, either directly or by subsidizing government extension activities. These companies also express interest in investing in local aggregation points to collect produce. For farmers, entering into contractual agreements with wholesalers/retailers guarantees a market for their produce, a transparent price not subject to manipulation by brokers, and the ability to earn premiums for quality, though at times they may receive prices below the going market rate. Selling to wholesalers/retailers also provides an opportunity to offload produce soon after harvest and at a convenient location, reducing the risk of loss from on-farm handling and storage.

Companies potentially interested:

- **ETG** – Tanzania

- **Trufoods** (maize) - Kenya
- **Promasidor** (beans) – Kenya

Integrated sourcing models in the crops and countries outlined above offer opportunities for loss reduction at every stage of the value chain but are particularly beneficial to losses at the smallholder level, as the purchase of produce after harvest reduces the high risks of loss associated with on-farm handling, processing, and storage. These models also ensure a market for smallholder produce and enable strategic, business-oriented planting and harvesting for smallholders. While financial incentives are often in place for companies to invest in these sourcing relationships (as will be explored in further detail in section 5), additional support may be needed to catalyse or intermediate these relationships. Significant opportunities to reduce post-harvest losses in ways that benefit smallholders exist in the promotion of these relationships. In the final sections of this report we draw upon these learnings to highlight strategic approaches to deploying these models successfully and specific intervention opportunities across crops and countries.

4. Strategic implications for RF/AGRA

Based on interviews with many companies active in agriculture across focus countries of this study, it is clear that the private sector can have a strong impact on reducing post-harvest losses for SHFs by integrating them into their supply chain. In an integrated sourcing model, a wholesaler/retailer works directly with a specialized intermediary—often a farmer organization or cooperative—to aggregate and source from a known set of smallholders. This is contrasted with the current situation in a number of value chains we examined, where buyers work with brokers and middlemen who often do not have any interest in a long-term relationship with either a specific set of smallholders or a specific buyer.

ADDRESSING LOSSES THROUGH PRIVATE SECTOR SMALLHOLDER SOURCING

Shortening the value chain between producers and wholesalers/retailers can play a catalytic role in addressing the root causes of losses for smallholders. Companies have the greatest impact on loss reduction for farmers when their supply chain is short and relatively tight (e.g., few layers of aggregation between farm and company and a consistent, formal relationship). Large offtake opportunities facilitate produce aggregation and sales and therefore reduce overall inefficiencies in the supply chain. Guaranteed markets offered by the private sector create strong incentives and can make it easier for farmers to access finance that allows them to adopt improved technologies that increase productivity and reduce losses. In some cases, companies may even provide these technologies to farmers directly (potentially through contracted NGOs or farmer organizations) as part of a contractual relationship. Farmers can also access credit much more easily when supplying to wholesalers/retailers, using purchase orders or contracts to secure loans.

This sourcing approach, however, typically requires a highly effective aggregation function. In many cases, due to business needs and logistical challenges, this aggregation is best provided by a strong farmer organization or cooperative. However, we did find cases where private sector companies interfaced directly with farmers—for example, DADTCO and Thai Farm International in Nigeria both source cassava directly from the farm gate. Public, NGO or donor partners can also play a catalytic role in enabling these relationships.

We introduce the idea of “specialized intermediation” to describe this model of shortening the value chain. A specialized intermediary can be any type of organization—a cooperative, NGO, or even the company itself—but it is characterized by three features. First, an optimal specialized intermediary deals in multiple commodities, helping smallholders diversify and ensuring markets for any produce they want to sell. For example, a cooperative that aggregates farmers’ cassava for a processor should also offer to purchase and find secondary markets for intercropped legumes that those farmers may be growing. Second, these intermediaries should give smallholder farmers a stake in the ownership of the organization or its profitability. Such an arrangement gives farmers an incentive to participate and helps build trusting, long-term relationships with off-takers. Finally, a specialized intermediary offers full transparency to all actors and ensures the flow of information in both directions, so that farmers can make informed planting and harvesting decisions and companies can plan sourcing and procurement.

Figure 4 below shows schematics that compare this direct sourcing approach through specialized intermediation with a traditional, fragmented sourcing model with intermediation by informal participants.

Figure 4: Smallholder sourcing models: Specialized intermediation vs. ad hoc / loose value chains

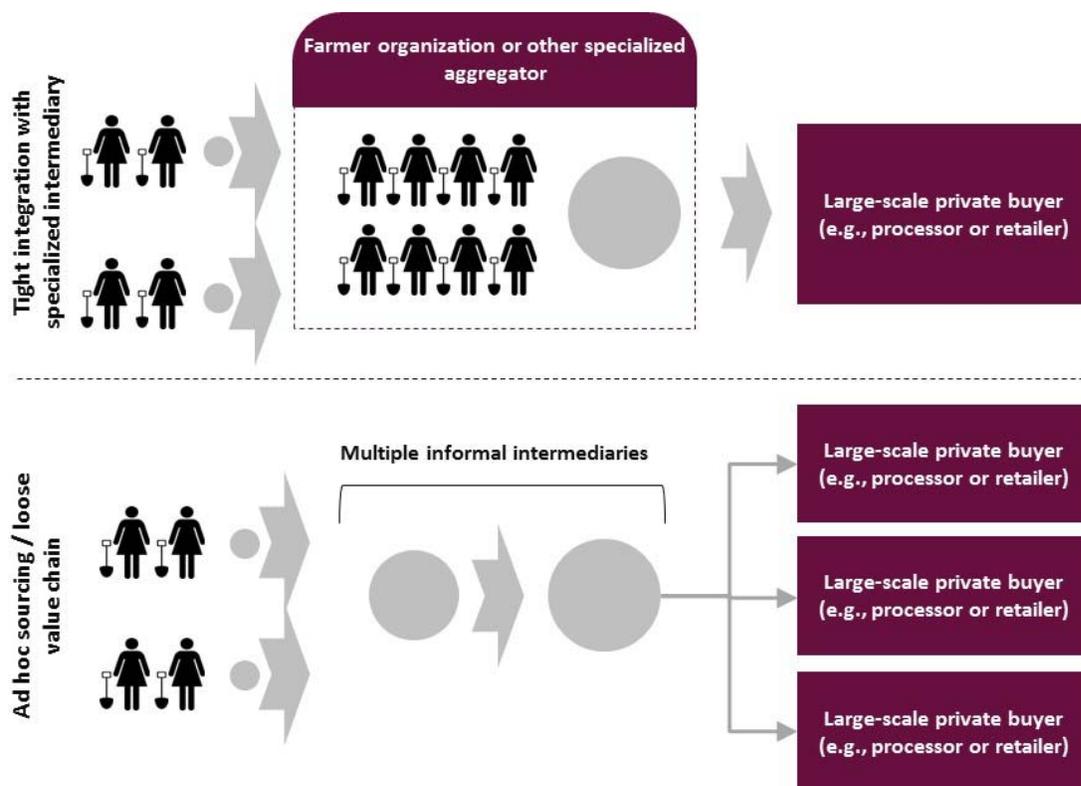


Table 3 below further outlines the differences between integrated smallholder sourcing and non-integrated sourcing at each stage of the value chain. This overview presents theoretical models that aim to synthesize our learnings with respect to existing conditions and best-practice scenarios.

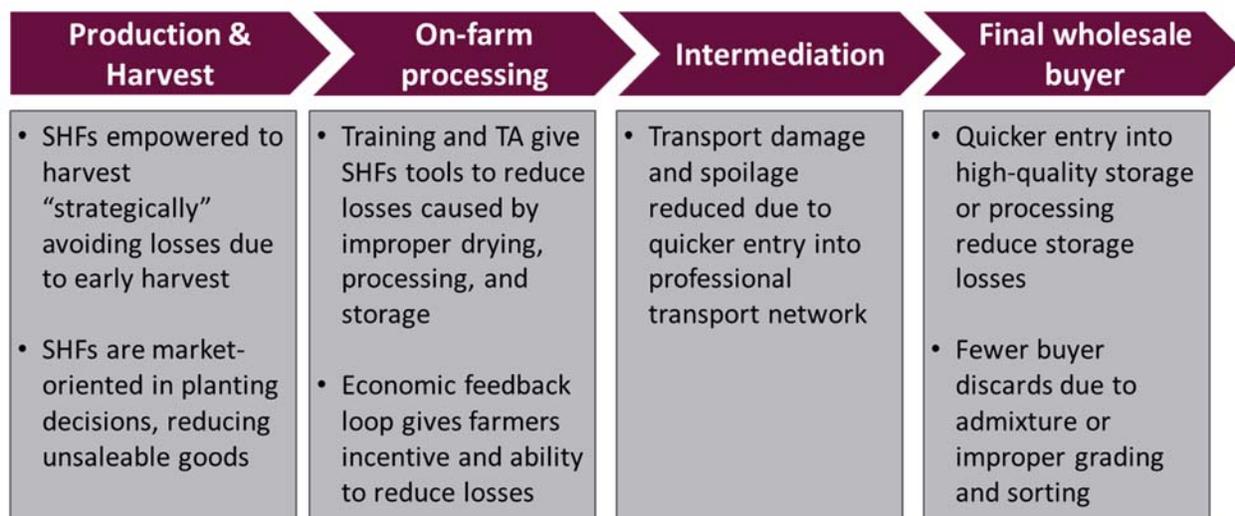
Table 3: Comparison of non-integrated and integrated sourcing models

		Impact on food loss	
		Non-integrated sourcing through informal intermediaries	Integrated sourcing with wholesalers/retailers
Production and harvest	<ul style="list-style-type: none"> Farmers may harvest early or simply plant crops with no clear end market in mind (beyond what is kept for subsistence consumption) and ultimately lose produce due to lack of market. 	<ul style="list-style-type: none"> Farmers can make seasonal decisions about land allocation and cropping to balance supply and demand dynamics with subsistence needs. Losses due to early or late harvest and quantities of unsaleable goods are reduced because of market-driven planting decisions 	

Impact on food loss		
	Non-integrated sourcing through informal intermediaries	Integrated sourcing with wholesalers/retailers
On-farm processing	<ul style="list-style-type: none"> Market structure with no or limited rewards for quality, and poor price signals provides no incentive for farmers to invest in technologies or processes that reduce losses and improve quality. Support that farmers receive on post-harvest issues is ad hoc and usually very limited due to over-stretched government extension programs. 	<ul style="list-style-type: none"> Some companies invest in infrastructure such as transport and storage networks that directly reduce losses for smallholders. SHFs receive training (typically funded by donors or end buyers) in production methods including use of improved inputs, quality standards, grading, and proper processing, packing and storage methods.
Final wholesale buyer	<ul style="list-style-type: none"> Off-takers remain anonymous with no interaction with farmers. Multiple layers of aggregations do not allow produce traceability and increase loss risks (via informal channels) before reaching wholesalers. 	<ul style="list-style-type: none"> Sale in bulk at harvest means minimal on-farm processing and storage is required. With guaranteed markets, farmers have the incentive to invest in technologies that reduce losses and improve produce quality.

Figure 5 below highlights the specific implications for reducing food losses at each stage of the value chain based on an optimal integrated sourcing model, where the private sector buyer deals with a specialized, dedicated farmer organization aggregator, rather than informal brokers and middlemen with no vested interest in the success of the farmer or the wholesale buyer.

Figure 5: Impact of best practice models on food losses



STRATEGIES FOR INCREASING PRIVATE SECTOR ENGAGEMENT

While wholesalers/retailers — for example, market-dominant retailers—that do not engage farmers directly may still have positive impacts on smallholders in terms of loss reduction and livelihoods (by indirectly expanding market access and demand for a product that filters down through intermediary players in the value chain), we did not find this to be the highest-potential option for private sector-led

interventions to reduce losses and thus have not focused on such opportunities or examples here. Rather, we focus on improving the scale and efficiency of models in which private companies source from farmers using a single specialized intermediary such as a farmer organization, or—when the logistical hurdles are not overwhelming—directly from farmers themselves.

To create opportunities for expanded integrated sourcing by formal private buyers and reduce smallholder losses, we have identified two broad strategies applicable to various target crops and countries. While the specifics of the strategies vary by crop and country, at a high level, the strategies are as follows:

- **Shorten and improve domestic linkages:** In some crops and countries, private buyers are already active at a sizable scale but tend to source through longer chains of intermediaries. Here, the strategy is to increase the feasibility and attractiveness of more-integrated sourcing from smallholders, intermediated where necessary by specialized aggregators like farmer organizations, while at the same time carrying out targeted interventions to improve the functioning of value chains to reduce losses.
- **Create domestic value-addition:** In other crops and countries, there is a large volume of smallholder produce, but limited procurement from the large formal private sector, and where procurement does exist, it is often confined to raw produce with little value addition. In some cases there may also be substantial imports of processed forms of the same or similar crops, creating a natural opportunity to integrate smallholders and formal private buyers. Here, the strategy is to stimulate (by technical, regulatory, or financial means) the value-adding activities of the domestic private sector and simultaneously organize smallholders to be able to supply raw materials to these companies.

Section 6 below outlines the crop- and country-specific opportunities and recommended intervention approaches within each of these two high-level strategies. But before diving into individual interventions, it is important to test the viability of these engagement models. The section that follows explores expected returns for both farmers and companies from entering into more direct sourcing relationships.

EXPECTED RETURNS OF DIRECT SOURCING MODELS

For direct sourcing models to be commercially viable and sustainable, they must have positive expected returns for both farmers and companies. Though financial returns may be the most important factor to consider to understand commercial viability, we also consider non-financial returns to better estimate the total impact of these models. The evidence provided below offers illustrative examples of possible returns that can be expected across different categories, but given the nuances of individual value chains there may be significant variability in actual returns. Nevertheless, our findings suggest that returns will be strongly positive overall—financial and otherwise—both for farmers and firms engaging in direct or near-direct sourcing relationships.

Returns to farmers can be divided into three categories: 1) income growth, 2) income stability (reliability of market for sale of produce), and 3) on-farm investments in equipment and TA. Loss reduction is also an important outcome of these models but not a direct return; rather reduced losses are a factor that

contributes to income growth and stability. Empirical evidence from across the developing world supports the notion that farmers benefit from direct sourcing models in these ways.

Income growth: Farmers entering into direct sourcing relationships with companies (including outgrower schemes and contract farming arrangements) can see growth in income ranging from 12 percent and 50 percent. This income growth results directly from receiving a higher price for produce and indirectly from yield improvements, lower labour costs, reduced losses, improved access to finance, and other spill over effects. In one example in India, soybean farmers selling to a single large buyer (ITC) reduced losses from 50 rupees per MT to zero. This loss reduction accounted for 20 percent of the total savings realized through the direct sourcing model.¹¹ A study of vegetable farmers incorporated into supermarket supply chains in Kenya showed income growth of up to 50 percent per capita driven by selling to the supermarket. Farmers sold produce at significantly higher margins, and participation in the scheme reduced the incidence of extreme poverty among poor suppliers by 35 percent.¹² A study of farmers in Madagascar showed that farmers participating in contract farming schemes were 30 percent more likely to receive a formal loan (which would enable them to use better inputs, plant more land, or upgrade equipment).¹³ These spill over effects may explain why income often increases more than the savings from cutting out middlemen.

