CHAPTER 6

Kickstarting agroprocessing value chains

Agriculture has the potential to contribute greatly to economic transformation, just as it did earlier in many developed countries. It can increase incomes in rural areas. It can increase exports and the foreign exchange needed to import machinery and other inputs for industry. It can supply the raw materials to support agricultural processing. It can release labor to manufacturing and other sectors of the economy. It can boost the supply of food to the growing urban areas and the growing industrial labor force, thus moderating increases in the cost of living and thus wages. And it can expand the markets for inputs and consumption goods and services for the nonagricultural sectors.

With agriculture making up the bulk of most African economies, and with most of the poor relying on subsistence farming for their livelihoods, Africa’s economic transformation has to include modernizing agriculture to increase the productivity of smallholders. Using agriculture as a basis for manufacturing and services, particularly by increasing agroprocessing and other agribusiness, will create jobs, especially for women and youth. It will also increase the demand (and prices) for what smallholders produce.

But modernizing agriculture and increasing its links with other parts of the economy have been slow. In most Sub-Saharan countries smallholders use traditional low-productivity methods, and most exports are unprocessed agricultural commodities. Converting subsistence agriculture into a modern commercial sector—whether large commercial farms, small and medium-size farms using modern and intensive methods, outgrower schemes, or other commercially scalable models—is thus an essential part of the transformation agenda. But achieving broad results across rural Africa will take time (box 6.1).

In the meantime, what opportunities exist to focus on more discrete, manageable areas but still drive a substantial and catalytic effect toward economic transformation? The agriculture-to-agroprocessing value chain is an area that can, if successful, bring together a potent combination of genuine comparative advantage, scalability, and substantial spillovers for African countries. Agroprocessing typically offers a big step up in generating employment, income, and foreign exchange, which can often be unlocked by well designed policies to overcome barriers that prevent domestic players from emerging, reaching scale, and becoming globally competitive.
Box 6.1 Challenges in modernizing agriculture

Improvements in agricultural technology have come slowly in Africa, and not much is known about the diffusion of better technologies. In many ways, Africa is late in developing research capacity, and many crops and commodities had very little research effort until the past 10–20 years. In addition to research and technology, many challenges remain, including:

- **Roads.** Many rural areas are cut off from markets so it is very costly to move goods—including agricultural inputs and outputs, but also non-agricultural goods.

- **Power.** Electricity is essential for agricultural processing and postharvest uses of crops and livestock. And for dairy products it allows cooling and makes more efficient collection schedules possible.

- **Irrigation.** Infrastructure to convert rainfed to irrigated farming will be a public good in some places and purely private in others. But irrigation has the potential to transform agriculture in many locations, both by increasing productivity and by reducing weather risk.

- **Competition.** Rural isolation opens the door for noncompetitive behavior. With rural markets spread thinly and handling low volumes, traders can often set prices for both farmers and consumers. Transport also lacks competition, especially on long-haul and cross-border routes. Mobile phones can reduce information asymmetries.

- **Property rights.** Tenure security is necessary for farmers to invest in long-term land improvements, but in most parts of Africa, cadastral surveys are lacking, and formal programs of land registration and titling have not advanced far. Customary systems of property rights provide adequate security for traditional agriculture, but it is not clear that they can provide the tenure security required for agriculture’s transformation. And western-style land titles and markets cannot be introduced without doing violence to existing economic, social, and cultural arrangements. An enigma.

Here the focus is on three major types of such opportunities:

- **Processing traditional exports** such as coffee, cocoa, and cotton, where Africa has demonstrated its global competitiveness in producing raw products, adding value, and creating jobs. Producer countries typically have relative advantages in raw material and labor costs that can, with the appropriate combination of policies and investments, offset other challenges to start a processing base. The scale of the commercial opportunity in processing is typically many multiples of the current raw production opportunity, making this a particularly high value area if successfully leveraged.

- **Scaling up promising nontraditional exports** such as fruits by upgrading the supply chain—from farms to processing factories—increasing farmer incomes, and generating jobs in factories and allied agribusiness services. A broad range of potentially very high value, but underexploited, crops and growing international demand provides a scale opportunity. If leveraged, the associated supply chain and infrastructure investments can form a platform for (or reduce the cost of) entry into other adjacent export sectors.

