CHAPTER 6

Getting More for Farmers from Post-Harvest to Market

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Smallholder farmers in Africa are failing to take advantage of existing and emerging opportunities because of many market-related constraints that require urgent attention.

Three interrelated solutions are required to ensure that smallholder farms in Africa become more commercialized and profitable:

- Increased uptake of improved technology.
- Increased investment in physical infrastructure through prioritizing public investment in rural roads and promoting incentives for private investment in storage, marketing and processing infrastructure, and reducing the fiscal burden associated with such investments.
- Addressing policy barriers by creating a predictable and rules-based enabling policy and regulatory environment to attract much greater private investment in agricultural value chains in a way that serves smallholder farmers.
Introduction

Africa’s economic and demographic landscape is changing profoundly. Over the past 30 years, the population of SSA has doubled, and in urban areas it has tripled (NEPAD, 2013). Rapidly rising urban populations, changing consumption patterns and growth in per capita incomes in SSA are creating major opportunities for local farmers by driving vigorous growth in domestic and regional market demand for food and rapid changes in food systems (Pingali, 2006; Reardon, et al., 2013; Tschirley, Haggblade, & Reardon, 2013). Urban diets are diversifying, with more animal products being consumed. The change in consumption demand is creating new marketing options as witnessed by the growth in the number of supermarkets in Africa (Beyene, 2014; NEPAD, 2013)

Most farms in Africa are smaller than two hectares, and with rising population, they are likely to get even smaller. This implies that the number of smallholder farmers in Africa will continue to grow and hence should be part of the solution to meeting the food demand of the growing urban population and changing consumption patterns (Fan, Brzeska, & Halsema, 2013). At the same time, the number of indigenous medium- and large-scale farmers has increased in the past decade, a situation that will help fill the emerging demand as most of these farmers are commercially oriented (Jayne et al., 2015).

Africa has also seen a rise in more sophisticated retail outlets and supermarkets providing additional marketing channels for commercial farmers. However, most smallholder farmers are currently unable to keep up with the demands of rapidly rising urban populations (Shepherd, 2007). The continent has witnessed a surge in imported cereals such as rice and wheat and processed products with the annual food import bill in excess of US$40 billion (Beyene, 2014). The food import shares of most African countries still remain moderately low, between 5 percent and 25 percent of total food expenditures, but these import shares are rising (Rakotoarisoa et al., 2012). Per capita food consumption in Africa has been rising 10 times faster than per capita food production, leading to an increase in food imports (Rakotoarisoa et al., 2012). However, despite the increase in imported food products, most domestic food needs are still supplied by local producers (NEPAD, 2013).

These trends indicate that there are major opportunities for African farmers to meet the demands of the rapidly growing urban population. However, most smallholder farmers in SSA face major constraints and challenges in responding to these opportunities, such as: (1) limited access to land and tenure insecurity; (2) weak public agricultural research and extension programs, contributing to low productivity; (3) high post-harvest losses; (4) weak and uncertain input and output markets; (5) unpredictable weather; (6) liquidity constraints; (7) high transport costs; and (8) questionable agricultural policies, to mention a few.

The main premise throughout this chapter is that raising farm incomes is key for improved well-being of smallholder farmers and to attract investors (emerging and commercial farmers and youth). To be successful, most countries in SSA will need to develop efficient and transparent marketing systems to raise the returns to labor in farming. Against this backdrop, this chapter summarizes the progress made in transforming Africa’s agriculture in terms of reducing post-harvest losses and improving market linkages. In addition, the chapter outlines the underlying causes of inefficiencies and uncertainty in food markets, drawing from experiences in East and Southern Africa, and then identifies strategies that African governments may consider to address these challenges.

The main conclusion is that if these inefficiencies and uncertainties are not creatively addressed, then most smallholder farmers will continue to lag behind and will remain poor as the opportunities generated by the region’s rapidly rising demand for food are filled by imports. Fortunately, we believe that a solid policy enabling environment coupled with well targeted public expenditures to promote the performance of local food markets can turn these trends around and contribute greatly to agricultural transformation in Africa. Ensuring that African farmers get more from post-harvest to markets requires at least three interrelated solutions, namely: 1) improved farm productivity to close the huge yield gap across all commodities and across African countries (with a focus on more effective agricultural research and extension programs); 2) raising smallholders’ ability to generate marketable agricultural surplus production, especially for food crops—including through reducing harvest and post-harvest losses; and 3) investing in physical infrastructure to improve smallholders’ market access conditions. The chapter ends with some policy options and recommendations.

Progress towards agricultural transformation in reduction of post-harvest loss and market linkage systems

Recognizing the importance of attaining food security for long-term sustainable development to take root, African Heads of State and Government ratified the CAADP initiative, as part of NEPAD at the AU’s Second Ordinary Assembly held in July 2003 in Maputo, Mozambique. The explicit goal of CAADP is to “eliminate hunger and reduce poverty through agriculture”. Four pillars for priority investment were identified to drive agricultural
transformation in Africa. The achievements of CAADP to date have been modest as discussed in Chapter 2.

This section presents a summary of some positive trends towards agricultural transformation in the reduction of post-harvest losses and market linkage systems that have been helping smallholder farmers receive more from their farm produce.

Adoption of innovative post-harvest technologies

Despite the recent high growth rates in many African economies, agricultural production is still based on traditional low-productivity methods with limited processing and value addition activities. Post-harvest losses, variously estimated at 10–40 percent and as high as 50–70 percent, occur: (i) at harvest; (ii) during preliminary processing; (iii) at handling; (iv) during transportation and distribution; (v) at storage due to pests, spillage, spoilage, and contaminations; (vi) during processing due to inefficient technologies; and finally (vii) during commercialization (Affognon, Mutungi, Sanginga, & Borgemeister, 2015). As a result, farmers receive low net prices and revenues for their produce. At country level, Malawi and Uganda show a 1 percent and about 6 percent level of post-harvest losses respectively (Kaminsky & Christiaensen, 2014), while post-harvest losses of fruits and vegetables can reach 35 percent (ILRI, 2011). In particular tomato losses were estimated at 10.1 percent, 10.2 percent and 13.4 percent for Kenya, South Africa and Nigeria respectively. Between 2005 and 2007, the average value of grain post-harvest losses were about US$4 billion of the estimated total value of production of US$27 billion representing about 48 million people’s annual caloric requirement and more than the food aid donated to SSA over the last 10 years (World Bank, 2011). Lessening post-harvest losses can result in increased food availability thereby enhancing food security and reducing poverty leading to improved livelihoods (Affognon et al., 2015; Kiaya, 2014; Sibomana, Workneh, & Audain, 2016).