Income stability: Having a reliable market for selling produce is critical to farmers, and often just as important as income growth. In fact, farmers supplying to DADTCO's mobile cassava processing facility in Ghana suggest that they are sometimes willing to sell at a price below what they could get from informal traders simply to ensure they develop a stable relationship with the company. Farmers participating in contract farming schemes in Madagascar saw on average a 16 percent decrease in income volatility.¹⁴

On-farm investments in equipment and technical assistance: In addition to seeing higher incomes and securing reliable markets for produce, farmers who choose to enter into relationships with larger buyers often see additional benefits in the form of investments in technical assistance and equipment for their farms. Buyers often have an incentive to ensure that their suppliers produce and harvest with maximum efficiency or at the highest quality. In Madagascar, farmers entering into a production scheme for French beans for European export markets were given training for their contracted plots that they could apply to non-contracted plots, leading to significant growth in yields and income from other sources.¹⁵ Companies may also provide facilities for post-harvest handling, storage, and processing. All these factors help

¹¹ Annamalai, Kuttayan and Rao, Sachin, "ITC's e-Choupal and Profitable Rural Transformation," *What Works* Case Study, World Resources Institute, http://www.wri.org/sites/default/files/pdf/dd_echoupal.pdf, August 2003.

¹² Rao, Elizabeth J.O. and Qaim, Matin, "Supermarkets, farm household income, and poverty: Insights from Kenya," Georg-August-Universität Göttingen, Discussion Papers, http://www2.vwl.wiso.uni-goettingen.de/courant-papers/CRC-PEG_DP_28.pdf, March 2010.

¹³ Bellemare, Marc F., "As You Sow, So Shall You Reap: The Welfare Impacts of Contract Farming," Duke University, http://mpr.ub.uni-muenchen.de/23638/1/MPRA_paper_23638.pdf, July 2010.

¹⁴ Ibid.

¹⁵ Minten, Bart et al., "Global Retail Chains and Poor Farmers: Evidence from Madagascar," Katholieke Universiteit Leuven, LICOS Centre for Transition Economics, <http://www.econ.kuleuven.be/licos/publications/dp/dp164.pdf>, September 2005.

farmers professionalize, allowing them to operate their farms as businesses and giving them credibility in their communities.

It is not necessarily surprising that direct sourcing opportunities offer positive expected returns to farmers who participate. While it is important to sensitize farmers to these opportunities and associated benefits, it is far more challenging to encourage formal private companies to invest in these relationship. Demonstrating positive expected returns for firms will be necessary to build buy-in.

Returns to companies can be broken into three categories: 1) reduced input costs, 2) better control of supply, and 3) improved public image and relations. While robust empirical evidence exists only for the first category, anecdotal evidence based on experiences of companies suggests that all three are important drivers for entering into direct sourcing models.¹⁶

Reduced input costs: Companies entering into sourcing relationships with farmers can expect the most direct return in the form of reduced input costs. By bypassing traditional inefficient marketing systems, companies can purchase commodities at lower prices. Reducing input costs allows companies to either sell their finished goods at a higher margin or pass savings on to consumers and expand market share. In India, a retail chain selling fresh onions that began sourcing directly from farmers was able to reduce costs by 10-12 percent. By passing these savings on to consumers and holding prices stable when traditional market prices spiked, the company was able to increase sales of onions by 40 percent.¹⁷ In Nigeria, estimates for the grain value chain suggest that companies can save 8-12 percent of total input costs by sourcing directly from farmers, bypassing middlemen and avoiding market charges.¹⁸ Direct sourcing models also enable loss reduction for companies, increasing the efficiency of supply chains which translates to lower per-unit supply costs. Nestle’s direct-to-farm milk procurement model has allowed the company to reduce losses from traditional collection networks—averaging 16 percent to 27 percent—down to less than 0.6 percent in places like Pakistan, India, and China.¹⁹

Better control of supply: Improving quality and reliability of supply is a major driver for companies to engage farmers directly. Many firms we spoke to expressed dissatisfaction with the quality of raw materials they buy from informal brokers and traders. Two firms in Tanzania—METL and ETG—noted that at times up to 35 percent of delivered goods are impurities like dust and stones. Spar, a grocery store buying produce from local markets in Nigeria said that throwaways of tomatoes can be as high as 80 percent, and airfreighted imports are prohibitively expensive. Direct sourcing relationships provide opportunities for companies to control the quality of the raw materials they purchase and enables traceability back to individual farmers, while at the same time lowering costs. Shoprite in Nigeria has been able to ensure that fresh produce they buy from a specialized intermediary, AFGEAN, is not improperly

¹⁶ Except where noted, figures and comments cited in this section are drawn from in-person interviews with private-sector actors conducted by the Dalberg team. Please see Annex 3 for a full list of stakeholders interviewed.

¹⁷ “Direct sourcing from farmers helps retail chains keep onion prices low,” *The Economic Times*, 20 August 2013, http://articles.economictimes.indiatimes.com/2013-08-20/news/41429163_1_onion-prices-safal-stores-wholesale-prices.

¹⁸ “Nigeria--Agribusiness Sector and its Support Institutions,” FAO, <http://www.fao.org/docrep/008/y5785e/y5785e0c.htm>.

¹⁹ “Driving Sustainable Consumption – Value Chain Waste,” World Economic Forum, Overview Brief, [http://www.weforum.org/pdf/sustainableconsumption/DSC percent20Overview percent20Briefing percent20- percent20Value percent20Chain percent20Waste.pdf](http://www.weforum.org/pdf/sustainableconsumption/DSC%20Overview%20Briefing%20-%20Value%20Chain%20Waste.pdf).

treated with pesticides that could be dangerous to customers. A study of the Nigerian grain value chain found that mixing of high and low quality grains and infestations/impurities nearly always occur at traders' and speculators' warehouses.²⁰ Bypassing aggregation at that level, companies can reduce losses and ensure they are buying only high-quality, fresh produce.

Improved public image and relations: Though not easily quantified, direct sourcing from smallholders can have strong benefits for a company's public image. One supermarket chain in Ghana not currently sourcing produce directly said they would be willing to pay a premium of several percent over market price to source directly, simply for the positive public image. In the example cited above of Shoprite sourcing produce from AFGEAN in Nigeria, the retailer is able to safeguard against a public relations crisis that would occur if customers became sick from eating improperly treated produce. In South Africa, Walmart subsidiary Massmart has launched a "Supplier Development Fund" to build the capacity of South African SMEs. Its direct farm initiative is integrating farmers into the company's supply chain. These efforts are well advertised by the firm and contribute to a positive public image.

THE PRIVATE SECTOR'S ROLE IN IMPROVING POST-HARVEST INFRASTRUCTURE

Market observers frequently cited infrastructure deficits as important causes of food loss in the target crops, pointing to issues including poor roads that lengthen the time tomatoes, cassava, and onions spend in transit, lack of pack houses and cold-storage facilities to support the fresh produce export and urban retail markets, and lack of improved village-level and district-level storage for durable crops. However, due to the economics of the value chains studied, direct private-sector investment in post-harvest infrastructure is not feasible in all cases (especially for issues such as poor roads and poor provision of electricity for processing and cold storage). However, interviews with formal private buyers did reveal several private-sector contributions to infrastructure development that make economic sense. These include:

- Operation of village- and district-level warehouses for storage of durable crops, as part of a warehouse receipts system model or simply as a standalone service. Farmer organizations noted that in some contexts (e.g. Tanzania), private operators would be viewed as more reliable and competent than government operators, and indicated that farmers would be willing to pay for high-quality storage services if this allows them to exert more market power and serve broader markets. However, private sector participation would still potentially need to be supplemented by public capital (or at least government efforts to increase bank financing for storage). In addition, finding the right type of private operator requires some effort, as grain traders interviewed indicated they were not interested in operating public warehouses, viewing them as a distraction from their own logistics operations and a potential way to give farmers leverage at their own expense.
- Investment by specialized intermediaries (like farmer organizations) in village-level pack houses as part of an agreement to supply fresh produce to urban supermarkets. Some level of aggregation before delivery to the store or distributor will be essential as supermarket networks continue to expand, and given supermarkets' consistently-expressed desire to increase integrated produce sourcing, there is a natural economic rationale for such investment. However, ensuring

²⁰ "Nigeria--Agribusiness Sector and its Support Institutions," FAO, <http://www.fao.org/docrep/008/y5785e/y5785e0c.htm>.

that entrepreneurs wishing to invest in pack houses have access to bank or government capital will be crucial.

- Investment by private processors in distributed, small- or medium-scale (at the village or district level) processing plants to transform crops like tomato and cassava into more stable forms. This role represents the most significant direct private investment in physical infrastructure, and is thus only suitable in contexts where a large, inefficiently-served market exists to provide a return on investment. However, as discussed at length in Section 5, this role may be relevant for tomato in Ghana and Nigeria and cassava in Ghana, Nigeria, and Mozambique.

RISKS AND UNINTENDED CONSEQUENCES ASSOCIATED WITH INTERVENTIONS

Expanding integrated sourcing has several risks. While many of the risks are specific to individual crops and country environments and are discussed more fully in Section 5, several general risks are important to keep in mind:

- **Farmer resistance to behavioural change:** Perhaps most frequently cited by private buyers is the risk that farmers will be resistant to the changes in production, harvest, and post-harvest behaviours required to support greater integration with wholesalers/retailers. For example, retailers worry that farmers will be unwilling to grow the requisite variety of fresh produce needed to make engagement worthwhile or will fail to fully incorporate best-practices in packing and grading. Processors worry that farmers will return to traditional planting schedules and fail to stick with the coordinated, rotating schedules needed to ensure a reliable year-round supply of raw material. This resistance is a natural consequence of near-subsistence farmers' inherent risk aversion, and likely requires intensive investment in farmer education (carried out over multiple seasons with gradual shifts in behaviour), along with strong and visible commitments by private buyers to provide a consistent market for produce even during short-term financial difficulties.
- **Noncompliance:** Non-compliance on agreements from both side, leading to issues such as side-selling, may create an environment lacking in trust and undermine the prospects for long-term partnerships between smallholders and wholesalers/retailers. Several companies expressed a strong desire to fund or collaborate on the provision of inputs and technical assistance but worry that such investments could be lost due to side-selling and opportunistic behaviour. Similarly, farmer organizations and outside observers noted the very real risk of private buyers convincing farmers to change their behaviour in expectation of increased income but then subsequently collapsing or withdrawing from a market, leaving farmers worse off than before and unwilling to trust any future private-sector entrants. Problems such as these can be mitigated by encouraging the creation of strong industry associations (with farmer organization representation) to prevent opportunistic behaviour among businesses, expanding farmer education campaigns, carefully selecting crops to target for pre-financing and buyer investment (avoiding commodity crops with a strong local market in favour of higher-value crops), and vetting private buyers targeted for endorsement or partnership.
- **Political challenges to interventions:** One additional risk, which manifests itself differently from country to country, is the risk of political challenges to interventions. While policymakers

interviewed in this study were broadly supportive of private investment and integration with smallholders, a number of crops have political sensitivity. For example, maize in Tanzania and teff in Ethiopia are important food-security crops and are subject to a variety of government interventions including price adjustments (releasing reserves to force retail prices down), periodic export bans, and restrictions on trading/marketing channels. These interventions, while they may be valuable for food-security and other government objectives, can create a difficult investment environment for private buyers who would otherwise be interested in expanding sourcing. A second type of political challenge comes from the enforcement of existing policies. The most salient example of this is in Nigeria, where the cassava-flour substitution policy is perceived by cassava processors to be incompletely enforced (in part due to the resistance of politically powerful millers and baking companies). This uncertainty in enforcement means private processors are hesitant to significantly expand processing capacity or invest in smallholder organization and outreach.

ADDITIONAL ISSUES RELATED TO EXPANSION OF INTEGRATED SOURCING

While understanding the opportunities and risks associated with the expansion of integrated sourcing by formal private buyers is crucial, it is also important to consider an additional set of issues affecting the viability of potential interventions. While many of these issues are covered in some detail at the crop- and country-level in Section 5, we present a brief overview of the additional dimensions of viability here:

- **Access:** Many of the most promising interventions identified in this study relate to improved organization of production and harvest, supplemented by relatively low-tech infrastructure investments such as village-level storage. As such, there is no specialized technology or advanced infrastructure required, meaning accessibility of the interventions is high, provided awareness barriers can be overcome. Much of the commentary in Section 5 focuses on suggestions for increasing farmer education to move smallholders and farmers towards a mutually-beneficial, more integrated relationship. Where access may be an issue is in the provision of processing-appropriate varieties of key crops like cassava and tomato, as well as the dissemination of locally-appropriate small scale harvesting and on-farm processing technology. Here, ensuring early collaboration with agribusiness stakeholders and national research institutes may add significant value. One other access constraint that has been identified is in the provision of working capital to farmer organizations and other specialized intermediaries to facilitate aggregation, especially for groundnuts in Senegal. Ensuring that intermediaries can access the necessary credit to work effectively with farmers is a potentially high-value intervention, as is discussed in Section 5.
- **Affordability:** Expanding integrated sourcing may pose financial burdens in some cases. The largest investments would be required from processors, especially those involved in cassava or tomato. Fortunately, experts we spoke with noted that the minimum efficient scale for processing plants is not as high as once thought, and small- or medium-scale plants may be effective in certain environments. Examples of this include DADTCO's mobile cassava processing units, successfully operational in three of the countries covered by this study. Further details on this model are available in Section 5 and Annex 1. Even when medium-scale fixed plants are required, they may be usable for alternative crops (for example, tomato paste concentrating plants can be used for other types of fruits, such as pineapple). On the other hand, investments in expanded sourcing by

retailers and large aggregators appear to be quite affordable. The main hurdles for bringing together smallholders and these types of buyers are the successful creation of farmer organizations or clusters, and the training of farmers in modern planting, harvesting, packaging, and storage practices. Pilot programs with limited financial investment (leveraging local experts and government extension programs) may be useful in demonstrating sustainability prior to scaling up.