Over the years much progress has been made to reduce the overall spoilage, wastage and eventual loss of food after harvest. Some of the techniques and technologies that have been recommended and adopted in Africa include hermetic bags (e.g., Purdue Improved Crop Storage Bag (PICS)) plastic silos, and metal silos. Innovations aimed at getting more for farmers include the recently launched CIMMYT (International Maize and Wheat Improvement Center) program for reducing post-harvest losses. This has been through the supply of cheap metal silos. Metal silos are airtight and therefore suffocate any pests that may be stored along with the grain. The program has also been promoting the use of airtight post-harvest bags in four countries: Zambia, Zimbabwe, Malawi and Kenya (CGIAR, 2011). The USAID Feed the Future (FTF) Program in Kenya and Uganda has been promoting private sector provision of PICS. Improved PICS storage bags have been proven to protect farmers’ harvest by hermetically sealing the grain, cutting off the oxygen supply to pests that would otherwise destroy it and limiting the use of pesticides. The use of hermetically sealing technologies allows farmers to safely store their grain for longer periods. The ability of smallholder farmers to store grain for longer periods enables them to delay the sale of their harvest and earn higher price later in the marketing season.

Although there is demonstrable evidence that these technologies can be technically effective, uptake is often constrained by several factors, key among which are lack of credit to finance procurement of the technology and consumption smoothing finance (NRI, 2014). The evidence generated from a cross-country study covering seven African countries revealed, for instance, that even if new storage technology which can be adopted at the household level is technically effective in storing grains, smallholder farmers may be unable to adopt it if they cannot access credit to ease household liquidity constraints during the harvest season. Farmers need to continue to be educated about these technologies to increase adoption. In addition, affordable financing needs to be made available to local agro-dealers to be able to procure and stock the bags from companies that manufacture and/or distribute these technologies

Emergence of contract farming:

Contract farming has considerable potential in countries where smallholder agriculture is widespread, and where agricultural processing and export enterprises are being promoted. The practice is receiving increasing attention as an institutional approach which has the potential to link resource-poor smallholder farmers with remunerative, high-value crop markets, and thus to help pull them out of poverty. Contract farming is one of the many innovations that can reduce market uncertainties, ceteris paribus. This farming arrangement ensures that output is guaranteed for one party while the other party may have a guaranteed market for their output (ACET, 2015).

Other than a readily available market for their outputs, farmers are assured of the output price and are supplied with inputs, finance and extension services before planting. Evidence has shown that adoption of contract farming models has resulted into increases in the incomes of farmers (Minten, Randrianarison, & Swinnen, 2011; Shumba, Robermtz, & Kuona, 2011). The contractor may also be contracted to supply the output to other
markets. Lecofruit, a company that contracts about 9,000 vegetable farmers in Madagascar may be a classic example of linking farmers through contract farming. The company has contracts with both local and international supermarkets (which accounts for over 60 percent of output supplied) to supply vegetables (Minten et al., 2011). Cotton out-grower schemes in Zambia are another example. Another example cited in Ethiopia (Gálvez-Nogales & Fonseca, 2014) involves agreements between farmers’ organizations (e.g., cooperatives) and major buyers such as the World Food Programme (WFP) and the breweries to trade on the basis of contracts which assure a floor price. This does not involve supply of inputs and associated extension services, but the certainty of market access and of a minimum price has enabled farmers obtain farm credit, boosting their capacity to procure inputs and therefore increase output and yield simultaneously.

Contract farming and cooperative organization are among the chief instruments used to better link smallholders to emerging value chains. For instance, in Senegal, a private firm contracts 32,000 farmers to produce confectionary peanuts (Arachide de Bouche) most of which are exported to the European Union (EU). The company, which has been operational since 1990, supplies contracted growers with inputs such as seeds, fertilizer and agro-chemicals for one hectare plots, and provides agronomic and farm management services through extension agents. The incomes of participating farmers increased significantly, raising the standard of living of the peanut farmers and creating additional jobs in the local economy due to multiplier effects (Wiggins & Keats, 2013).

In Kenya a private company (Ojay Greene) uses a business model which leverages ICT to pioneer an integrated approach to link small-scale farmers to well-paying markets (Box 6.1).

**BOX 6.1**

**Ojay Greene:**

*Improving the Productivity and Earnings of Smallholder Farmers in Africa through an Innovative & Integrated Model.*

Despite several initiatives to improve the rural business environment, small farmers in Kenya face several challenges. These include limited access to markets, high cost of inputs and inadequate advisory services. Fragmented and uncertain markets often discourage technology adoption and result in low incomes.

Ojay Green was established in 2013 as a private enterprise with a mission to transform smallholder agriculture by providing market-based services. Participating farmers are linked to well-paying markets (e.g., supermarkets and processors) and benefit from high-quality advisory services and value additions.

The company uses a unique business model, which leverages on ICT to pioneer an integrated approach that addresses all the key challenges small-scale farmers face. A mobile platform is used to allow two-way communication between farmers and the company. The data exchange includes a wide array of features and benefits such as access to quality inputs, technical advice (e.g., timely disease and pest management), guaranteed output markets and prices, finances and sales planning. The company is convinced that by using the correct business models and innovations in working with smallholder farmers, it can directly benefit from high farm incomes and transformation of agriculture. Each week, farmers receive advice via SMS updates and can respond with questions about the unique challenges they face.

In July 2015, Ojay Greene won a US$100,000 investment prize at a pitch competition hosted at Nairobi’s iHub by the Case Foundation, Village Capital and the Sorenson Global Impact Investing Center. The event, “Pitch for Impact”, brought together eight companies offering for-profit solutions to drive social impact, and represented East Africa’s burgeoning social enterprise sector.

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**Source:** Interview with Ms. Yvette Ondachi, CEO and Founder of Ojay Greene; See also: http://disrupt-africa.com/2015/07/ojay-greene-wins-100k-pitch-for-impact-competition/
from agribusiness actors to smallholder farmers such as farmers having access to farm equipment, for example, the case of sugar schemes in Kenya, Zimbabwe and South Africa (Oya, 2012).

However, the nature of out-grower schemes (specializing in particular crops) and lack of data across countries makes it difficult to assess the role of out-grower schemes in strengthening input and output market linkages. Although national data sets are unavailable, literature on out-grower schemes underscores the increasing price risks (volatility), and the transition from spot markets to out-grower (contract) markets that is resulting in full vertical integration in global agribusiness and supermarkets in many African countries (Gibbon & Ponte, 2005; Weatherspoon & Reardon, 2003).

In the Kenyan horticultural export sector, smallholder farmers operating through out-grower schemes account for 27 and 85 percent of exported fresh vegetables and fruits, respectively (Jaffee, 2003). About 60 percent of tea production in Kenya is supplied by the Kenya Tea Development Agency (KTDA), the largest out-grower scheme in Africa. KTDA guarantees output market for its members and also provides input and credit services (Oya, 2012). In Ethiopia, a horticultural export association guarantees its member farmers of output market for vegetables under contract (FAO, 2011), while Africa Fruit—an Ethiopian company—procures 50 percent of its passion fruits from out-growers (Melese, 2010). In Malawi, about 66,000 paprika and chili farmers produce under out-grower schemes; they are assured of market and input supply (Kumwenda & Madola, 2005). The same authors also show that in 2005, the Smallholder Tea Authority of Malawi contracted about 8,000 small-scale farmers, providing them with free seedlings, technical assistance, and input credit in addition to an assured output market. In Madagascar, exporters provide inputs and extension services to about 10,000 smallholder farmers who grow French beans and other vegetables under out-grower schemes (Minten et al., 2009).