- **Adoption:** The successful expansion of integrated sourcing may be complex; however, improved smallholder-large buyer relationship models can be adopted effectively as long as consistent effort is put into farmer education, buyer recruitment and sensitization, and commitment to creating the right policy environment (e.g. ensuring enforcement of value-addition policies, ensuring satisfactory funding and performance of extension agents), as detailed in Section 5. Of course these tasks require significant effort. But because identified opportunities focus only on value chains where there is significant alignment between the incentives of smallholders and wholesalers/retailers, we believe that successful adoption in most cases requires only a catalytic push, rather than a long and indefinite period of subsidy or support.
- **Awareness:** Expanding stakeholder awareness likely requires effort in two areas. First, on-the-ground organizing and sensitizing of smallholders is crucial in nearly every crop context, due to the behaviour changes required in many cases. This may be best done through temporary engagements with NGOs or existing farmer organizations, following a “training-of-the-trainers” model where new farmer organizations are set up and equipped to pass on their learning to other farmers in the region. Sometimes this may require a temporary subsidy, although in other cases (*cf* the discussion of fresh produce in Nigeria and pulses in Tanzania), training and technical assistance can be provided on a commercially sustainable basis due to the improvements in sourcing quality realized by wholesalers/retailers. Second, continued conversations and outreach to government officials and representatives of wholesalers/retailers is important. These conversations should be explicitly economic in nature and should emphasize the strong alignment in incentives uncovered as part of this study. For most of the crop contexts highlighted here, the commercial viability of integrated sourcing appears high; although the perception of risk and uncertain policy environments in some cases have thus far prevented widespread adoption. Judging from the conversations held as part of this study, sensitization campaigns backed by financial analysis of the benefits that could flow to buyers are likely to be well-received by many companies (some, however, appear to be relatively content with operating through traditional inefficient value chains, sacrificing return for a perception of lower risk).
- **Innovation:** The main forms of “innovation” uncovered in this study involve new forms of organization of production and sourcing. Several larger private buyers have created innovative means of interacting with farmers, ranging from investing in extremely small-scale transport (e.g., a 300kg capacity tricycle vs a 30MT truck) and storage assets to bring their procurement efforts as close as possible to the farm gate, to funding rotating agronomists and management training efforts for farmer organizations, to providing salary subsidies and motorcycles to government extension agents. A number of these models are detailed in Annex 1. However, technological innovation is also being harnessed to expand integrated sourcing. Several mobile and IT

applications offer the promise of coordinating the efforts of smallholders, specialized aggregators, and buyers, creating price transparency, easing logistical burdens, and creating “paper trails” that can be used to obtain credit from banks. Some of these innovations are profiled in Annex 2.

- **Scale:** The scale of opportunity for smallholder engagement varies dramatically by crop and by the type of large buyer. In general, we found that opportunities for serving the modern retail market, while offering substantial potential income gains, would be limited to a relatively small set of farmers. For example, in countries in our study, the main supermarket chains have no more than one or two dozen stores each, and serving all of their produce needs would require only a few hundred or thousand smallholders. On the other hand, processing markets, especially those backed by market-creating policies such as the HQCF policy in Nigeria, have massive potential. The HQCF policy in Nigeria, if fully enforced and implemented, would require an estimated 1.2 million tons of raw cassava each year, enough to consume the full production of over 100,000 smallholders or the partial production of several hundred thousand. We have attempted to present a general picture of potential scale in Table 4 in Section 5.

To summarize the discussion above, we believe more-integrated chains will prove more efficient in terms of post-harvest losses, driving reductions in food loss through two main channels:

- **Creating more direct economic feedback loops and stronger price signals to drive behaviour change,** especially regarding investments that would reduce post-harvest losses. By reducing the interventions of middlemen working at cross-purposes to the farmers, the desires of buyers can be communicated more clearly and transparently to farmers and, additionally, farmers can gain the leverage necessary to capture the economic benefits associated with post-harvest loss reduction. This in turn increases their ability and inclination to make any required investments, such as utilizing improved storage or better on-farm processing equipment.
- **Enabling the easier delivery to smallholders of technical assistance, technology, and investments aimed at loss reduction.** When buyers and farmers are disconnected from each other and deal only indirectly, it is difficult for buyers to have an expectation of dealing repeatedly with the same set of smallholders, limiting any natural incentive for buyers to assist in supplying technical assistance, equipment, or investment and making such delivery difficult. But, when a large buyer deals with a fixed set of farmer organizations or smallholders, incentives are aligned, the buyer’s organizational and logistical capabilities can be used to deliver services, and in some cases the buyer even has an incentive to give financial assistance as well.

In the following section, we discuss crop- and country-specific opportunities to improve value chain linkages and create domestic value addition in more detail, and expand the discussion of specific risks and challenges.

5. Strategic implications for targeted crops by country

Building on the recommended approach outlined in the sections above, we present country- and crop-specific intervention approaches to improving and creating direct sourcing relationships across two categories: Improving sourcing linkages and expanding domestic value addition. The following subsections draw upon desk research and interviews in target countries with private companies, farmer groups, and other value chain actors²¹. While we believe that all the opportunities presented are feasible and would make important contributions to reducing food losses, we offer a prioritization of opportunities at the end of the section to support decision-making with respect to funding allocations and approaches.

IMPROVING SOURCING LINKAGES

TANZANIA: MAIZE AND PULSES

Market overview and rationale: While most maize and pulse production in Tanzania is for on-farm consumption, there is a strong and growing commercial trade in maize and pulses. This formal market is dominated by a handful of large traders and processors like Mohammed Enterprises (METL) and Bakhresa, serving the local milling market as well as the export market. Conversations with traders and exporters revealed that the traditional sourcing method—which relies on informal brokers and middlemen gathering produce from the farm gate and delivering it to one of the trader’s regional warehouses—is inefficient for a number of reasons.

For one, the reliance on informal brokers with little vested interest in repeated interactions makes it difficult for traders to enforce quality standards; if a trader is perceived to be too demanding, the brokers will take their supplies elsewhere, and the trader (who often has supply contracts that he must meet, especially in the pulse export sector), will scramble to procure supplies. Instead, there is a “race to the bottom” of sorts, with brokers sacrificing quality to force down prices across a given region, leading to high losses due to discards (as high as 35 percent in some pulse crops, according to one trader). Traders, despite being much larger and ostensibly economically more powerful, are unable to blacklist brokers who persistently deliver low-quality goods due to the informal but highly competitive nature of the market. Furthermore, even when end buyers offer a premium for quality—which should stimulate investment by farmers in loss-reduction—the disorganized nature of sourcing and opportunistic behaviour by all parties means the economic signal is not strong enough to drive behaviour change.

Intervention points: As a result of this market dysfunction, there is an opportunity for large end buyers to collaborate more closely with smallholders to improve procurement. At least two organizations—ETG and Kilimo Markets—are currently doing this, working with farmer organizations to provide technical assistance, instruction in loss-reducing practices, and logistics coordination (with the end buyer picking up goods at the farmer organization level) along with guaranteed purchase prices. Picking up goods at a distributed network of aggregation points has reduced transport and storage losses, and the consistent

²¹ All comments and facts cited in this section are drawn from in-person interviews with private-sector actors conducted by the Dalberg team. Please see Annex 3 for a full list of stakeholders interviewed.

and targeted relationship-building efforts have helped reduce losses due to discards, as farmers know that they will receive a premium for supplying high-quality produce.

ETG and Kilimo Markets are currently working with several thousand farmers each (ETG sources 80 percent of its produce from smallholders through their direct-interaction model), although additional support is needed to help scale up further and potentially bring additional private-sector actors into the market. Several main needs were noted:

- Additional support for organizing farmers into co-operative structures and sensitizing them to the business aspects of working with the formal private sector (e.g. contract negotiation, planning planting and harvesting, budgeting for inputs).
- Support for successful extension-service subsidy programs, such as the one used by ETG, where government extension agents are given a transportation allowance and have their salaries subsidized in exchange for serving ETG-aligned smallholders. This would be on a temporary basis, until it can be demonstrated to farmers and market participants that technical assistance is a worthwhile investment.
- A review of government policies in staple crops, especially maize, where export bans and price stabilization efforts have occasionally lowered domestic prices to such an extent as to make investment by smallholders unprofitable.
- Research into cost-effective and market-appropriate post-harvest technologies (on-farm or village level processing and storage equipment), along with initial financial support for local entrepreneurs seeking to operate such equipment on a commercial basis.
- Better organization of formal commercial actors (in the form of an industry association), to help formulate standard contracts and potentially prevent opportunistic behaviour that damages both traders and farmers in the long run. For example, one of ETG's farmer-support trials involving input credit was disrupted by another large multinational trader, who convinced ETG farmers to engage in side-selling, threatening ETG's ability to continue delivering input credit. While competition should of course be encouraged, negative-sum actions such as this are unlikely to help farmers in the long run.

Risks and challenges: One of the key risks in any model that involves substantial private-sector provision of technical assistance or subsidized inputs is the risk of side-selling and other opportunistic behaviour, where buyers who did not provide inputs or assistance to farmers nonetheless purchase their crops and derive the benefits of improved productivity and reduced losses. Commonly traded crops like maize are especially susceptible to this, whereas higher-value export crops where one large buyer has an established position may be less susceptible. For example, industry players noted that private-sector funding of technical assistance and input provision was more likely to succeed in the pigeon pea and green gram markets than in the maize market.

An additional risk stems from the entrenched position of several large-scale private traders such as METL and Bakhresa. While METL expressed their own concerns about the state of the market, and claimed to be at a disadvantage relative to the informal middlemen currently in operation (suggesting they would not resist efforts aimed at disintermediation), it is undeniable that the large-scale traders are very powerful and well-established and control a good deal of grain marketing and processing. Thus, efforts

aimed at increasing the bargaining power of smallholders could potentially be met with resistance unless the benefits to buyers are made explicit. Similarly, efforts to recruit private traders to operate strategic and village-level public warehouses (sometimes cited as a goal by government and NGO actors) may fail due to the perception that this would increase smallholder leverage at the expense of traders. Instead, other types of private actors – without entrenched interests in grain trading – may be better candidates to operate new storage infrastructure.

Finally, the maize market in Tanzania poses special challenges due to the rain-fed nature of maize production. Multiple sources noted that low and irregular productivity makes investment in maize very difficult for the private sector, as capital-intensive district- and village-level storage and transport infrastructure may go underutilized from season to season. For this reason, a continued focus on productivity, in addition to post-harvest infrastructure, was recommended by industry participants.

TANZANIA: ONIONS AND FRESH BEANS

Market overview and rationale: The onion and fresh bean markets in Tanzania appear to suffer from a similar lack of coordination as the maize and bean markets. We found relatively little formal commercial sourcing, although some smaller private-sector players (such as HomeVeg) are involved in various forms of fresh produce sourcing. However, there appears to be substantial export demand (e.g., from Kenya) for onions, as well as demand from local urban markets.

Intervention points: One organization active in this value chain is conducting similar activities to those of ETG and Kilimo Markets described above, providing training, guaranteed markets, and farmer organization capacity development, although currently on a non-commercial basis. Even though they are not currently sustainable on a commercial basis, some of the lessons they have learned may be adaptable to potential commercial entrants, namely:

- Strengthening farmer organizations with a specific focus on building business acumen and management capacity, so that farmers can be strategic about planting and marketing decisions (e.g., staggering planting and increasing crop diversification to become a more reliable one-stop source for retail buyers and avoid gluts that currently lead to significant losses). Onions and fresh beans, if grown as part of a diversified program, are uniquely suited to this type of farmer-empowering strategic marketing, as planting and harvesting can be staggered such that farmers receive a consistent stream of income throughout the year, giving them leverage to resist the temptation to harvest early (which can result in losses) and the ability to continually invest in production and on-farm processing improvements.
- Strengthening farmer organizations (or providing funding for third-party technical assistance) to disseminate best practices in packing, grading, and sorting, which are currently roadblocks to effective coordination with private sector buyers. Government officials report that untrained farmers have seen up to 75 percent of fresh produce rejected at the point of purchase by exporters due to poor grading and packing; with better training, non-export standard produce can be diverted into other markets rather than lost completely.
- Investing in a distributed network of small-scale (district-level) pack houses to facilitate a more formal export market. Pack houses are an important focus area for the government, which has been working on a 5,000T pack house to serve the onion export market and wants to develop a

full strategic network of such pack houses. However, a key intervention opportunity here is in finding the right operator—ideally a private-sector actor or farmer organization that can focus on efficient and trustworthy operation, as several industry participants commented on the poor reputation and track record of government-run storage facilities. Fortunately, interviews with farmer-focused NGOs and government officials revealed no objections to working with for-profit private operators on strategic storage projects. Investments in this type of post-harvest infrastructure, however, is likely to be costly, and subsidies or short-term support may be necessary.

Risks and challenges: As with the maize and dried beans market, side selling poses an important risk to intervention efforts in onions and fresh beans, as it impairs the ability of farmer organizations and buyers to provide credit for improved varieties and packing equipment. However, the risk may be less severe here than for maize and dried beans, as Tanzanian observers note that onions and other fresh produce lend themselves more easily to periodic, continuous harvesting, which limits farmers' working capital needs. One final risk in this sector is in the operation of small-scale and strategic pack houses. If these pack houses are operated by the government, several observers have noted that trust issues (stemming from a perception of previous poor performance of government warehousing) may limit farmers' willingness to use them, meaning private-sector operators may be a more promising choice.

SENEGAL: GROUNDNUTS

Market overview and rationale: The groundnut sector in Senegal includes a very large number of small producers and value chain participants, creating coordination difficulties and generally resulting in reliance on chains of intermediaries. However, there are three major groundnut oil processors currently operating, along with food processors such as Chocosen who also source local groundnuts. This large and growing private sector demand for groundnuts creates space to pursue interventions that shorten and improve the value chain.

Intervention points: The most common potential improvements cited by market participants relate to better coordination of small producers and increased access to finance. Several oil processors, including CAIT, have experimented or are currently experimenting with direct smallholder sourcing (CAIT is procuring 5,000MT of groundnuts through a farmer organization). According to their initial findings, this model of sourcing, which offers a higher price to farmers in exchange for adherence to stricter quality standards, has reduced discards and poor-quality seeds. Other processors, such as SUNEOR and Chocosen, also have experimented with direct procurement and are interested in expanding, although lack of coordination poses an access challenge.

With more reliable financing (potentially backed by a government guarantee, at least initially, to encourage commercial bank participation), farmer organizations could effectively aggregate their member's produce and engage in more direct supply to the major groundnut processors, avoiding the current problems of contamination caused by the poor storage techniques used by middlemen and smallholders, and the lack of communication of quality standards and techniques to smallholders.

Risks and challenges: Given the relatively large number of very small value chain participants and past coordination problems, commercial banks may be unwilling to lend to farmer organizations and

aggregators without some sort of government guarantee. Without access to working capital finance, farmer organizations would likely be unable to play the necessary role in coordinating the efforts of and aggregating the production of smallholders.

GHANA: BEANS AND PULSES

Market overview and rationale: While many farmers grow beans and pulses in rotation with staple crops in Ghana for their nitrogen-fixing properties, formal market activity is relatively limited at present. However, government interest in improving the market for pulses (especially cowpea) due to their nutritional content suggests future opportunities for formal private sector involvement. Additionally, the fact that private-sector buyers are already sourcing staple crops from the same smallholders that grow cowpeas in rotation suggests that market links exist and can be built upon. If these links could be exploited and cowpeas could be marketed faster, on-farm storage losses caused primarily by pests could be reduced. Income generated by pulse sales could also give more farmers the ability to invest in better post-harvest processing equipment (e.g. threshers), addressing another key source of loss.

Intervention points: To facilitate expanded sourcing in beans and pulses, the main intervention points are:

- Create incentives for private-sector buyers to purchase cowpeas and other pulses from the same farmers they are already sourcing staple crops from. As the formal pulse market is relatively limited, initial demand generation may have to come from purchases for government or donor use, for example to support the World Food Program's Purchase for Progress initiative. If, however, the private sector could be assured of initial demand through a program like this, investments in marketing and sourcing might become more feasible.
- Investigate the potential of serving the West African export market, leveraging growing demand from Nigeria and other neighbouring countries for cowpea specifically.

Risks and challenges: The main risks in expanding the bean and pulse market relate to the current lack of formal market activity. Without some sort of temporary guaranteed market, it may be difficult to bring private wholesalers on board, as purchasing beans and pulses will require upfront commitments to farmers. To overcome this risk, it will be important to raise stakeholder awareness of opportunities to work in these crops and encourage the government to offer incentives in the short term. Another risk may come from the political sensitivity of beans and pulses, which are being promoted for domestic consumption for their nutritional benefits. Any private-sector investment based on potential future exports should be balanced with supplying the domestic market to avoid conflict with government food security goals.

NIGERIA: FRESH VEGETABLES (INCLUDING TOMATOES AND ONIONS)

Market overview and rationale: The fresh produce market in the urban areas of Nigeria is still highly traditional, with most produce being sourced from large open-air markets after being transported from the growing regions by informal traders and brokers. Even high-end retailers such as international supermarket chains occasionally source from these markets, although they attempt to work with distribution partners as well. However, the retailers we interviewed in this study expressed a strong willingness to explore more direct relationships with smallholders to increase the reliability of their stocks

and obtain higher-quality produce. Unreliability of supply, which occasionally forces Nigerian supermarkets to source imported goods at tremendous expense, or leads to stock-outs, and low quality goods (Spar indicated that if forced to procure from the local open-air market, only 20 percent of tomatoes would be saleable) are significant economic incentives to drive retailers to collaborate more closely with smallholders.

Intervention points: One retailer, Shoprite, is already working on a pilot basis with a farmer organization (29 farmers) a few hours outside of Lagos to source a variety of fresh vegetables, and Spar is willing to consider a similar arrangement if some initial logistical challenges can be overcome. The main interventions required to make such collaboration successful are:

- Initial investment in farmer organizing and capacity-building, along with education about the sourcing needs of modern retailers. One of the biggest obstacles mentioned by the retailers was a need for a full variety of produce – not just one or two types. Convincing farmers to grow a wider range than traditionally done requires careful organization and a process of sensitization, which is an ideal catalytic role for a third-party funder.
- Outreach regarding modern grading, sorting, and packing standards. Retailers in Nigeria have expressed a willingness to collaborate with farmers on this outreach, dedicating some time to training efforts, but their capacity is somewhat limited.
- Targeted investments in cold chain infrastructure, such as small pack houses, along with efforts to mobilize smallholders closer to urban areas (outside the traditional tomato and onion growing areas of the north) to grow supermarket-ready fresh produce.

Additionally, several participants noted a role for increased dissemination of more shelf-stable varieties in crops such as tomato, although again, distributing new varieties requires investment in farmer trust-building, farmer awareness, and technology access, which is sometimes hampered by lack of capacity in government seed registration organizations.

Risks and challenges: The primary risks in this space involve farmer behaviour and the willingness of farmers to adapt traditional practices to the needs of modern retailers. The primary behaviour change required is a diversification of crops, including some that farmers may have no previous experience growing, to provide a one-stop-shop for retailers. A second behaviour change will be to lengthen growing seasons to ensure a more consistent year-round supply of key crops like tomatoes. New varieties and techniques make this possible, but farmers may be resistant to such changes. While retailers are optimistic about the opportunity to work with smallholders, they have also indicated that their foremost concern is ensuring reliable, year-round stocks of fresh produce, and that they would not be willing to continue partnerships with smallholders who prove themselves unable to effectively deliver.

While interventions to expand fresh produce sourcing are likely to have an important impact on livelihoods for participating farmers, these opportunities have limited scalability due to the relatively small market demand for high quality fresh produce. Though demand will continue to grow, in the near term these interventions are unlikely to reach as many farmers as other opportunities.

KENYA: MAIZE

Market overview and rationale: Maize is the staple food of Kenyans and is therefore produced and consumed in large quantities in the country. Many small scale farmers farm maize for subsistence and sell any extra produce. The maize milling industry in Kenya consists of hundreds of small-scale mills serving rural areas and a few large-scale mills in urban and peri-urban areas.

Kenya loses at least 30 percent²² of post-harvest maize. The main cause of loss is mycotoxins (especially aflatoxin) contamination with incorrect post-harvest practices being the underlying driver. At the farm level, maize is often harvested soon after rains, not fully dried and fumigated. This results in the need for drying and fumigation by traders. Without additional heat, it is difficult to reduce maize's moisture content, which is necessary to avoid mycotoxins contamination. In many parts of Kenya, dryers are not easily available, resulting in considerable loss from fungal attack. Most of the time, high levels of mycotoxins remain unobserved in the value chain and that maize is not discarded. Currently, the regulation on standardized grades of maize is weak, however when standards become more stringent in future, much more maize will be discarded i.e. post-harvest losses will increase significantly.

Intervention points: Maize is commonly divided into two categories – wet maize and dry maize, with dry maize accounting for most of the consumption in the country. Almost all dry maize is milled. Millers require thousands of tons of maize and source it from wholesalers and traders with little sourcing directly from farmers. This is essentially to reduce transaction costs of working with smallholders and instead work with a few aggregators and wholesalers. Some organizations, e.g. Trufoods, in the wet maize market source directly from smallholders because they require lower quantities and specific maize varieties and therefore prefer control and close coordination of farm conditions.

In the dry maize market, significant opportunities exist for a catalytic interventions to shorten the value chain, which means working with large intermediaries who can source directly from farmers instead of sourcing through small traders and commission agents. Opportunities include:

- Invest in a network of small-scale warehouses with warehouse receipt system (WRS) capability. The National Cereals Produce Board (NCPB), a Kenyan parastatal which buys and stores maize as a strategic food reserve and sometimes intervenes in the market to balance supply and demand, owns warehouses in multiple parts of the country. Some of NCPB's warehouses have WRS, however most of their warehouses suffer from poor management and smallholders' mistrust. In addition, to reduce post-harvest losses in maize, farmers' accessibility to warehouses is essential. There are some privately owned warehouses with WRS in the country, e.g. Lesiolo Grain Handlers Ltd. in Nakuru. However, to scale-up proper handling of maize, many such facilities are required across the country. Advocacy with the government to provide incentives to the private sector for investments in warehouse infrastructure can lead to impact. Incentives include free or subsidized land for warehouses as well as VAT-free import of grain handling equipment such as threshers, cleaners, and moisture meters. Another service that private sector can provide is commercial drying (e.g. mobile dryers) because there is high demand for it in many parts of the country.

²² National Cereals Produce Board, Kenya

- Train contracted farmers on best practices in harvesting, drying and storing. Additionally, third party technical assistance can be utilized to strengthen farmer organizations capabilities in packing, grading and sorting maize. There is opportunity to broker such partnerships and develop contracts that benefit both the participants and significantly reduce food loss.
- The Kenyan government considers maize as the most important crop from a food security perspective and therefore intervenes frequently on maize trade policies. Uncertainty over policy actions sometimes leads to gluts and inadequate investment by all actors. Working with the government to rationalize maize trade policies and making them consistent can improve the value chain and help reduce food loss.
- As stated in the market overview, mycotoxins are the main cause for maize loss/discards, and these losses will increase with the enforcement of maize standards by the government. However, initiative can be taken now to train on standards in the maize value chain before regulation comes into full effect.

Risks and challenges: As stated in other opportunities, one of the key risks in contract farming where the private sector provides technical assistance, loans or inputs is the risk of side-selling by farmers. Moreover, commonly traded crops like maize are highly susceptible to it. The other risk arises from regulation on maize value chains. Historically, maize has been politicized, with at time unfavourable regulations for the private sector. The risk of unpredictable policy changes in the future can hamper private sector engagement and increase post-harvest losses.

EXPANDING DOMESTIC VALUE-ADDITION

ETHIOPIA: SESAME

Market overview and rationale: Sesame is an important export crop in Ethiopia, with strong international demand, but very little processing and value addition occurs domestically. With little value being captured by domestic players, there is limited room to invest in loss reduction, and according to interviewees, local and regional storage facilities are poorly maintained and quality is often poor. However, private sector sesame traders are beginning to experiment with value addition, and if certain challenges can be overcome, the future outlook is promising.

Currently, Selet Hulling has the most developed domestic processing model, using a 300ha nucleus farm with 1,500 out growers (organized into co-operatives) cultivating 12,000ha. Selet handles near-farm pre-cleaning, final cleaning, and hulling of seeds, and exports 99.8 percent pure organic white humera sesame. Once sesame enters Selet's production chain, quality and quantity losses are extremely low (in part due to the strict adherence to organic standards that Selet targets).

Intervention points: Selet and others note that production and sourcing could be expanded if key financial and organizational challenges could be addressed. For example, while Selet currently works with two cooperatives, another 19 have expressed interest in partnering. Challenges to overcome include:

- Access to finance to fund high working capital requirements, as raw sesame is a significant investment.

- More legal opportunities to procure sesame directly from smallholders rather than through the Ethiopian Commodity Exchange, which was cited as driving prices up and potentially impacting the ability to implement the tracing and quality standards required to serve high-value international markets.
- Support for farmer organization and cooperative development to enable closer links between smallholders and processors, and quicker entry of raw sesame into the production process (for example, farmers storing sesame in their homes, where it is exposed to anti-malaria spraying, was cited as a quality loss concern).
- Consideration of value-addition support policies, including minimum value-addition requirements, expansions in tax holidays, public-private partnership funding, and potentially even bans of raw exports (although such policy would require extensive review).

Risks and challenges: The environment for value addition in Ethiopia remains challenging, especially due to high prices for raw sesame and significant government involvement in various aspects of the market (restrictions on foreign ownership and investment, restrictions on land ownership, and government support for various state-run businesses that makes it difficult to mobilize private investment). While many of these policies may fulfil other key government aims, private processors are of the opinion that their consequences on sesame value addition should be reviewed.

GHANA: CASSAVA

Market overview and rationale: Demand for cassava by-products in Ghana is nascent but promising. The most developed end use of processed cassava is for beer brewing. Both SABMiller and Guinness have launched cassava beers, marketing them as “home-grown.” SABMiller is currently buying 90MT per month of cassava wet cake from DADTCO and is confident that demand is even greater (due in part to the “buy local” appeal of cassava beer in pilot launch regions). Cassava substitution into beer and other goods has been tested across Africa and continually shows promise. While beer is the most prominent current end use in Ghana, other markets may exist in cassava flour (due to high wheat flour imports), cassava chips, and animal feed.

Additionally, the cassava processors (who produce the mash used by brewers) themselves, especially DADTCO, have successfully introduced smallholder-focused sourcing models, using mobile processing and local logistics specialists to coordinate pickups of fresh cassava and quickly process it into more stable forms to protect it from loss.

Intervention points: In order to further expand production and roll out commercially viable smallholder sourcing models at scale across Ghana, industry participants highlighted several intervention points:

- Consider the implementation of a cassava-flour substitution policy similar to that of Nigeria, which mandates the inclusion of 10 percent high quality cassava flour in all wheat flour, or similar infant industry supports, such as import tariffs on wheat and starch or tax breaks (for example, SABMiller receives an excise tax reduction on beer that is produced with local cassava, which contributes to the financial sustainability of the product).
- Provide targeted support for technical assistance, farmer education, and farmer organization, to sensitize farmers about the longer-term benefits (more stable prices, more reliable payment, less

time spent marketing, and larger demand, even if prices are occasionally higher in informal markets) of selling to processors, to increase yields, and to move towards more standardized weights and measures (in the past, differences in purchase measures between the informal and formal markets have caused some farmer trust issues).

Risks and challenges: Processors did point out that demand for by-products other than beer in Ghana is currently untested, suggesting caution and further study are required before committing to investments. Additionally, the policy environment may not be entirely favourable for the adoption of a cassava-flour substitution policy in the near term, as proposals have been raised in both the legislature and in the executive but have failed to gain sufficient traction or garner political attention.

NIGERIA: CASSAVA

Market overview and rationale: The cassava market in Nigeria is even larger than in Ghana, and the opportunities for expanding cassava processing are substantial. While the cassava beer market is not as well-developed as in Ghana, the cassava flour market is already established and shows great promise. Thanks to a government policy mandating a 10 percent mixture of high-quality cassava flour (HQCF) into all wheat flour (a large portion of which is imported), there is a ready source of demand for cassava by-products. In fact, processors report that if the HQCF policy was fully implemented, 300,000MT of flour would be required, creating demand for 1.2 million MT of raw cassava. Additionally, the starch, glucose, and animal feed markets were cited as nascent sources of demand for domestic cassava by-products.

Several processors, including DADTCO and Thai Farm International, have successfully set up commercially viable smallholder-sourcing models either using direct interaction (where farmers deliver raw cassava in exchange for immediate payment) or farmer organization / local mobilizer intermediation. While their processing plants are operating at a medium scale, they are not yet at full capacity – for example, Thai Farm is operating at around 30-40percent capacity currently.

Intervention points: Processors point to several intervention opportunities to help drive expansion of smallholder sourcing models:

- Ensure strict enforcement of the HQCF policy, free from political interference. Processors identified periodic lapses in policy enforcement (sometimes driven by efforts by powerful bakers and millers) as sources of uncertainty in their business and mentioned that it occasionally led them to stop purchases from SHFs, which in turn undermines the trust required to convince SHFs to bypass the traditional market and coordinate operations with processors. On this front, engagement with flour millers and bakers, to understand the causes of their resistance to HQCF and explore changes that might ameliorate their concerns, may be helpful.
- Fund research and support the delivery of better varieties and locally-appropriate small scale harvesting equipment. While breakage during harvesting is not a significant problem in Ghana, a large portion of cassava in Nigeria is harvested in the north where the ground is very dry and hard, leading to breakage and rapid spoilage. Current imported harvesting equipment is not appropriate to deal with this challenge, suggesting a role for more financing of research and delivery efforts. Similarly, longer-lasting varieties of cassava are being developed by local researchers, but delivery efforts may require greater extension funding.

- Provide targeted short-term funding to strengthen and develop farmer organizations. The logistical challenges of sourcing directly from smallholders are substantial but manageable for small- and medium-scale processing plants, but larger plants operating at full capacity will require some level of specialized intermediation. Farmer organizations also have important roles to play in convincing SHFs to adopt higher-starch varieties that make processing economical (such varieties are not popular on the local *gari* market), in disseminating best practices in planting and harvesting, and in coordinating planting to ensure reliable, consistent supply.
- Ensure continued focus on increasing productivity (potentially in tandem with the two points above, as training through farmer organizations and dissemination of improved varieties may help productivity) to ensure that processors are able to access the required volume of cassava to run plants efficiently.