These improved market linkages stimulated by out-grower schemes have huge potential for promoting high adoption rates of improved inputs and transformation of subsistence farming into commercial farming. For example, evidence from World Bank data for Tanzania shows that most out-growers are using fertilizers and improved seed; they are also using credit and subsidy services. Possibly because of easily accessible market linkages, out-growers are more commercialized than other small-scale farmers are. In Tanzania, out-growers sell more than 50 percent of their total production, which is twice as much as the proportion of production (25 percent) non-out-growers supply to the market.

**Warehouse receipt programs: Current status and early lessons**

The status and implementation of warehouse receipt systems (WRS) in SSA are difficult to assess because of lack of access to publicly available data and other published materials. The core elements of a well-developed WRS include: an enabling legal and regulatory framework; a regulatory and supervisory agency; licensed and supervised public warehouses; insurance and financial performance guarantees; and financing banks (Höllinger, Rutten, & Kariakor, 2009). Development of WRS into formalized institutions is gradually increasing in scope. Based on the core elements of WRS, warehouses have been fully institutionalized in Ethiopia, Uganda, Kenya and Tanzania. Elsewhere, the Government of Rwanda is collaborating with the Eastern Africa Grain Council (EAGC) of Kenya to promote WRS; in Nigeria, the Abuja Securities and Commodity Exchange is seeking Federal Government support to develop a WRS; and similar strategies are being followed in Ghana and Burkina Faso (Onumah, 2010).

Lessons from case studies show that without strong government support and a legal framework, WRS are bound to fail. Examples of failed WRS include the Uganda Commodity Exchange (UCE) and the Abuja Securities and Commodity Exchange (ASCE) of Nigeria (Jayne, Sturgess, Kopicki, & Sitko, 2014). In contrast, well developed WRC are beginning to pay off in several ways including: improving prices, linking smallholders to markets, reducing transactions costs, and improving earnings. The following discussion focuses on only one function of WRS: improving price, since price is a key incentive for smallholders to participate.

WRS play a significant role in reducing price volatility. Volatile output prices increase farmers’ uncertainty that eventually leads to suboptimal production and inefficient investment decisions. In Ethiopia, depending on the time of disposal of coffee (years or seasons), WRS can reduce price dispersion by 0.86–1.78 Ethiopian Birr per kilogram (Anderson, Bezabih, & Mannberg, 2015). For example, in Malawi, by 2014, the low level of price uncertainty of soybean and sunflower sales had attracted a many farmers to trade warehouse receipts worth US$20.4 million (Jayne et al., 2014). In Mali WRS significantly reduced the inter-seasonal price gap, incentivizing financial institutions to reduce their collateral restrictions from 70–80 to 40–50 percent of warehoused maize grain (Bass & Henderson, 2000). This meant that farmers could access similar credit amounts using a small proportion of their stored grain as collateral, leaving them at liberty to sell off uncollateralized grain when prices increased later in the season. Furthermore, (Bass & Henderson, 2000), report that during the lean
The Eastern Africa Grain Council (EAGC) has been promoting a Structured Grain Trading System. The system involves organizing farmers into farmer groups and encouraging them to consolidate small volumes in more efficient storage facilities, guaranteeing delivery of quality commodities by warehouse operators, use of stored commodities by depositors as collateral for loans, and provision of a credible and formal market for grain commodities with inventory financing opportunities.

EAGC started implementing the Warehouse Receipt System (WRS) in Kenya in 2008 and substantial benefits have been noted after adopting the structured trading system. Since its inception, the EAGC WRS has recorded several achievements including: (a) 16 warehouses with a capacity of over 60,000 metric tons certified annually; (b) over 50,000 metric tons of grains traded through the systems; (c) total of US$4.8 million loaned out by 5 participating banks; and (d) 68 aggregation centres managed by smallholder farmers linked to the system.

One of the success stories is the Kipchamo Poverty Eradication Programme (KIPEP), a community based organization (CBO) which has benefited from WRS. The group has 815 members, 170 males and 645 females. KIPEP has been involved in producing maize which members grow individually, but market it collectively. Before engagement with EAGC the group members would harvest the crop and sell it immediately after harvest to the National Cereals and Produce Board (NCPB). Group members would sell the rest of the maize harvest directly to middlemen at farm gate. As would be expected, the farmers would receive low prices for several reasons: low individual volumes, lack of a bargaining voice as individuals, depressed prices due to market glut, poor grain quality, and lack of market information. This situation was worsened by delayed payments from the NCPB. Group members had challenges with storage space as they stored grain within their homesteads. This coupled with immediate cash needs were the reasons why the farmers preferred to sell a portion of their grain to middlemen.

KIPEP engaged with EAGC in 2012. The group was trained in market price monitoring, post-harvest handling, cleaning, pest control, sorting and grading, and value addition of the grain. In 2013, EAGC certified a warehouse owned by Nafics Trading Company Ltd., in Eldoret town which is within easy reach of KIPEP, to operate the WRS. This prompted the CBO to being depositing grain in the warehouse under the WRS: 48 metric tons (2013), 75 metric tons (2015), 84 metric tons (2016). They used the warehouse receipts to access credit from the participating bank in Eldoret.

Operating under the WRS, the group has realized tremendous benefits including:

- Access to improved storage that ensures high grain quality at the time of sale.
- Support from EAGC in terms of market information on prevailing prices, scouting for buyers and even negotiating prices.
- Access to credit facilities using the warehouse receipts as collateral which is used to purchase inputs early and therefore increase production. The amount of credit obtained by the group in the 2015/2016 season was Ksh1,576,000 (US$15,760). Access to credit enabled the group to increase acreage under cultivation from 35 to 60 acres, and to buy inputs in good time.
- Deferred sale of grain resulting in better prices. For example, in 2015 the group deposited grain when the prevailing market price was Ksh2,200 (US$22.5) per 90 kilogram bag and sold the same amount at Ksh2,650 (US$27),—20 percent higher than the initial price. In 2013 the prevailing market prices at the time of deposit was Ksh2,650 (US$27),—20 percent higher than the initial price. In 2013 the prevailing market prices at the time of deposit was Ksh2,700 (US$31.8) per bag, and the same was sold at Ksh3,300 (US$38.8), 22 percent higher, 3 months later. The trend was the same in 2014 when the prevailing market price of a bag of maize at the time of deposit was Ksh2,200 (US$29.1), but the group sold the maize at Ksh2,800 (US$22.5)—27 percent higher than the price at deposit.

Source: Eastern Africa Grain Council
season, maize prices could be 270 percent higher than the harvest price. The high profits maize farmers obtained as a result of WRS in Mali led to warehousing of other crops including cowpeas, groundnuts and rice. In Tanzania, after accessing the remunerative cotton market and overcoming price information asymmetry through engaging with WRS, Oridoyi Rural Cooperative Society (ORCS) was able to raise cotton output from about 130 metric tons of seed cotton to a peak of over 1,100 metric tons of seed cotton in four years (Onumah, 2010). Still in Tanzania, WRS enabled coffee farmers who were members of primary cooperative societies to process their coffee and sell it at a high price that earned members an incremental income of about 70 percent (Onumah, 2010).

Despite the realized benefits in terms of price improvement, none of the countries in SSA, except South Africa, has registered a successful and well institutionalized WRS (Rashid, 2015). In some cases, for example in Zambia and Zimbabwe, progress made under WRS and exchange trading is erratic as a result of direct government interventions (Sitko & Jayne, 2012; Mezui, Achille, & Hundal, 2013). The presence of WRS in Kenya, Malawi, Nigeria, and Uganda is largely in writing with limited practical actions on ground, despite support from donors and government (Rashid, Minot, Lemma, & Behute, 2010). The success of WRS in Ethiopia is well publicized in the media, but no empirical evidence is available to back up the claimed success associated with smallholder–market linkages and increasing export earnings (Rashid, 2015). Overall, the key lesson from WRS in SSA countries is that the success of WRS requires political stability, limited government intervention, sound policy and legal framework and public/donor support (Mezui et al., 2013; Rashid, 2015). While these conditions for successful WRS are necessary and appropriate, the last condition - need for public or donor support - requires further research to analyze the structural management of WRS to understand the efficiency levels associated with each component of WRS. The research should be able to provide the structured determinants of gains or losses upon which capacity development for self-sustaining WRS can be based.

Market-friendly quantity and quality assurance systems

Enforcement of private commodity standards in agricultural trade can constitute a barrier to trade for smallholder farmers in Africa and other developing countries (Jaffee, Henson, & Diaz-Rios, 2011). This argument rests largely on farmers having limited compliance capacity and therefore failing to exploit opportunities which can catalyze upgrades in production and improve the welfare and competitiveness of producers. Emerging evidence suggests, however, that if compliance capacity is embedded in accessible market institutions which deliver quality premium on a transparent basis then “scaling the quality hurdle” becomes a financially beneficial and attractive option which smallholder farmers in Africa would be willing to take up. For example, in Burkina Faso, WRS has been promoted for a long time and has exclusively targeted smallholder farmers—often described as warrantage (which involves warehouse receipting in small-size warehouses located in rural communities).

The primary focus of the pilots has been assuring food availability for households and therefore no quality standards were enforced in the designated warehouses. In 2014 an initiative was launched to institute a quality assurance system for receiving grains which meets quality standards acceptable to WFP, the parastatal Société Nationale de Gestion du Stock de Sécurité Alimentaire (SONAGES) and other private large-scale buyers. This process entailed adoption of the standards and equipping designated warehouses (similar in size to those operated under warrantage pilots in general). Crucially, farmers were trained in post-harvest practices to assure compliance and also directly linked buyers who bought grains stored under the warrantage by participating farmers.

Within one year depositors began to sell to these major buyers. Most of them, on average, sold about 60 percent of their deposits and retained the rest for household consumption. Hence, opening up access to formal grain markets did not increase the risk of household food insecurity. By selling graded grains they obtained incremental income ranging from 35 to 68.7 percent of farm-gate prices prevailing during the harvest season. In addition, post-harvest grain losses declined from an average of 13 to about 1–2 percent meaning the overall net increase in household income obtained by farmers was well over 50 percent.

East Africa adopted harmonized grain quality standards in June 2011, as part of the measures to foster regional grain trade under the banner “maize without borders”. These standards are expected to facilitate and lower the cost of transacting for parties across the region as they will ease cost-efficient trade-by-description. However, years later this ambition of driving trade through formalized trade standards is yet to be achieved due to several factors identified by Onumah and Nakajo (2014):

- Some of the member countries delayed gazetting the harmonized standards, and others maintained additional health-related standards which constitute non-tariff barriers to trade in quality grains in the region.
• Lack of clarity regarding the definition of some parameters, leading to subjective testing by different parties.

• Non-standardization of testing procedures and equipment leading to variable results from testing similar grain samples.

ICT and farmer extension programs

Agricultural extension services provide critical access to the knowledge, information and technology that farmers need to improve their productivity. Public sector extension workers are largely underfunded and in some cases preoccupied with running government subsidy programs instead of interacting with farmers. However, advances in ICT can help bridge the human capital requirements and funding gap. Mobile phone penetration has been growing rapidly even in the remote rural areas. For example, recent evidence suggests 60–80 percent mobile phone use in the rural areas (Aker & Mbiti, 2010). Therefore there is great potential in continuing to integrate mobile phones into providing smallholder farmers with relevant extension messages. Mobile phones have been used successfully in providing farmers with price information, money transfer, and mobile banking. The role of ICT in agriculture is discussed in more detail in Chapter 8.

Role of market Intermediaries and collective action in crop marketing

Market intermediaries: The role of market intermediaries in crop marketing in most African countries has rarely been fully understood and they tend to be described as being exploitative (Sitko & Jayne, 2014). The rather unflattering perception of the role market intermediaries (sometimes referred to as “briefcase” or “bicycle” traders) can be attributed in part to high distribution margins, which tend to squeeze producer margins while increasing food prices for consumers (Coulter & Poulton, 2001). Despite this, the intermediaries are the most accessible market channel for most smallholder farmers. Chapoto and Jayne (2011) observed that over 60 percent of maize farmers sell their produce directly to trade intermediaries at the farm gate. Severe limitations in accessing trade finance are among the constraints which undermine efficiency in this segment of most food crop value chains in Africa (Onumah, 2013a). While rural trade in food crops is largely cash-based, due partly to lack of trust, traders are often required to extend trade credit to players in urban wholesale markets. The liquidity constraints created in this way often weaken market capacity to absorb substantial surplus at the peak of the harvest. This drives down farm-gate prices. Furthermore, the predominantly informal trade at the farm gate is mainly volume-driven and provides no quality premium. As a result, steep quality discounts may occur when the crop is sold to processors or exporters, leading to even tighter margins for producers (Nakhumwa, 2015). Limited access to storage and other post-harvest handling facilities further hamper the activities of the intermediaries. Evidence exists that intermediaries can be part of the solution to these challenges, as illustrated in Box 6.3—either on their own (the traditional “Market Queens”) and when their capacity is strengthened through leveraging links with other value chain actors (food crop aggregators).

Collective action: Cooperatives and other forms of farmer organization could reduce transaction costs by facilitating the bulking of both agricultural inputs and output. Most agricultural production originates from smallholder farms. These are usually geographically scattered and tend to produce small surpluses. Under such circumstances, where fixed costs are inherently high, access by smallholder market participants can be limited unless they engage in some form of collective marketing (Ton & Proctor, 2013).