Risks and challenges: The main risks mentioned by industry participants relate to policy enforcement and farmer trust. Without guarantees of strict HQCF policy enforcement, investment decisions are difficult to justify. Also, if small-scale, commercially-unviable processors interact with farmers, convince them to change planting and harvesting behaviour, and then disappear (as has happened, according to industry participants), farmers will be much less likely to engage with future processors.

MOZAMBIQUE: CASSAVA

Market overview and rationale: Mozambique's formal cassava market is still relatively small, with marketed cassava accounting for ~12-13 percent of total production in the north and ~3-6 percent of production in the south. Cassava is an important subsistence crop, providing 30 percent of all calories consumed in Mozambique. The value chain is predominantly informal, with a proliferation of traders transporting fresh cassava (predominantly young men carrying heavy water-laden fresh roots) and small-scale retailers (primarily women). Most processing is done artisanally by women (into *rale*—a traditional food—and flour) but there is a nascent commercial processing industry for *rale*, mill flour and cassava cake.

The most promising commercial intervention in formalizing the value chain is the DATDCO micro-processing model. As in Ghana, DATDCO operations in Mozambique supply processed cassava wet cake to SABMiller for a cassava beer called Impala. In Mozambique, DATDCO reaches ~1500 farmers and operates with one-way contracts that allow farmers to sell elsewhere or grow other crops. As in Ghana and Nigeria, the company is highly aware of food security concerns and recognizes the importance of crop rotation. Current operations rely on partnerships with two NGOs, IFDC and the Corredor Agro farm. DATDCO selects farmers, and IFDC provides proper disease-resistant varieties of cassava (preventing significant losses that occur in non-disease-resistant varieties). Lead farmers receive improved stems for free and distribute 40 percent of harvested cuttings to other farmers.

Intervention points: While demand for cassava by-products in Mozambique is growing, largely driven by the beer industry, value chain actors identify an important set of challenges and needed interventions, primarily focused on provision of appropriate inputs:

- Increased support for research into hardier and more processor-appropriate varieties, along with facilitation of active engagement between the private sector and the government's Seed Services

Department; a specific challenge cited here was the slow approval and testing of disease-resistant varieties, which could be mobilized to address one of the main cassava loss drivers in Mozambique.

- Strengthening of innovative seed multiplication and distribution models that involve the private sector, in order to ensure small farmers are able to access the most appropriate varieties.
- Farmer education to ensure the efficacy of variety-focused interventions (if farmers mix old and new varieties, interventions are unlikely to be economically sustainable).

Risks and challenges: Other challenges include lack of infrastructure to enable efficient and fast movement of raw cassava roots to processing facilities. One cassava processor that had piloted a smallholder sourcing model for its ethanol production had to end the program because its factory was operating well below capacity due to sourcing challenges. Companies also cite an expensive business environment driven by vague regulations and high taxes).

GHANA AND NIGERIA: TOMATO

Market overview and rationale: Both Ghana and Nigeria are substantial markets for tomato paste in addition to fresh tomato (for example, in Nigeria, the paste market is estimated at 200,000MT/yr²³, requiring 800,000MT of fresh tomatoes). However, nearly all tomato paste in both countries is imported as concentrate from China, Italy, and elsewhere, despite enormous volumes of local tomato production. Cost competitiveness (due to strong local demand for fresh tomatoes), as well as lack of appropriate processing varieties, are the most common reasons cited for the lack of development of domestic processing, along with difficulties in aggregation caused by poor transport infrastructure in the tomato growing regions.

Despite the challenges, several processors are in the exploratory stage in both countries, and industry participants are guardedly optimistic about future potential, especially given regional successes in countries like Senegal. In Ghana, TEPCO is in the process of rehabilitating a medium scale (2MT/hour) plant originally built by the government and setting up partnerships with smallholders. In Nigeria, Dansa Foods (a subsidiary of the Dangote Group conglomerate) has invested \$35 million in the construction of a large-scale tomato plant near the major tomato-growing region, although the plant is not yet commissioned. TGI Foods, an importer of tomato paste, is already working with smallholders in cotton production, and notes that tomato and cotton are complementary crops and the same smallholders could be organized to provide local processing tomatoes if conditions were right.

Intervention points: Industry participants in both countries noted that several targeted interventions would be needed to drive growth in domestic processing:

- Study the effects of an infant-industry protection tariff on imported tomato paste, with an eye to implementing *temporary* tariff barriers to enable domestic processors to ramp up to commercial scale. Such tariff barriers would need to be carefully studied for their effects on consumers in the

²³ Central Bank of Nigeria, "Integrating Nigeria's Agricultural & Financial Value Chains: The Role of NIRSAL", Nov 2011

short-run, but may have significant long term benefits in catalysing the domestic processing industry.²⁴

- Help fund agribusiness and processor efforts to develop and distribute market-specific varieties appropriate for processing, as traditional varieties contain too much water to process economically, and current yields are too low to support economical operation of processing plants. Note that this intervention may require capacity development efforts for agricultural extension services and national varietal registration services, as agribusiness participants have noted weaknesses in the approval and dissemination process, especially in Nigeria.
- Provide temporary funding for efforts to organize farmers and to build the managerial and technical capacity of co-ops and FOs and help them sensitize their farmers to the benefits of working with processors. Due to the trust issues involved in convincing farmers to switch to processor-appropriate varieties (which will likely not be popular on the fresh market), as well as the logistical challenges of delivering perishable produce to medium-scale processing plants, the farmer organization link is critically important.

Risks and challenges: There are four general risks associated with interventions in the tomato market in Ghana and Nigeria. First, on the supply side, farmers may be unwilling or hesitant to adopt processor-appropriate varieties. These varieties are usually less appealing for sale as fresh produce, and thus farmers would have to trust that they will be able to sell to a processor at a fair price. Processors will need to build strong relationships with farmers and farmer groups, and they may find it necessary at the outset to support production through provision of seeds and other inputs.

The second major concern is adequate plant utilization. If factories cannot operate at or near full capacity, businesses will not be feasible or sustainable in the long run. Low utilization may be a problem for two reasons. First, yields for tomato are very low in both countries. Experts suggest target yields of 40+MT/ha to make medium-scale processing viable, whereas current yields for small-scale farming using unimproved inputs and traditional practices are barely 10MT/ha. Thus, any post-harvest intervention effort will need to include a substantial productivity improvement component.

The third challenge to overcome to ensure sufficient utilization is seasonality of production. Tomato production is rain-fed in many areas of Ghana and Nigeria, meaning there is a single season with a major glut at the time of harvest. However, some industry participants do not believe seasonality is a critical issue. One processor noted that the capital investment required for a medium-scale plant is low enough to make utilization at capacity for only 3-4 months a year economically feasible, and also noted that many Chinese plants are not fully utilized throughout the year and are still economically competitive. Additionally, one agribusiness expert noted that with improved varieties much of the tomato-growing region of Nigeria can produce tomatoes nine months out of the year (the only exception being rainy season). He believes the main obstacle to reducing the seasonal glut is farmer behaviour and adherence to “traditional” planting patterns. Finally, equipment for tomato processing can be switched to the

²⁴In addition to tariffs, affirmation of quality standards for imports may also be an important angle, as industry observers (not processors) have alleged that imported paste is sometimes cheaper due to being of substandard quality

processing of other fruits and vegetables for juice, so factories may be able to utilize lulls in the tomato season for production of other products.

Finally, entrenched interests and the structure of the tomato market may pose a risk. In Ghana, tomato trading is highly complex and dominated by a class of traders known as “market queens.” These women control prices and quantity of tomatoes on the market and operate a quasi-cartel. Bypassing these marketing channels may be difficult, with the possibility of significant resistance from traditional actors. In Nigeria, multiple industry participants cited some risk of smuggling by existing players or informal actors if infant-industry tariffs were enacted.

MOZAMBIQUE: GROUNDNUTS, PULSES, AND SESAME

Market overview and rationale: Groundnuts and pulses have similar market structures in Mozambique. Value chains are informal and unstructured, with a proliferation of small traders for the local market (as with cassava) and a few large processor/exporters for international markets (e.g., Olam and ETG). Many farmers grow groundnuts and pulses for subsistence, and they are often grown together. Export opportunities exist in groundnuts, pigeon pea and green gram, while domestic demand is growing for soybean (for oil and use in animal feed).

The sesame market structure is oligopolistic, with few buyers and many sellers. The vast majority of sesame produced is for the export market. Sesame is a relatively new crop to Mozambique, and thus no official seeds (improved or not) exist. Many farmers are not accustomed to cultivating it, thus poor agronomic techniques are commonplace and there is a high rate of shattering and impurities. As such, there are high losses in the value chain.

Wholesalers/retailers like Olam and ETG source all three crops directly from farm gate and/or aggregation points, offering technical assistance to some farmers through limited contract farming schemes. Pilot programs have recently emerged for commercial outgrowing hubs in both soy (JFS) and groundnut (ECA). ETG is piloting an outgrower scheme for sesame in Nacala, providing inputs, mechanization and market access through a partnership with SNV. Shoprite has piloted a direct-to-retail sourcing model for beans and nuts, but additional support is needed to scale. Specifically, farmers need to produce appropriate quality and volume of produce and be able to deliver pre-packaged products.

Intervention points: In all three crops, farmers face a number of challenges, including difficulty sourcing seeds, poor agronomic techniques, trust issues between farmers and the private sector, and infrastructural barriers that make access (e.g., transport and logistics) costly. Given the nature of informal marketing, farmers have little incentive to produce better quality goods. But a number of opportunities exist to address these challenges through private sector initiatives. In all three crops, the commercial nucleus farm with outgrower model has had success in linking smallholders to processing opportunities. However, industry participants note that several interventions are needed to scale up domestic value addition and reduce post-harvest losses:

- Strengthen farmer organizations and offer temporary support to third parties engaged in technical assistance, as well as capacity-building support to enable farmer organizations to deal effectively with commercial farms and processors.
- Support research and delivery efforts aimed at identifying and multiplying improved seeds that facilitate processing and limit risks to farmers; seed multiplication and distribution should be incorporated into commercially-viable models and handled by private sector participants to ensure maximum incentives for widespread distribution and adoption.
- Facilitate partnerships between the private sector and NGOs to ensure the private sector is supported at an initial stage with providing technical assistance to the farmers
- Investigate grading and sorting systems and opportunities to give price premiums to farmers for a better quality crop, reducing concomitant losses.
- Support efforts to build trust between farmers and private sector, which sometimes lack when farmers feel they are being offered too low prices; this may be done through an NGO or farmer organization acting as an intermediary, or through government regulations of prices.

Risks and challenges: Selecting the right crops and processors to target for expansion of outgrower models will be critical to success, as side-selling is always a risk in contract farming. Identifying crops, such as soybean or sesame, where a single formal buyer can offer a substantial premium to farmers above informal market prices is important to ensure that farmers deliver as promised and that processors can recoup any investments in input distribution and technical assistance.

KENYA: TOMATOES

Market overview and rationale: Among horticulture crops, tomato accounts for the second highest produce in Kenya, after French beans. Smallholders are the main producers of tomatoes in the country. Local demand for tomatoes is high and all domestic produce is absorbed in the country. The demand shortfall is mainly met by imports from other countries in the East African Community. Except for some supermarket chains in Kenya that source directly from smallholders, the tomato supply chain is unorganized. Currently, around a tenth of horticulture produce in the country passes through organized supply chains and its share is growing²⁵. Tomato loss happens mainly during handling, transportation, storage and at the point of sale. Smallholders normally store a small quantity of the produce as the demand is high. There are some small-scale tomato processors in Kenya, however their supply is a fraction of the demand for processed tomato. Most of the manufacturers of tomato-based end products import tomato paste from India and other countries.

Intervention points: Lack of cold chains and standards in transportation are the main causes of loss in the tomato value chain. This results in tomato consumption happening closer to the production regions with many parts of the country dependent on imports. Therefore, investments to bring processing facilities closer to production areas can significantly reduce losses. Interventions to facilitate this include:

- Agribusinesses interviewed in the tomato value chain cited lack of access to finance as the major impediment for investments in tomato processing. Agriculture contributes ~25 percent to Kenya's

²⁵ Fresh Produce Exporters' Association of Kenya

GDP, however the sector's share in bank lending is only 5 percent²⁶. Banks do not understand the agriculture sector well and perceive it as high risk, and other financial institutions such as MFIs, and SACCOs provide loans sizes that are insufficient for processing equipment. AGRA's experience in implementing credit guarantee schemes in the agriculture sector can be leveraged to design guarantee schemes specifically for the processing industry.

- High energy costs in Kenya are a major deterrent to manufacturing in Kenya. Advocacy with the government to provide incentives to the private sector for investments in the cold chain can lead to impact. Incentives can include VAT-free imports for all cold chain equipment (not only refrigerated trucks) and subsidies on energy costs for agro-processors.
- Availability of information on market prices can be significantly improved. Lack of information reduces the ability to extract value from price differences and leads to gluts and wastage in some parts of the country and non-availability of tomatoes in other parts.

Risks and challenges: The main risks in expanding the tomato market relate to the current lack of formal market activity. Without some sort of temporary guaranteed market, it may be difficult encourage the private sector to invest in tomato processing. Other risks include farmers' unwillingness to grow processor-appropriate tomato varieties and that it could be difficult to find a balance between facilities large enough to operate economically but small enough to be situated close to production regions (to minimize transport losses and costs).

CROPS WHERE DIRECT PRIVATE SECTOR SOURCING IS UNLIKELY IN THE NEAR TERM

While many of the target crops in this study present some opportunity for direct interaction between formal private buyers and smallholders, a few crop markets currently suffer from deficiencies that make near-term private sector involvement less likely. For these crops, policy interventions and dissemination of improved technology to smallholders through channels other than private-sector off-takers (e.g. government extension services, NGOs) may be more promising. The specific crops in this category include:

- **Cassava in Senegal:** Cassava is produced in Senegal at a much smaller scale than in Ghana or Nigeria, and more importantly, is traditionally consumed as a vegetable rather than as a source of carbohydrates. As such, there is limited demand for processed forms of cassava and limited opportunities to operate cassava plants at economic scale. Industry players agreed that cassava flour would likely be an un-economical substitute for wheat flour (unlike in Nigeria, where the production cost of HQCF is lower than the sale price of wheat flour), meaning value-addition policies might be counterproductive.
- **Teff in Ethiopia:** Over the long term, it is likely that the commercial market for processed teff (*injera*) will develop well, both to serve the growing urban middle-class market and to serve the high-value export "health food" market. However, while several local processors are currently involved in commercial production of *injera* from teff, they still source mainly through local traditional brokers, who, unlike in other crops in the study, are considered by private players to perform a relatively valuable role. In addition, the producers report that in the near term, they are generally able to meet their raw material needs through traditional value chains, without a

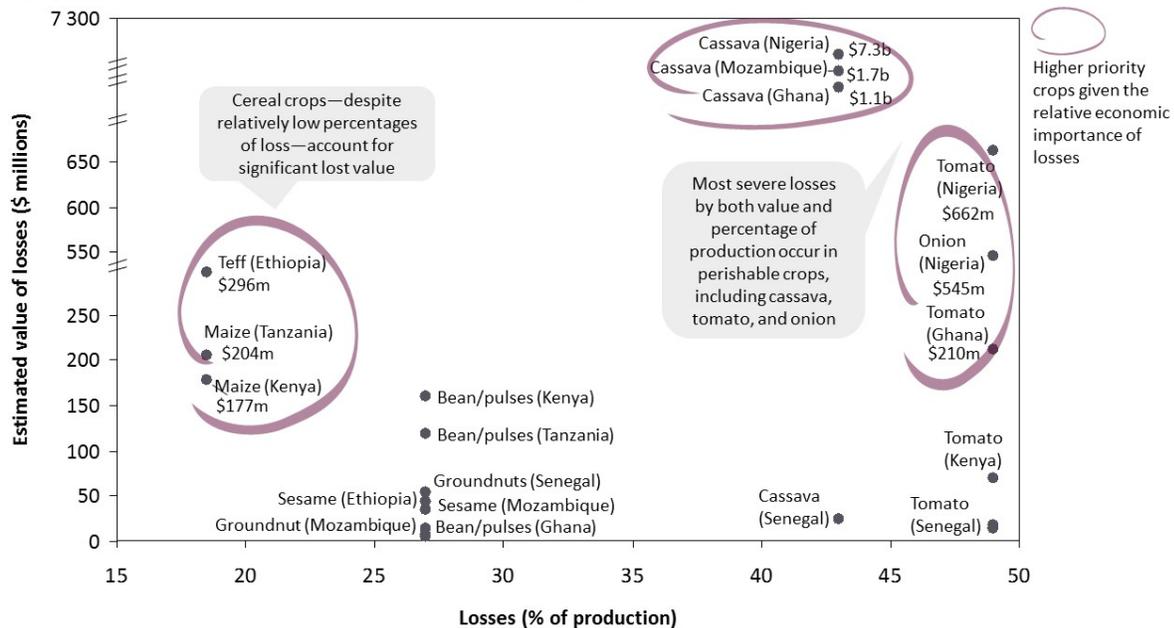
²⁶ Central Bank of Kenya – Banking Supervision Report 2012

need for more integrated sourcing. In fact, there was relatively little sentiment from private-sector participants that the value chain could necessarily be “improved” in a way that would drive substantial loss reduction, as, following harvest and initial processing, losses in teff are noticeably lower than for other crops such as maize, due to teff’s greater resistance to damage and pests in storage. On the other hand, on-farm processing losses, especially in threshing, are relatively high (due in part to unavailability of improved equipment), so government extension and technology delivery efforts may be more promising near-term routes to reduce losses. In the long term, it is worth keeping an eye on private-sector involvement in the modern retail and export market to see if increasing demands for quality and quantity will eventually encourage more integrated sourcing from smallholders.

PRIORITIZATION OF OPPORTUNITIES

When considering the potential interventions presented above, it is worthwhile also to consider the economic impact of post-harvest losses in each target crop and country. An analysis of the value of smallholder production and the typical ratio of crop lost due to food loss, which is shown in Figure 6, highlights crop/country pairs where private-sector sourcing interventions might have significant positive impacts on the overall agricultural economy.

Figure 6: Share of crop lost vs estimated value of production, target crops and countries



Sources: FAOSTAT; “Global Food Losses and Food Waste,” FAO, 2011; additional desk research to fill data gap. Note that statistics here are regional estimates for sub-Saharan Africa. Significant variations can exist within countries based on market structures— e.g. Industrial tomato produced in the Valley area in Senegal and cassava from Ogun State in Nigeria suffer lower levels of waste due to the presence of large-scale processors. In recognition of the scarcity of reliable data on losses by crop/country these estimates are provided with caution.

In addition to this lens, it is important to consider addressable potential, ease of implementation, and the relative risks involved when prioritizing types of interventions. To this end, we consider the near-term addressable potential (in terms of the number of smallholders affected) offered by the possible intervention models seen in each country and also categorize economic hurdles to implementation along

with the private sector's interest in engaging. A qualitative ranking of these measures helps understand which interventions are "quick wins" and which may be more speculative. While a full quantitative analysis of such factors is beyond the scope of this study, the field interviews and desk research allows us to draw qualitative conclusions about each intervention. These conclusions are shown in Table 4 on the following page, with prioritized interventions based on these impact and feasibility screens highlighted in green.

Table 4: Prioritization of private-sector expansion strategies based on scale of impact and ease of implementation

Country	Crop	Channel	Size of loss (relative to agricultural GDP)	Scale of private-sector impact potential	Ease of implementation		Additional constraints or explanatory comments (see profiles in section 6 above for complete details)	
					Private-sector interest	Economic feasibility & risk		
Tanzania	Maize	Improve links to traders	\$\$	👤👤	🟡	7	🟡	Risk of side selling is high due to market structure
	Pulses	Improve links to traders & exporters	\$\$	👤👤	🟡	8	🟡	
	Onion	Improve links to retail and export	\$\$	👤	🟡	7	🟡	
Nigeria	Tomato	Expand processing	\$\$	👤👤👤	🟡	8	🟡	Key barriers to overcome in selection of proper varieties and smoothing seasonal production
	Tomato	Improve links to retail	\$\$	👤	🟡	9	🟡	
	Cassava	Expand processing	\$\$\$	👤👤👤	🟡	11	🟡	
Ghana	Tomato	Expand processing	\$\$	👤👤	🟡	6	🟡	Market structure presents significant challenges
	Tomato	Improve links to retail	\$\$	👤	🟡	8	🟡	
	Cassava	Expand processing	\$\$\$	👤👤	🟡	9	🟡	Policies needed to drive demand in addition to beer
	Pulses	Improve links to traders & exporters	\$	👤👤	🟡	6	🟡	Policies needed to support creation of local and regional formal markets
Ethiopia	Sesame	Expand processing	\$	👤👤	🟡	7	🟡	Government intervention via ECX is large risk
Senegal	Groundnuts	Improve links to traders & expand processing	\$\$	👤👤👤	🟡	9	🟡	High potential for impact if able to overcome primary constraint of availability of finance
Mozambique	Groundnuts, Pulses	Improve links to traders & expand processing	\$\$	👤👤	🟡	9	🟡	
	Sesame	Improve links to traders & expand processing	\$	👤	🟡	8	🟡	
	Cassava	Expand processing	\$\$\$	👤	🟡	8	🟡	
Kenya	Maize	Improve links to traders	\$\$	👤👤	🟡		🟡	Better storage and harvest practices are key
	Tomato	Expand processing	\$\$	👤👤	🟡		🟡	Incentives for investment in processing required
	Pulses	Improve links to traders & exporters and expand processing	\$\$	👤	🟡		🟡	

Note: Scale of loss expresses the figures from Figure 6 relation to overall agricultural GDP: \$ = <0.5 percent, \$\$ = 0.5-1 percent, \$\$\$ = 1 percent+.

Scale of potential private-sector impact is an order-of-magnitude estimate based on existing base of private companies operating or expressing willingness to enter market and domestic production and demand. 👤 = 1-10,000 farmers, 👤👤 = 10-100,000 farmers, 👤👤👤 = 100,000+ farmers in the medium term.

For ease of implementation, higher scores (more-shaded) represent lower barriers to entry.

Annex 1. Details of best-practice models

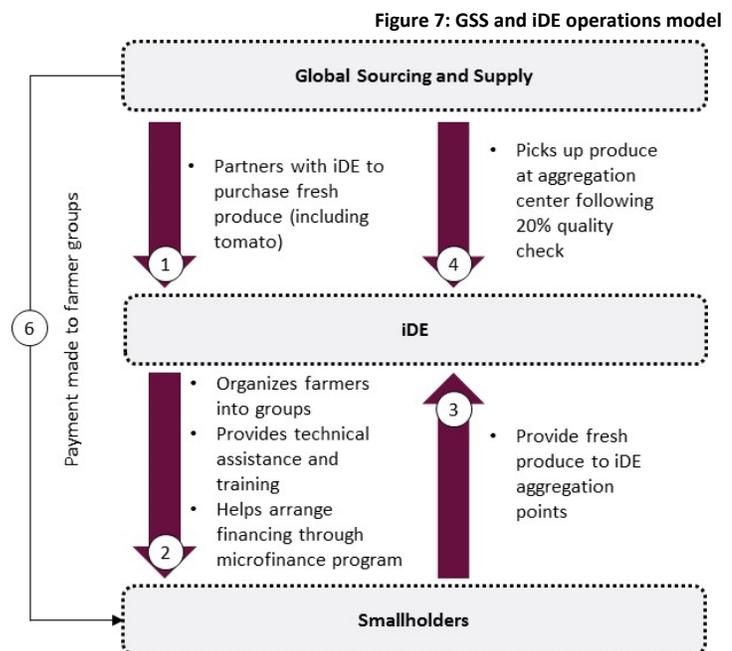
Throughout the field research, the Dalberg team uncovered numerous examples of successful integration between smallholder farmers and private-sector buyers. These “best practice models” provide economic incentives for both parties to reduce post-harvest losses in a number of ways, and offer the potential to be scaled up in their current countries or replicated in other countries in whole or part. In this section, we present seven best-practice models, primarily drawn from interviews with market experts and company representatives, supplemented by company websites, and discuss each one’s success factors, built-in economic incentives, ways to drive further improvement, and future potential to scale.

GHANA: TOMATO AND FRESH PRODUCE SOURCING BY GSS AND IDE

Global Sourcing and Supply (GSS) is a subsidiary of the Bahrain-based BBMI, with catering and food-supply contracts with numerous international extractives companies in Ghana. As part of their operations in Takoradi, the hub of Ghana’s relatively young oil industry, they partner with an NGO called iDE to source fresh produce from smallholders. iDE has organized 400 smallholder farmers in one district into 25 groups and provides them with technical assistance and training while working with local microfinance institutions to obtain financing for farmers. The farmers, in turn, deliver fresh produce to a series of aggregation points run by iDE. GSS picks up produce at aggregation centers (see Figure 7 for more details).

The economic incentives in this arrangement are strong for all parties. For GSS, sourcing in this manner as opposed to through traditional markets means that produce arrives faster and has a longer shelf-life. GSS also reports that quality has consistently been higher than through other channels. Additionally, Ghana’s relatively strong extractive industries local content law means that GSS’s customers have an incentive to participate, giving GSS the long-term security to participate in innovative models such as this. For farmers, participating in the iDE program gives them better access to microfinance and technical assistance, along with a

guaranteed market with a steady price for their produce and a convenient set of aggregation points. The participation of iDE, meanwhile, allows both farmers and GSS to manage the logistical difficulties that would otherwise complicate such a sourcing arrangement, as iDE’s role as a trusted, consistent intermediation agent minimizes transport difficulties and also minimizes the amount of time and effort that GSS needs to spend on quality control – GSS only checks around 20 percent of the produce for quality, which is feasible thanks to the strong incentives to farmers and iDE for ensuring continued quality.



While only 400 farmers are currently covered by the GSS project, iDE works with a total of 11,000 farmers, giving ample supply potential. GSS also has a number of supply contracts in the Accra area, meaning the demand is also substantial – however, the main obstacle to scaling up is the difficulty of arranging high-quality, consistent transportation from iDE’s farmers in the north down to Accra. If a reliable logistics partner could be found, this model could be scaled up.

GHANA, MOZAMBIQUE, AND NIGERIA: CASSAVA SOURCING BY DADTCO

The Dutch Agricultural Development & Trading Company (DADTCO) is a cassava processor with operations in several African countries. Its major innovation has been developing medium-scale (50T/day) mobile cassava-processing units (AMPUs) that can travel to villages and make the process of cassava aggregation substantially easier. In the countries in our study, DADTCO is already sourcing from smallholders at a small to medium scale (300 farmers in Ghana, 1,500 farmers in Mozambique, and a full 21,000 in Nigeria), producing cassava cake for brewers and cassava flour for millers. As shown in Figure 8, the DADTCO model in Ghana and Mozambique relies on collaboration between individual smallholders, locally-trusted “mobilizers” who coordinate logistics and sign up farmers, and financial / technical assistance partners. The model in Nigeria (see Figure 9) features the additional participation of medium-scale commercial farmers (up to 150ha) who help anchor production and also serve as improved seed and root multipliers for the smallholders.

Figure 8: DADTCO operating model in Ghana and Mozambique

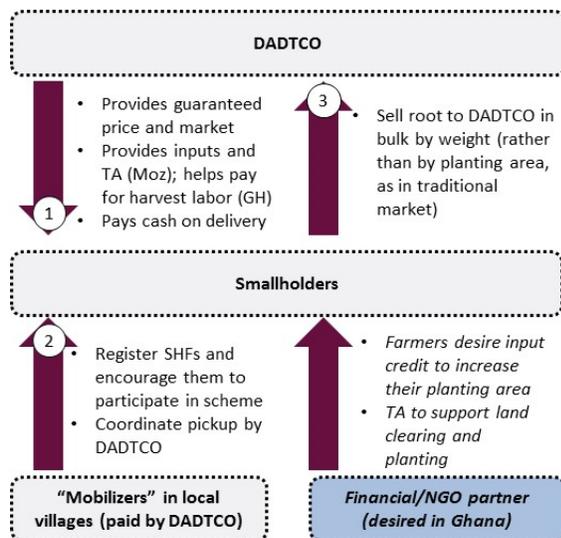
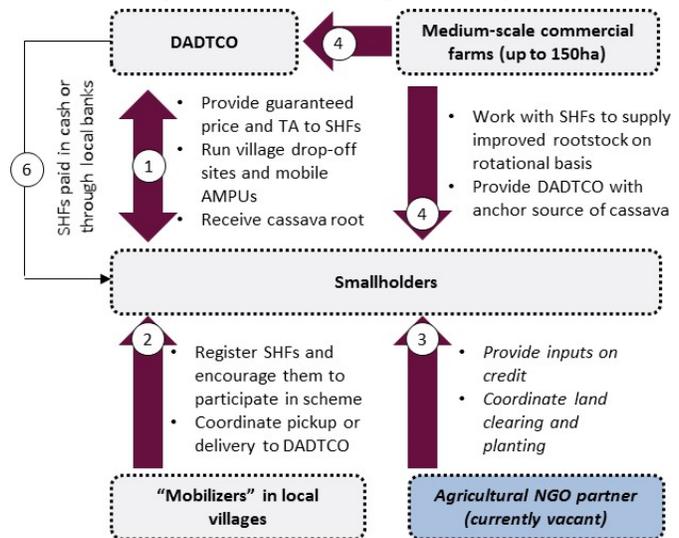