Cooperatives are the most common channels for milk marketing in Kenya and other East African countries. They provide a wide range of services, including milk collection and distribution, input supply, provision of artificial insemination and veterinary drugs, offer access to credit, and deliver extension services. Kenya has the most advanced and organized cooperative structures in the region, with some cooperatives processing and marketing value-added products such as the Githunguri and Limuru cooperatives (Bingi & Tondel, 2015). The Githunguri Dairy Farmers Co-operative Society has revolutionized the Kenyan dairy industry. With about 23,000 members and 40,000 dairy cattle, the cooperative operates its own milk processing facility and its Fresha milk is now the leading fresh milk brand in and around Nairobi. By 2014 the Githunguri Cooperative had increased its capacity to 220,000 liters per day, employed a workforce of 8,000 and expanded its market beyond the borders to neighboring South Sudan and Tanzania (Business Daily, 2014). The benefits being achieved by the cooperative provide a blueprint for wider replication throughout the region.

Challenges that farmers face in the market

Farmers in most African countries face huge challenges that hinder their ability to take advantage of existing and emerging market opportunities. These marketing challenges directly depress farm incomes and thereby dampen the potential for the agricultural sector to be an engine of growth and create multiplier effects that would otherwise contribute to broader economic transformation processes. In this section, we briefly examine some of the
critical challenges and the solutions which can ensure that farmers get more for the time and effort they invest in farming activities. The challenges include low producer margins and uncertain output market prices and impediments such as high cost of and limited access to inputs and financial services. Though often unintended, government policies and regulatory interventions sometimes constrain the drive to promote sustained growth in agricultural productivity and increased farm incomes. This section discusses how addressing these problems requires concerted efforts first and foremost from governments to provide the incentives for private actors and farmers to respond in the desired manner.

Earnings from farming activities in Africa, especially for smallholder farmers, tend to be depressed by a combination of factors. These factors include high transport costs, limited access to lucrative market segments, inability to store product to take advantage of seasonal price rises, and weak bargaining position. These issues are briefly discussed in turn.

**High transport/trade costs**: Factors that contribute to high transport costs in Africa are poor road infrastructure, lack of competition, inefficient regulation of the freight logistics sector, and impediments to cross-border trade such as formal and informal taxes, tariffs, bribes and delays (World Economic Forum, 2015). The World Bank (2009) observed that the costs incurred to transport output from the farm gate to a primary market is on average four times higher than transporting the same quantities from the primary market to the wholesale market. This implies that most (45 percent) of the transport charges are incurred within relatively short distances from the farms. As a result, farmers are left with low farm-gate prices and low returns to their labor and capital investments into farming, which in turn acts as a disincentive for farmers to adopt technologies that enhance productivity (Porteous, 2015). Torero (2011) argues that the poor state of transport and communication infrastructure, coupled with lack of effective institutions that can reduce marketing risks and transaction costs, have undermined the process of exchange between producers and buyers and depressed and delayed Africa’s agricultural transformation process. Teravaninthorn and Raballand (2009) estimated that a 10 percent decrease in rural transport costs can generate a 25 percent increase in the quantity of food traded, with consequent major benefits to smallholder farmers.

**Limited access to lucrative segments in agricultural value chains**: Small-scale farmers are usually unable to supply their produce directly to major buyers in formal markets including agribusinesses, supermarkets, wholesalers and exporters even though rising demand

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**BOX 6.3: Role of Market Queens and Aggregators in improving crop marketing in Ghana**

The tomato sector in Ghana is characterized by seasonal glut, due to the low absorption capacity of the market for fresh vegetables and underdeveloped storage and processing facilities. Market Queens in the main urban wholesale/retail markets in Ghana play an important role in regulating supply and easing liquidity constraints. There are about 5,000 Market Queens, most (about 85 percent) of whom are women (KIT & IIRR, 2008). Their role involves taking delivery of truckloads of produce supplied by rural traders and farmers; immediately paying off the transporters; distributing the produce to a network of retailers on credit; ensuring that the suppliers are paid within a specified time frame (ranging from 3–4 days to two weeks). The system ensures that aggregators can operate with significantly reduced risk of default from extending trade credit. They are also assured that their supplies will be taken on delivery. This system has even been extended to sub-regional traders (e.g., from Burkina Faso), making it possible to fill in supply gaps during the so-called lean seasons (between January and May) in a market where import finance is largely unavailable.

Some major food processing companies have also adopted a procurement model with the market intermediary (in this case the aggregator) at the center. The aggregator is trained to source quality produce—which complies with the requirements of the processor—and is offered a supply contract. The contracts tend to be flexible and match the capacity of the aggregator, who is also linked to a financier. The assured market and guarantee of a floor or fixed price reduces significant default risks and therefore allows formal financial intermediaries to lend to such borrowers. Improved access to finance and guaranteed markets with high levels of certainty about prices, enhances the competitive edge of aggregators in the rural trade. There is evidence that their role is being extended to include mobilizing and training farmers who are then linked to inputs suppliers.

*Source: Robinson and Kolavalli, (2010); and UNDP (2012).*
represents income-boosting opportunities which they could potentially exploit (Onumah, 2013a). As noted by Ferris et al. (2014), local producers are often unable to respond to the changes in consumption patterns in urban areas, which are driving growth in demand from the formal segment, leading to increased dependence on imported processed products (CSA, 2014). Most small-scale producers can only access poorly regulated markets that often lack grades and standards, traceability and a proper price setting mechanism, which all depress the value farmers receive for their produce (Ferris et al., 2014). Smallholder growers who want to participate in global value chains are required to comply with voluntary standards. Yet compliance is difficult because it requires considerable informational and organizational resources, which many smallholders may lack (Arias, Hallam, Krivonos, & Morrison, 2013).

Inadequate market power: Lack of collective action, which limits farmers’ bargaining strength, and low production levels, implies that most small-scale farmers have limited capacity to influence farm-gate prices (Onumah, 2013b). With no functional groups or associations, small-scale farmers cannot interact on equal terms with market actors who are generally larger in terms of scale, are better informed and are therefore able to bargain from a stronger position. Even when prices are higher in some areas, farmers are unable to exploit such markets. This is due to the absence of a good and reliable market information system (Fafchamps & Hill, 2007) that would allow them to take advantage of optimal trade and arbitrage opportunities. Pressing household cash needs often compel farmers to sell large volumes of output soon after harvest, creating a seasonal glut, which the severely under-capitalized small-scale aggregators are unable to absorb. As a consequence, prices of most agricultural produce are severely depressed during the harvest season and farmers cannot bargain for significantly higher prices unless sale can be delayed through intra-seasonal stockholding (Onumah, 2013c).

Unstable output prices: Price risks constitute a major challenge for farmers and other players in agricultural value chains in Africa. Volatility in the prices of agricultural commodities, especially food prices, tends to be higher in African countries than in Asian or Latin American countries (Kornher & Kalkuhl, 2013). Smallholders find it difficult to invest in productivity-enhancing and income-raising technologies and practices, which would enable them to overcome poverty traps, when output price trends are unpredictable (FAO, 2011). For instance, evidence from Ethiopia indicates that negative output price shocks dampen uptake of fertilizer and other inputs by reducing the income gains from using these inputs (IFPRI, 2011). Intra-seasonal price variation (i.e., price changes within a season) appears to be the focus of attention for policy makers and development partners who tend to invest in physical and institutional infrastructure such as WRS to provide a means by which farmers and other actors can manage this risk. However, inter-year price volatility can be much higher than intra-year price movement, making it difficult for farmers to plan for long-term investments as revenues are uncertain and profitability cannot be guaranteed.

Among the factors contributing to high price risks are inadequate infrastructure to manage seasonality of production; international price volatility; governance/political stability; unpredictable trade and procurement policies; variability of yields/production, weather, tenure security, and risks associated with pest and diseases. Climate change is likely to worsen natural and environmental risks, including pests and diseases, resulting in supply-side volatility. According to CSA (2014), farmers’ demand for money changes; this affects the supply of produce on the market. For example, there is high demand for money by the farmers at planting and harvesting time, when schools open at the beginning of the year, during religious festivals, funerals, and christenings. Subsequently, unstable prices and low prices in the market do not encourage producers to invest in farming (CSA, 2014). Therefore governments need to adopt a rules-based and transparent approach to their operations in markets to improve the business environment for the private sector and to stabilize prices (Chapoto & Jayne, 2009). Further, investments in market infrastructure lower the costs of transportation, reduce price volatility, and aid in price transmission (Demeke & Balie, 2016).

High cost of production inputs: Markets which are underdeveloped due to low production volumes and high transport costs have made inputs such as fertilizers very expensive in African countries compared to other developing countries. The cost of fertilizer per ton ranges from US$600 to US$1,400 in countries like Uganda, Zambia, Malawi and Burundi compared to US$250 to US$500 for other developing countries like Brazil, Argentina and Pakistan (World Bank, 2012). Seed trade between countries is limited by repressive trade policies that create high transaction costs (World Bank, 2012). Seed trade between countries is limited by repressive trade policies that create high transaction costs (World Bank, 2012). Also, rules and regulations in most African countries give rise to small and segmented markets that hamper the dissemination of new seed varieties, hence the high seed prices (Minde & Walthaka, 2006). In addition, weak regulatory enforcement sometimes leads to variability in quality and therefore performance of imported inputs, thereby discouraging uptake by farmers (IFAD, 2015).
Limited access and high cost of accessing financial services: Farmers have limited access to financial services because few financial institutions are willing to invest in remote areas (EAFF, 2013; NRI, 2014). Most commercial banks avoid rural areas due to low income levels, lack of scale economies, poor infrastructure, high risks and seasonality of agricultural production (Mahieux, Zahar, & Kherallah, 2011; NRI, 2014). Even where financial institutions are operating, the high cost of finance has hindered farmers from undertaking the requisite investments to increase productive capacity (World Economic Forum, 2015). Interest rates that range from 10 to 30 percent per annum are too high, and therefore discourage farmers from participating in the banking system to finance their agricultural operations (CSA, 2014). The high interest rates and burdensome repayment schedules are due to lack of collateral for smallholder farmers, which make smallholder farmers be regarded as risky and characterized by scale diseconomies (EAFF, 2013). Land can act as a source of collateral when farmers need to access credit, but most smallholder farmers do not have titled land (Chapoto & Zulu-Mbata, 2015).

High post-harvest losses: Post-harvest losses, which may affect quantity or quality, are substantial and the proportion of the added value that goes to the farmers is small. Quantity losses threaten food, nutrition and income security while quality losses lead to inferior nutritional value, food borne health hazards and economic losses when the produce loses market appeal. Post-harvest losses occur at various stages, from as early as harvesting to the point of sale (Affognon, et al., 2015; World Bank, 2011). The major cause of post-harvest losses in Africa is lack of quality storage infrastructure.

Low yield and production: Farmers are held back by low productivity levels with yields in Africa effectively lower than those in other regions due to: lack of access to productive inputs, machinery, and financing, and a lack of technical supervision (CSA, 2014). For example, although farmers use improved seeds and fertilizer, SSA is still a long way from using as much improved seed and fertilizer as in other regions (Livingston, Schonberger, & Delaney, 2011). The low use of fertilizer could be the result of its high cost and inaccessibility (Ndjeunga & Bantilan, 2005). These same reasons could also explain low improved seed use. To increase productivity and income will require farmers to expand their use of improved seed and fertilizer and of irrigation technologies (Livingston et al., 2011).

Variable production—rainfed agriculture: Increase in crop productivity and stable yield are directly related to water availability and irrigation (World Bank, 2008). Rockstrom and Karlberg (2009) showed there is a close correlation between poverty, hunger and water stress, and between average annual rainfall and GDP growth. But agriculture in SSA is mostly rainfed even with the region’s many water sources due to low agricultural investments (World Economic Forum, 2015). The proportion of land under irrigation in Africa is about 6 percent which is only a third of the world proportion of land that is under irrigation (Svendsen, Ewing, & Msangi, 2009). SSA records a low proportion of land that is under irrigation (4 percent) compared to South Asia and East Asia (39 percent and 29 percent respectively) (World Bank, 2008).

Counter-productive government policies: Government intervention in markets is often a source of inefficiency and uncertainty for all market participants. Policy actions are often conducted in a way that crowds out private sector investment and creates disincentives for smallholder’s to produce. Shifts in government policy tend to be ad hoc, especially with regards to policies on regional trade and domestic food price controls. These measures impede private sector participation in agricultural value chains (Wiggins, 2013) and deepen risk aversion among smallholder farmers, discouraging them and other actors from adopting a more entrepreneurial approach to farming (IFAD, forthcoming). Ad hoc policies also tend to increase price volatility which may deter farmers from producing for the market. In countries such as Kenya, Malawi, Zambia, and Zimbabwe where government has directly intervened to control prices of staple food crops, prices are more volatile than in countries with fully liberalized food markets (Chapoto & Jayne, 2009; Minot, 2014). Other policy distortions include subsidies, price or income support and regulations that tend to discourage private sector engagement to service smallholder farmers (Kahan, 2013).