Figure 9: DADTCO operating model in Nigeria



The DADTCO model has demonstrated significant potential to reduce losses for smallholders. DADTCO offers a guaranteed market at a consistent year-round price. Farmers are given the opportunity to sign a guarantee form that commits DADTCO to buying their cassava but does not commit farmers to selling any specified quantity. DADTCO is highly aware of food security concerns and ensures that farmers have adequate information about market conditions to decide when and how much produce to sell. Though DADTCO’s fixed price is sometimes below the market price, farmers say that they benefit from being able to sell in bulk, having transport arranged, and being paid immediately in cash. Farmers who supply to DADTCO in Ghana noted that a common driver of “loss” is simply not being paid by a market trader. Others noted that, prior to selling to DADTCO, they would leave their roots in the ground after maturation to wait

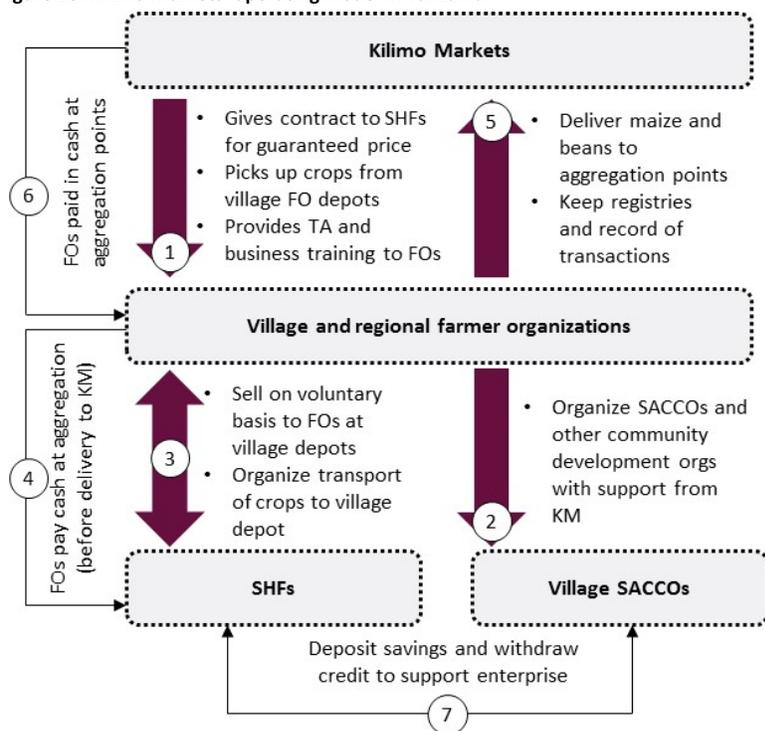
for a higher market price before selling, only to lose the entire harvest to fire or rot after a flood. Farmers also said that they have already or are planning to use earnings from sales to DADTCO to invest in improving their production and harvest capabilities.

As DADTCO operations continue to expand in target countries, the company seeks support in a number of areas. In Ghana, the main need is to drive demand for wet cake to increase operations to capacity (from only about 10 percent currently). A financial or NGO partner is needed in both Ghana and Nigeria to provide input credit to farmers and support expanded technical assistance. In Nigeria, the company also seeks research, technology, and support for yield improvement along with support to research and financing for locally-appropriate mechanization.

TANZANIA: MAIZE AND PULSE SOURCING BY KILIMO MARKETS

Kilimo Markets is a for-profit social enterprise that works holistically to strengthen smallholders and farmers organizations. The company sources maize and bean crops for the export market and also conducts seed multiplication for other private-sector players (e.g., ETG). Kilimo Markets currently works with 20,000 farmers in Arusha and has plans to expand to 70,000 in near term. Smallholders participate on a voluntary basis but get guaranteed prices. The company organizes farmers in a tiered organizational system, making logistics manageable without imposing many burdens on farmers. It also provides support for business training and the development of Savings and Credit Cooperatives (SACCOs) that give farmers means to invest in their businesses and improve output. As part of the company’s outreach, Kilimo Markets also works with farmer organizations on childhood nutrition in an effort to build trust and make the farmer organization central to the lives of the farmer. Kilimo Market’s operating model is outlined in the diagram in Figure 10.

Figure 10: Kilimo Markets’ operating model in Tanzania



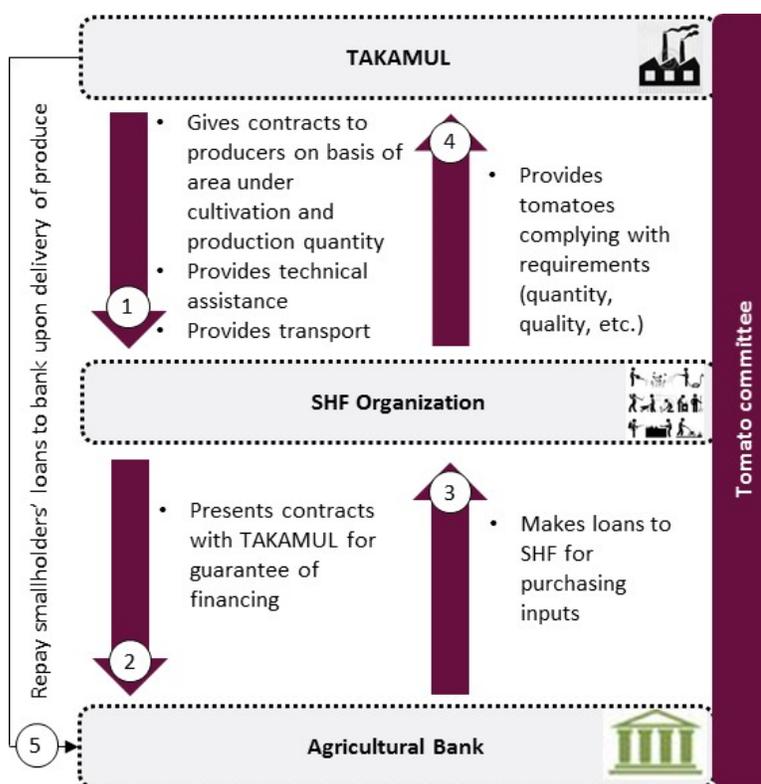
The model provides a formal sales channel for any surplus produce grown by smallholders. By not requiring suppliers to sign contracts specifying sales volumes, Kilimo Markets contributes to farm-level food security and reduces losses by mopping up surpluses that are otherwise at high risk for loss if kept on-farm. Currently, the biggest obstacles to Kilimo Markets reaching its scale potential are:

- The need for a low-cost technology solution to enable greater transparency and more efficient record-keeping between farmers, village farmer organizations, and the apex organizations that work with Kilimo Markets, and Kilimo Markets itself. This is necessary to make scaling up easier and also to build farmer trust.
- The need for funding for small entrepreneurs who could operate village-level processing equipment (e.g. threshers) needed to reduce on-farm losses. Kilimo Markets does not have the core capabilities to run such equipment, and neither do the farmer organizations, but they have observed successes in their target villages with an entrepreneur-driven tractor service model.

SENEGAL: TOMATO PROCESSING BY TAKAMUL

Takamul is one of the three large tomato processing companies in Senegal. The company sources from smallholders on a government irrigation project in the Senegal River Valley. During the harvest season, when tomatoes are most readily available, the company processes between 135 and 210MT of fresh tomato per day. Between 2011 and 2013, the company’s full supply of fresh tomatoes came from these farmers, but the company has recently invested in its own farms to supplement smallholder produce and increase operations. Senegal’s tomato processing sector has seen success largely due to effective coordination through a committee of processors, financial institutions and farmers. This committee sets prices and provides a cooperation platform among key stakeholders. This transparent channel of communications and market regulation simplifies the relationships between processors and farmer organizations. Financial institutions also participate on the committee, enabling farmers to use supply contracts to get input credit. At the time of harvest, farmers sell produce to processors who pay directly into farmers’ bank accounts, enabling the banks to recover credit without hassle. This engagement model is outlined in Figure 11.

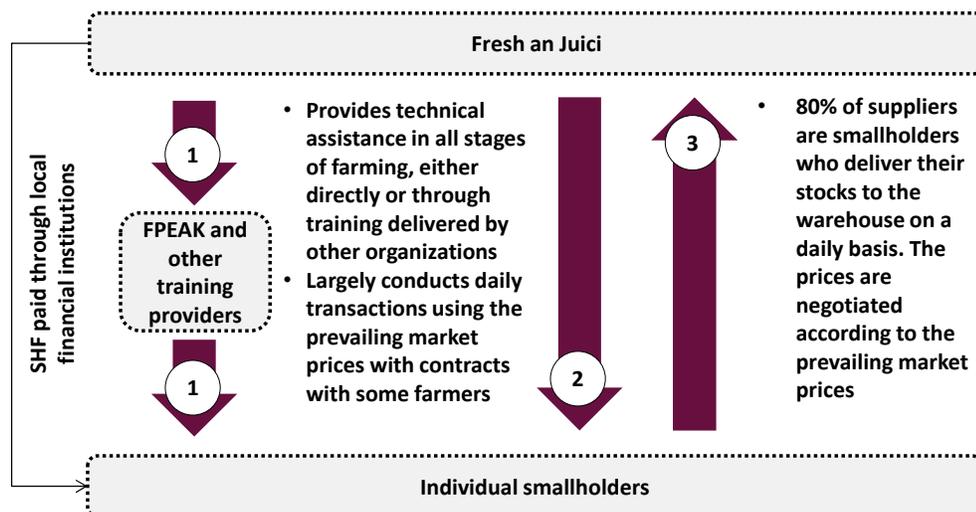
Figure 11: Tomato processor operating model in Senegal



KENYA: FRESH PRODUCE SOURCING BY FRESH AN JUICI

Fresh an Juici supplies fresh produce to Nakumatt, Tuskys and leading hotels and restaurants. All of their customers' target market is middle-/high-end retail customers and the company ensures a high quality of produce. Fresh produce is mainly grown by smallholders in Kenya. Therefore, their sourcing is mainly from smallholders in Kenya with some produce, which has demand but is not grown in Kenya, imported from South Africa and other East African countries.

Figure 12: Fresh an Juici's operating model in Kenya



Fresh an Juici works closely with farmers providing them with technical assistance in all stages of farming. The company also works with external training providers (e.g. FPEAK²⁷), where they hire them to train their suppliers (farmers). In addition, they advise farmers on inputs. One of the key reasons for Fresh an Juici's success is a distributed warehouse model. The company has warehouses in many horticulture producing regions of Kenya, with sorting and quality control being the main activities in those warehouses. The produce is distributed to customers from warehouses with the highest standards and sometimes using cold chains. With the growth in demand from its customers, Fresh an Juici is planning to open new warehouses in other parts of the country and start sourcing from local smallholders in those parts.

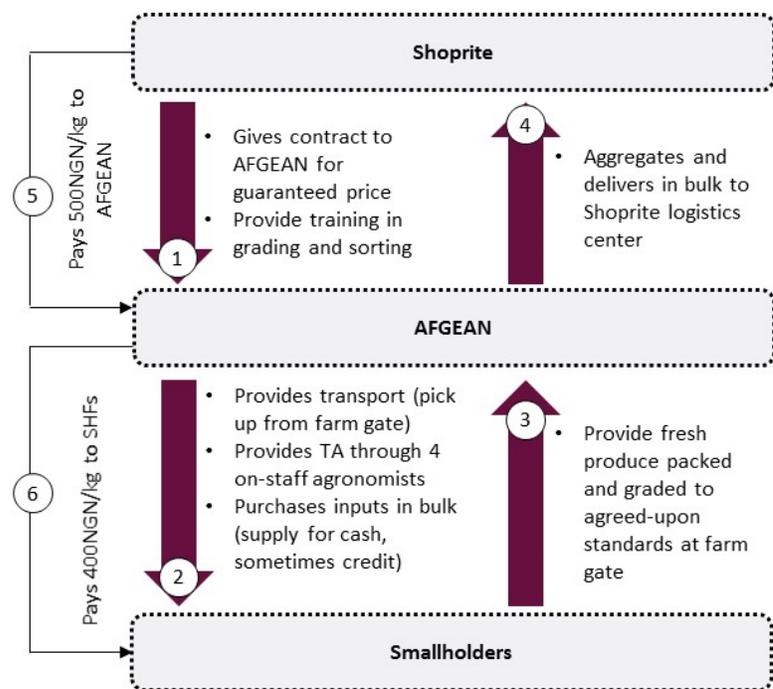
The main incentive for the company in working closely with smallholders is to obtain high quality of produce, which reduces losses (both physical and financial loss). In the interview, the company also emphasized their values and the desire to provide a market for smallholders as reasons for their sourcing strategy. Fresh an Juici makes all payments to smallholders through formal financial institutions (banks, MFIs, SACCOs), which provide farmers with an income record. This helps farmers' access finance as they now have a cash-flow history, which improves farmers' credit-worthiness to financial institutions.

²⁷ Fresh Produce Exporters Association of Kenya

NIGERIA: TOMATO AND FRESH PRODUCE SOURCING BY SHOPRITE AND AFGEAN

Figure 13: Shoprite and AFGEAN sourcing collaboration model in Nigeria

The Association of Fresh Produce Growers and Exporters Association of Nigeria (AFGEAN) is a farmer organization consisting of 25 smallholders and four medium-scale commercial farmers. AFGEAN was set up by a commercial farmer near Lagos using a \$50,000 grant from DFID and has since transformed into a commercially-sustainable organization supplying fresh produce to Shoprite Supermarkets. Farmers benefit because Shoprite contracts with AFGEAN to purchase a variety of fresh vegetables throughout the year, offering prices that can be 30 percent above those of the local markets. 80 percent of this price is passed directly on to farmers, with AFGEAN keeping 20 percent in exchange for coordinating all logistics and picking up produce from the farm gate.



Shoprite also gives training and feedback on quality standards, grading, sorting, and packing techniques, which drive improvements in produce quality. As a result of this training, Shoprite: Can now accept AFGEAN's goods with minimal spot-checks, has dramatically reduced the amount of tomatoes and other produce that is discarded, and supports the premium price structure that benefits farmers. One key success factor here is that, with transparency and advance knowledge of Shoprite's standards, farmers can be strategic about what goods they put up for sale, channelling their best produce through AFGEAN and the rest through local markets.

In addition to the reduced discards and more reliable supply, Shoprite benefits because as a condition of purchasing from AFGEAN, the organization agrees to work with its farmers on strict standards of horticulture, including safe application of pesticides and detailed record-keeping. This protects Shoprite's customers from substandard produce, which is often a problem with informally-sourced vegetables. Shoprite also reduces or avoids having to turn to imports (a common problem due to irregularities in local fresh market availability and pricing) to fill stock gaps, which can cost upwards of four times what AFGEAN charges. Currently AFGEAN is operating at a small scale, around \$10,000 / week in sales. However, Shoprite's demand exceeds AFGEAN's capacity and other rapidly-expanding supermarket chains have expressed interest in similar models. The lead farmers have also been in touch with high-end hotels and restaurants, who are also willing to serve as off-takers.