The private sector can respond to the needs of farmers if government actions are predictable. However, government operations in markets are costly. While private trading systems will always result in some price variability, they tend not to cause the frequent food crises caused by ad hoc government actions that are commonly seen in the region (Chapoto & Jayne, 2009). It remains unclear if the costs incurred by governments in their attempts to stabilize prices through interventions in input and output markets provide any tangible improvements in price stability and food security.
Opportunities to address identified constraints/risks in markets

Investments in Physical Infrastructure

Access to markets affects smallholder participation and competitiveness in markets. Transport costs are largely associated with the state of the road network. Evidence shows that investing in road infrastructure is positively associated with agricultural productivity (Dorosh, Dradri, & Hagglblade, 2012). Livingston et al. (2011) argue that there is more to transport costs than the much talked about road infrastructure. Over the last 40 years the World Bank has invested in road development. While these investments have reduced costs for trucks that carry cargo, this has not culminated in a decline in prices paid for transport by farmers in Africa, but has instead increased profit margins for trucking firms (Teravaninthorn & Raballand, 2009). Transport costs are also a function of other variables such as regulations and fuel price. The higher the level of regulation is, the higher the transport costs are. This explains why transport costs are higher in West and Central Africa than they are in East and Southern Africa (Livingston et al., 2011). The major reasoning behind improving transport costs is that by investing in the road network, transport costs would be significantly reduced by reducing the distance or time travelled by smallholder farmers to the nearest town.

Investment in construction of good quality rural feeder roads reduces transportation costs, accelerates efficient delivery of inputs, reduces post-harvest losses of perishable produce, and opens up lucrative market and trade opportunities for rural farmers. Several studies have found positive impacts of rural road development. Studies in China and India have found that investing in infrastructure contributes to productivity growth in agriculture (Fan, Zhang, & Zhang, 2002; Fan, Hazell, & Thorat, 2000). It also contributes to creation of non-farm job opportunities (Dorosh, Wang, You, & Schmidt, 2010) while reducing rural poverty (Fan et al., 2002; Fan et al., 2000). Minten and Kyle (1999) found that poor road infrastructure was responsible for high food prices in the Democratic Republic of Congo.

Better farmer access to irrigation infrastructure would also contribute to greater uptake of available technology and raise agricultural productivity. For instance, Ghana depends largely on regional imports from Niger and Burkina Faso to meet domestic demand for fresh onions. Producers in Niger and Burkina Faso have significant competitive advantage over their Ghanaian counterparts, as the cost of production per metric ton of onions in Ghana is about three times higher than in Niger. This is largely attributable to the existing yield gap. Agro-climatic conditions in northern Ghana, where onion production is concentrated, are similar to those in the onion producing regions in Niger and Burkina Faso. What accounts for the difference is cost-effective access to modern and reliable irrigation (Amekuse, Agyir, Acquaye, Asante-Dartey, & Huijmans, 2012). In the absence of access to large-scale irrigation facilities, onion producers can use available technology—treadle pumps which cost about US$100—to pump water from streams and boreholes. However, these authors noted that this is too expensive for most small-scale onion farmers in Ghana. In northern Nigeria, commercial production of sweet potatoes and vegetables experienced a major boost as a result of access to irrigation facilities (Onumah, Dipeolu, & Vetuga, 2012).

Storage and Processing Infrastructure

Efficient threshing/winnowing equipment and physical storage infrastructure would contribute to lower postharvest losses in the agricultural sector. Private investment in storage infrastructure tends to be concentrated close to ports, principally for servicing import/export trade rather than domestic trade in agricultural commodities (Onumah & Aning, 2009). Where modern storage infrastructure is available in rural communities with significant surplus production of storable commodities, it is often owned by governments or by cooperative associations. The government-owned facilities are often run by public agencies which prioritize holding strategic food reserves under conditions which limit access to the facilities by farmers for intra-seasonal stockholding (Coulter & Onumah, 2002). Fostering modern receipt-based trade and finance systems is one way of catalyzing private investment in storage infrastructure in rural areas but often the required enabling policy and regulatory framework is either missing or inadequate (Onumah, 2012).

Smallholder financing and market-supporting institutions

The share of domestic credit supplied to the agricultural sector in Africa is often minuscule compared to what other sectors are allocated. Despite its considerable contributions to employment and GDP, less than one percent of commercial lending in Africa goes to agriculture (Salami, Kamara, & Brixiova, 2010). This situation is usually attributed to the perception among financial intermediaries that the agricultural sector is risky. As a consequence, most farmers cannot afford inputs which can significantly increase farm output and household income. In the case
of onion production in northern Ghana, Amekuse et al. (2012) estimated that farmers require US$200 per hectare to cover non-labor production costs. Considering that the average plot size is about 0.5 hectares, the financing requirement per household is low. However, most farmers cannot access the required finance and therefore end up reducing the area they cultivate even further. Farmers may also choose to rely on rudimentary technology such as the “traditional calabash” to water the plants. It is therefore not surprising that yields in northern Ghana are less than half the levels obtained by smallholder producers in Niger and Burkina Faso under similar climatic conditions. Access to credit is important for inputs and in financing production costs. Credit is also important in encouraging storage and delayed sale because it offers households the means to acquire inputs for the next planting and also the liquidity to meet household consumption needs.

Several reasons contribute to the lack of finance for smallholder farmers. Miller (2011) summarized these reasons:

• The nature of the flow of capital is a challenge to both borrowers and lenders. Agricultural production (crops and livestock) generally has a slower turnover than other microenterprise ventures traditionally funded by MFIs and agricultural credit requires longer loan terms. Because of unpredictable and potentially lower returns on capital, investing in agriculture entails higher risk and is much more sensitive to interest rates than traditional microfinance.

• Agriculture in Africa is mostly rainfed. As a result, farmers face risks which are beyond their control. More frequent droughts or excessive rain lead to yield losses which affect the farmer’s ability to repay loans.

• Smallholder farmers’ incomes are seasonal. This coupled with weather risks make them a very risky group to lend to even for MFIs.

• Many farmers lack title deeds, hence their land is usually not considered suitable as collateral by financial intermediaries.

• Movable assets such as livestock are also considered high risk due to the absence of title or insurance to cover the livestock.

The global experience of the financial institutions and their partners that have successfully developed a growing and sustainable agricultural credit portfolio reveal that it is necessary to provide a wider set of financial services to smallholder farmers and their families. These services include savings, payments, transfers and insurance and enable smallholder households to diversify livelihoods and better manage farm and non-farm economic activities. This is because farm and non-farm economic activities and rural household consumption needs are interrelated (Carroll & Andrew, 2012; Collins, Morduch, Rutherford, & Ruthven, 2009).

The Way Forward

Trade barriers and lack of support institutions and policies that promote market development are major challenges in Africa. This section identifies important roles for governments to improve African farmers’ access to markets and build on nascent agricultural transformation processes underway in the region.

Addressing policy and institutional bottlenecks (soft infrastructure)

The success of commodity exchanges or WRS requires that significant quantities are traded freely. However, most of the commodities traded on commodity exchanges are politically sensitive and governments want to keep staple food prices low to ensure urban consumers can afford them. Governments may try to influence food prices through marketing board operations, but this tends to reduce the volumes that can be sold across the commodity exchange (Jayne, Sturgess, Kopicki, & Sitko, 2014). A more effective public–private partnership approach is needed to promote the emergence of viable commodity exchanges. While the private sector has significant expertise, exchange initiatives still require appropriate government support in the form of effective legal and regulatory frameworks; commitment to stable policies (with no unpredictable interventions); empowerment of institutional investors; establishment of a clearing house that is empowered and strong to attract international/regional participants; development of the WRS (in tandem with the exchange); and support (sub-) regional rather than national models (Mezui et al., 2013).