Annex 2. Additional case studies and resources

One issue frequently cited by private-sector market participants was the difficulty of organizing and coordinating groups of smallholders. Grouping or clustering smallholders is viewed as essential by most participants in order to overcome otherwise large logistical challenges, so any innovation that helps farmer organizations or informal smallholder clusters work better will likely be well-received by potential formal private buyers. To this end, while it was not the main focus of the study, we have included two examples of technology solutions that make it easier for smallholders to be integrated into formal supply chains. While this list is not exhaustive, both of these innovations have been tested and operated successfully in the target countries covered by this study.

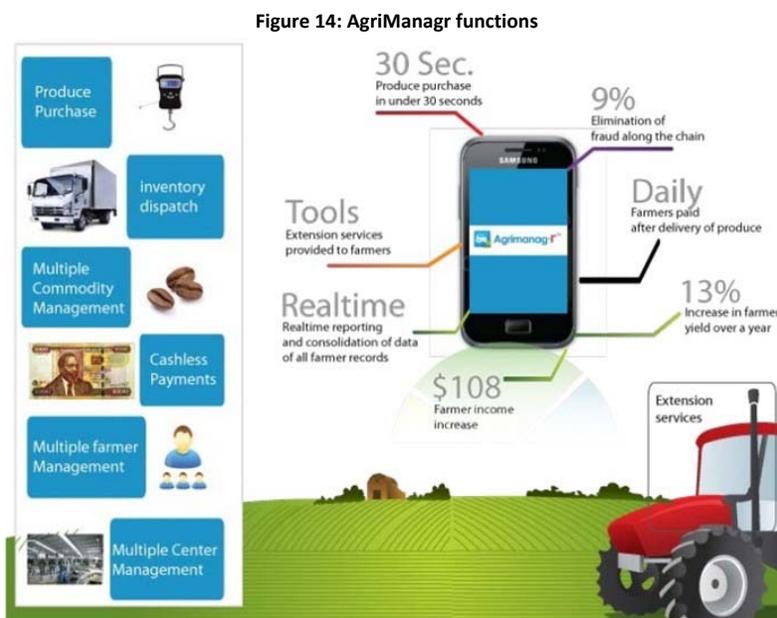
AGRIMANAGR FROM VIRTUAL CITY

Background: AgriManagr is a software solution that enables companies to build better links with farmers in their supply chain. It was created and launched by Kenyan technology start-up Virtual City in 2007 and is currently in use in Kenya and Tanzania.

How it works: AgriManagr helps automate the procurement process. Agents at collection points or farm gate use tablets or smartphones to collect farmers' registration information, GPS coordinates of transaction location, and time of delivery. Produce is weighed on a digital scale connected to the system, which then calculates payment owed. Farmers get paid via mobile money and are given electronic or printed receipts.

Impact:

- Reduced weighing time at farm gate.
- Reduction of up to two months in the time it takes to pay farmers.
- Paper trail that helps farmers secure access to finance and build credit history.
- Improved efficiency and traceability for off-takers.



Source: AgriManagr from Virtual City (Kenya) company website

VIRTUAL CO-OP TECHNOLOGY FROM GIZ AND SAP

Background: SAP and GIZ have been collaborating in East and West Africa since 2011 on a program designed to improve traceability and transparency for smallholder farmers. The program debuted with 400 cashew farmers in Ghana and is now being piloted with 7,000 coffee farmers in Uganda.

How it works: The technology involves a smartphone app to be used at aggregation stations by farmer organization representatives. Commodities are bagged and scanned using a unique barcode, generating a record of the farmer's production and guaranteeing rapid, transparent payment. The bag can then be traced throughout the value chain by intermediaries and end buyers, facilitating certification.

Impact:

- Gives price transparency to smallholders and allows them to make strategic marketing decisions.
- Facilitates transparent and rapid payment by buyers.
- Record of production and payment that helps farmers secure access to finance and build credit history.
- Improved efficiency and traceability for off-takers, along with geo-located record of production to enable better analytics and coordination.

Figure 15: Virtual co-op functions



Source: "Growing Business with Smallholders: A Guide to Inclusive Business", BMZ and GIZ, 2013

Annex 3. List of stakeholders interviewed

Country	Institution	Name	Role
Ghana	USAID	Jorge Oliveira Candace Buzzard Alfred Osei	Regional Food Security Advisor Regional Agriculture Director Project Management Specialist- Agriculture (Ghana)
Ghana	GIZ	Uwe Ohmstedt	Deputy Team Leader & Marketing
Ghana	International Fund for Agricultural Development (IFAD)	Theophilus Otchere Larbi	Country Programme Officer
Ghana	Peasant Farmers Association of Ghana	Charles Nyaaba	Programme Officer
Ghana	Ministry of Food and Agriculture -- Policy Planning and Monitoring Directorate	Angela Danson and Lena Otoo	Deputy Director and Director
Ghana	Ghana Commercial Agriculture Program	Ram Bhavnani Ben Johnson	Technical Advisor Financial Management Specialist
Ghana	Ministry of Food and Agriculture -- Agricultural Engineering Services Directorate	Emmanuel O. Oppong AKB Deyang Johnson Panni	Deputy Director Senior Agricultural Officer Post Harvest Officer
Ghana	Parliament of Ghana	Hon Dr. Sagre Bambang	MP; Member, Select Committee on Food, Agriculture, and Cocoa Affairs
Ghana	Parliament of Ghana	Dr. Owusu Afriyie Akoto	MP; Ranking Member, Select Committee on Food, Agriculture, and Cocoa Affairs
Ghana	IFDC	Arno Maatman	Project Leader, 2SCALE
Ghana	International Food Policy Research Institute (IFPRI)	Shashi Kolavalli	Senior Research Fellow and Leader of the Ghana Strategy Support Program in the Development Strategy and Governance Division
Ghana	Accra Brewery Limited (SABMiller)	Richard Edzeame	Supply Chain Director
Ghana	Dutch Agricultural Development and Trading Company (DADTCO)	Kodwo Osei Sarfoh (and Farmers)	Supply Chain Manager
Ghana	Global Sourcing and Supply (GSS)	Colin Mason	Country Manager

Country	Institution	Name	Role
Ghana	iDE Ghana (partner of GSS)	Laurin Banner	Country Director
Ghana	Melcom	Mahesh Malwani	Joint Group MD
Ghana	TEPCO - Techiman Tomato Processing Factory	Will Ofori	MD/CEO
Ghana	ETG - ETC Commodities	Mohammad Shanawaz	Finance Manager
Ghana	AGRA	Abdou Matieyedou Konlambigue	Programme Officer, Market Access Program
Senegal	TAKAMUL Food S.A	Mohamed LO	General Manager
Senegal	ITA (Institut de Technologie Alimentaire)	Dr Ababacar Sadikh Ndoye	Director
Senegal	SOCAS	Yvan Barry	Operations Director
Senegal	PDMAS (Programme de Développement des Marchés Agricoles du Sénégal)	Ndeye Coura Mbaye Diop	Monitoring & Evaluation expert
Senegal	Centre de Développement Horticole-ISRA	Youga Niang	Agronomist specialised in Horticulture
Senegal	CHOCOSEN	René Regnault	General Manager
Senegal	CAIT (Complexe Agro industriel de Touba)	Moustapha Sène	General Manager
Senegal	CASINO Supermarket	Patrick Pouvrasseau	Marketing Director
Senegal	Ministry of Agriculture & Rural Equipment	Arona Niang	Horticultural Technical Advisor
Senegal	SUNEOR	Mandaw Guissé	Seed Purchase Coordinator
Senegal	AAFEX (Association Afrique agro export)	Hawa Sy Berete Dr Babacar Ndir	Information and Communication Manager Quality Management & Food Safety Manager
Senegal	Association of Cassava producers	<i>Focus group</i>	
Senegal	Cadre de Concertation des producteurs d'arachide	<i>Focus group</i>	
Mozambique	Plant Protection Department, IIAM	Raul Chaquisse	Deputy National Director of Agrarian Services
Mozambique	AgDevCo	Roseanne Whalley	Country Manager
Mozambique	IIAM	Anabel Zacarias	Head, Agri. & Nat Res
Mozambique	AgriFuturo	Randy Fleming	Agribusiness and Business Development Director
Mozambique	CEPAGRI	Adérito Mavie	Agronomist

Country	Institution	Name	Role
Mozambique	TechnoServe	Jane Grob	Operations Director
Mozambique	SNV	Rik Overmars	Country Director
Mozambique	SETSAN	Sisenando Marcelino	Officer
Mozambique	UNIDO	Jaime Comiche	Head of Operations
Mozambique	DADTCO	Hubert Van Melick	Country Director
Mozambique	IDE	Marco Machado	Director
Mozambique	Ministry	Elsa Timana	Seed Services Department
Mozambique	ECA	Grant Taylor	Managing Director
Mozambique	Beira Corridor	Emerson Zhou	Executive Director
Mozambique	Saverite	Nuno da Silva	Sales Manager
Mozambique	IIAM	Isabel Andrade	CIP-SSA, cassava
Mozambique	Alif Quimica	Feloz Mohamed Faruz	General Manager
Mozambique	FAO	Jorge Machanguana	Agronomist
Mozambique	Associacio Josina Machel	Samuel Gobe	Lead
Mozambique	FAO	Castro Camerada	Director
Mozambique	OLAM	Ujjwalkanta Senapati	CEO
Mozambique	Department of Agrarian Services	Rafik Vala	Director
Mozambique	Extension Service Department	Inacio Nhancale	Director
Mozambique	CleanStar Mozambique	Kevin Endres	CEO
Mozambique	JFS	Francisco Santos	CEO
Mozambique	DFID	Gareth Weir	Private Sector Lead
Mozambique	Ikuru	Daniel Gerson	General Manager
Mozambique	African Century Agriculture	Pedro Pinto	CEO
Mozambique	National Cereal Institute (Ministry of Industry and Commerce)	Sidonio Dos Santos	Director
Mozambique	IFDC	Alexander Fernando	Country Director
Mozambique	Maeva Agro (Maputo)	Daniel Mondlane	Executive Director
Mozambique	Gensuala (Olho de soja)	Eng. Nelson Cardoso.	CEO
Mozambique	Plant Protection Department, IIAM	Raul Chaquisse	Deputy National Director of Agrarian Services
Tanzania	University of Dar es Salaam Business School	Prof. Marcelline Chijoriga	Dean of Business School, Director of Public Service, Acting Chair of Agricultural Delivery Division (ADD)
Tanzania	Agricultural Council of Tanzania (ACT)	Mark Magila	Tanzania Agricultural Partnership Coordinator

Country	Institution	Name	Role
Tanzania	Export Trading Group (ETG)	Nadia Paschetta	Director of ETG Foundation
Tanzania	Tanzania Warehouse Licensing Board (TWLB)	Fidelis Temu	Director
Tanzania	Kilimo Markets	Daniel Charles Edward Charles Esther Lampart	Managing Director Technical Director Operations Director
Tanzania	Economic and Social Research Foundation (ESRF)	Dr Hoseana Lunogelo	Executive Director
Tanzania	Mohamed Enterprises	Billu Singh	Procurement Manager
Tanzania	National Food Reserve Agency (NFRA)	Josephine Amolo	Post-Harvest Team
Tanzania	2Seeds Network	Ana Le Roche Colleen Shaffer	Country Director Senior Project coordinator
Ethiopia	Ethiopian Agriculture Transformation Agency	Mirafe Marcosl Iris Shim Dawit Mulugeta	Chief of Staff Senior Program Associate Program Associate
Ethiopia	Ministry of Agriculture, Extension Dept	Ato. Alemu	Planning Officer, the Extension Department
Ethiopia	Astu Injera	Ato. Derje Hailus	Managing Director
Ethiopia	Safeway	Fekadu Kebede	Managing Director
Ethiopia	Shoa Supermarket	Ato. Mohammed Idris	General manager
Ethiopia	Prosper International Pvt	Yemane Mekonnen	Managing Director
Ethiopia	Independent Consultant	Ravi Shankar	Consultant working on DFID PSD project
Ethiopia	SNV	Genzeb Akele	Sector Lead Agriculture
Ethiopia	Ethiopian Commodity Exchange (ECX)	Abenet Bekele	Chief Strategy Officer
Ethiopia	Sulet Hulling	Ben H.M. Van Ampting	General Manager
Ethiopia	ACDI-VOCA	Yohannes Agonafir	Value chain specialist
Ethiopia	SNV	Genzeb Akele	Sector Lead Agriculture
Nigeria	Thai Farm	Louw Burger	MD
Nigeria	International Institute of Tropical Agriculture (IITA)	Thierno Diallo	Post-Harvest Engineer
Nigeria	MARKETS (USAID)	Aliyu Samalia	Director of Agricultural Production
Nigeria	Sahel Capital	Ndidi Nwuneli	Co-Founder

Country	Institution	Name	Role
Nigeria	Min. of Agriculture and Rural Development	Dr Jide Olumeko	Head of post-harvest value chain
Nigeria	National Root Crops Research Institute	Solomon Afuape	Biotechnologist & Cassava breeder
Nigeria	TGI Nigeria	Roy Deepanajan	Vice President
Nigeria	Dutch Agricultural Trading and Development Company (DADTCO)	Temple Chijoge	Administration Manager
Nigeria	Nigerian Stored Products Research Institute	Dr. P Pessu	Director Lagos Station
Nigeria	IFAD	Ben Oluemo	Agricultural economist
Nigeria	Spar	Prakash Keswani; Hargovind Daliyet	Deputy MD Operations Head
Nigeria	Syngenta Africa Ventures Team	Dimitri Pauwels Peter Veal	Head, Africa Ventures Team Operations Lead
Kenya	HCDA (Horticulture Crops Development Authority)	Grace Kyallo	Acting Managing Director
Kenya	FPEAK (Fresh Produce Exporters' Association of Kenya)	Francis Wario	Technical Manager
Kenya	Fresh an Juici	Paresh Kanji Patel	Group Managing Director
Kenya	Trufoods	Hezbon Wafula	Executive – Supply Chain
Kenya	TechnoServe	Dickson Mbanda	Project Lead for Project Nurture
Kenya	NCPB (National Cereals Produce Board)	Dr. Kakai Shem Khakame Samuel Yego	Quality Assurance Manager Manager in Quality and Pest Control Department
Kenya	ACDI/VOCA	Steve Collins	East Africa Regional Representative
Kenya	KENFAP (Kenya National Federation of Agricultural Producer) Services Ltd.	Charles Gitau	General Manager
Kenya	Promasidor	Robert Clarke	Managing Director
Kenya	Eastern Africa Grain Council	Jane Wanza Kamau	Team Leader, EACG Kenya and Project Officer, Warehouse Receipts System (WRS)
Kenya	Cereal Growers Association	Anthony M. Kioko	Chief Executive Officer