Through comparative advantage, regional integration provides an opportunity for farmers to tap into foreign markets, especially where some countries face food deficits. But only about 10 percent of trade is between African countries. To a large extent, policies in most African countries have contributed to the status quo. They cause price instability and deterioration of food security (NEPAD, 2013). Policies such as ad hoc import and export bans, and bureaucratic procedures usually raise smuggling
costs, costs for consumers, and create disincentives for the private sector. This inhibits farmers’ access to more lucrative markets.

Therefore if farmers are to get more of their produce to the market, there is need to address and create incentives for them to take advantage of regional trade. Policies should go beyond just lowering tariffs, but must aim at opening up borders to broaden markets for smallholder farmers. International and regional trade should also be promoted in mitigating price instability. Minot (2014) finds evidence that tradable products (e.g., rice, wheat and cooking oil) are less volatile than the non-tradables (e.g., maize which is in most cases subject to export restrictions). In addition, large cities have lower volatility of prices than small cities possibly due to better storage infrastructure and more competitive markets, drawing surplus food from different parts of the country and attracting commercial imports which could help stabilize prices. Efforts should therefore be aimed at reducing trade barriers so that commodities move from surplus areas to deficit areas. Other researchers have advocated for a maize without borders policy as a way of stabilizing output prices (Cummings, Rashid, & Gulati, et al., 2009; Dorosh et al., 2009).

Efficient markets require policies and institutions that facilitate exchange and address market failures and risks that undermine agricultural markets. A more transparent and predictable market and trade policy regime is needed. This includes measures such as support to market information systems that effectively serve all stakeholders, removal of road blocks, harmonization of standards and coordination between customs and phytosanitary services, support to open dialogue on food trade policies and options for reform, simplified trade and tax regimes, and support to traders’ associations (World Bank, 2012). Since institutional arrangements that support markets are absent or weak, governments need to address these challenges by formulating supporting legislations, regulations and policies that will help develop markets and boost trade (Trienekens, 2011). Farmers will greatly benefit if uncertainties in regional trade are addressed by removing export and import bans, making import tariffs and quotas transparent, easing restrictions on rules of origin, and avoiding price controls (World Bank, 2012).

Removing/reducing infrastructural bottlenecks (hard infrastructure)

Literature shows that governments need to be proactive in ensuring infrastructure development and industrial upgrading are well developed to pave way for accessible and profitable market and trade (Di Maio, 2014). According to USAID (2011), weak linkages between key surplus and deficit markets in West Africa have resulted in steep price gradients along the trade corridors. The transport and logistics costs of moving maize and livestock along key trading corridors between Burkina Faso, Ghana and Benin account for approximately 59 and 18 percent of the respective end-market prices. The USAID study showed that transport costs, mainly fees paid to transport service operators and losses in transit, weigh most heavily on the end market price along the corridors studied.

Reduced transport and transaction costs are a major incentive for adoption of improved agricultural production technology and better management of natural resources, leading to increased agricultural productivity. Reducing transaction costs and linking farmers to markets, rural roads, extension services and communication infrastructure increase returns on investment and, as a consequence, make adoption and investment in better land management technologies attractive (Nkonya, Gerber, Von Braun, & De Pinto, 2011). Dercon and Hoddinott (2005) showed that improvement in road quality increases the likelihood of farmers’ purchasing inputs by 29 to 35 percent, depending on the season. Better market connections are necessary to improve the availability of inputs and agricultural extension services, all of which are critical to increasing productivity and therefore the welfare of farmers (Jouanjean, 2013). Wiggins (2013) explained that variations in harvests due to the erratic rainfall can be much reduced with investment in irrigation in SSA. Investment in irrigation will become more critical in future, as climate change threatens to exacerbate the variability of climate and hence yields from rainfed farms. While public schemes have suffered from mismanagement and technical problems, small-scale irrigation schemes managed by individuals or small groups have expanded in Africa over the last two decades.

By investing in regional infrastructure such as common power pools and water storage, trade would be enhanced through economies of scale (Ahlers, Kato, Kohli, Madavo, & Sood, 2014). A regional warehouse scheme and improved access to credit to build storage facilities could encourage traders to take advantage of economies of scale and invest in equipment and storage facilities (Jouanjean, 2013). Economies of scale associated with regional fertilizer production, blending or import can also reduce fertilizer costs for farmers. Procurement prices and shipment charges are lower if larger quantities are ordered for the whole region (World Bank, 2012).
Conclusions

This chapter presents the challenges and the policy options that enable farmers in SSA get more for their produce from post-harvest to the market. In particular, the chapter highlighted that smallholder farmers are failing to take advantage of existing and emerging opportunities because of many constraints that require urgent attention from all agricultural stakeholders including government. African governments, cooperating partners and the private sector should work together to address these constraints in a more coordinated and sustainable way to create lucrative markets and a cadre of smallholders who think of farming as a business.

Three major conclusions emerge from the discussions in this chapter:

1. **Increased uptake of improved technology:** Adoption of improved technology is critical to raising crop yields and reducing post-harvest losses. It is also a requirement for establishing sustainable and competitive agricultural sectors. Increased investment in technology must be accompanied by serious investments in research and extension. But improvements in the way input and output markets function will also be necessary to encourage farmers to produce for the market and also improve their access to yield-enhancing technologies.

2. **Increasing investment in physical infrastructure:** Prioritizing public investment in rural roads can produce tangible benefits which can transform production and post-harvest activities. Further, there is need to create/maintain incentives to promote private investment in storage, marketing and processing infrastructure, reducing the fiscal burden associated with such investments.

3. **Policy issues and institutional infrastructure:** Direct interventions in output markets can weaken private incentives for investment in activities at post-harvest level including storage, trading and processing. These actions also tend to squeeze producer margins and create even more uncertainty in output markets. Therefore, creating a predictable and rules-based enabling policy and regulatory environment are critical to successful transition from pilots to mainstream marketing, financing and market-based risk management instruments.

Several recommendations arise from the evidence summarized in this chapter:

1. Increase public investments in roads that reduce the cost of connecting smallholder farming areas with local markets.

2. Promote private investment in agricultural value chains by maintaining a predictable policy environment which does not impose sudden bans on cross-border or inter-district trade.

3. Promote competition in agricultural markets and avoid offering certain types of market action advantages through preferential access to subsidies or incentives.

4. Encourage platforms for periodic private sector–government consultations about the conditions in grain markets, needed actions and ways to improve the functioning of these markets;

5. Increase public investments in agricultural adaptive research and extension to raise farm productivity and surplus production. This will encourage value chains to promote local production as a way to feed the growing cities rather than relying on imports.

6. Conduct studies to determine feasible and profitable areas for irrigation investments.
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