- **Substituting agricultural imports**, which are growing in importance given the rapid rate of increase in agricultural imports into Sub-Saharan Africa. The total value of imports rose 62% between 2007 and 2011 to reach $37 billion. Some of the fastest growing products are poultry meat and associated inputs such as soybean cake, which have increased 139% and 119% in value respectively to reach a combined value of $2.1 billion. They are set to continue this rapid increase as incomes and meat consumption, particularly by the growing urban middle class, rise. Upgrading the domestic supply chain to put local players on a competitive footing with imports is critical to unlocking this opportunity.

Coffee, fruits, and soybeans illustrate the pantheon of possibilities for adding value to traditional crops, for moving into new or
nontraditional crops, and for substituting for imports. For each of them we look at the value chain, the opportunities for capturing value, and the requirements for policy. For all three the potential is considerable for drawing smallholders into the supply chain and factory workers into formal employment.²

Adding value to coffee, a traditional export

Globally, coffee is one of the most traded agricultural commodities, with production dominated by Brazil, Colombia, and more recently Vietnam. Most value addition is through processing, branding, and distribution to consumers through retail and food service outlets in consuming regions.

Africa is a small but significant player in coffee production, but has only a marginal role in processing and more advanced stages of value addition. It had a 13% share of global green bean production in the 2012/13 growing season,³ an export market worth about $26 billion. However, the region has only a 7% share of processed coffee, whose price tends to be double or even triple that of the green coffee in export value per ton. World demand for coffee is expected to grow by more than 2% a year to reach 9.6 million tons by 2020,⁴ and major buyers such as Nestlé expect major non-African exporters such as Brazil and Vietnam to capture most of this increase. African producers cannot look forward to a long-run supply squeeze to increase the value they capture in the coffee value chain.

African coffees of the Arabica variety are among the best in the world, with the highest graded Kenyan and Ethiopian coffees trading for many multiples of the price of “standard grade” Arabicas. Africa is thus well positioned to meet the growing demand for high-quality Arabicas in established markets in North America and Europe.

Structure of African production

Coffee production in Africa is largely a smallholder activity, with more than 90% of beans produced on farms of less than a hectare. Africa produces both Arabica and Robusta varieties, with a slight skew toward Arabica, with 61% of production in 2013.³ Arabica production is dominated by East African countries, given the availability of land at suitable altitude. Indeed, Ethiopia, Tanzania, Uganda, and Kenya account for more than 90% of Africa’s Arabica production. Robusta is produced in 17 African countries, with Uganda and Côte d’Ivoire accounting for more than 70% of Africa’s production in 2013 (figure 6.1). As of June 2013 Uganda and Côte d’Ivoire have maintained their dominance over the production of Robusta coffee, accounting for 63% of total production in Africa.

Most major producers have coffee boards responsible for coordinating inputs, agricultural extension, processing, and exports. Coffee authorities—such as the Kenya Coffee Board, Uganda Coffee Development Authority, and Ethiopian Fine Coffee Stakeholders Committee—aim to coordinate production and marketing activity, so that they can maximize the value of coffee production and manage the price volatility that farmers experienced.

Most final output in the region is traded by major international and regional trading houses, such as Volcafe/ED&F Man, Dormans, Socfinaf, and Schluters. But beyond coffee production Africa does not have a substantial domestic processing industry. Its processing of roast and ground coffee is 8% of the world total, and its production of instant coffee is 2% of the world total, most at Nescafé plants in Abidjan, Côte d’Ivoire, and Durban, South Africa, and a marginal amount at TANICA in Tanzania. Given Africa’s low coffee consumption—7% of the world total in 2013, with most concentrated in Ethiopia—processors need to focus mainly on export markets outside the region in the short to medium term.

Opportunities in the coffee value chain

The coffee value chain has three subsectors relevant for Africa, each

Figure 6.1 Sub-Saharan green coffee production, by variety and country, 2012/13 season

<table>
<thead>
<tr>
<th>Variety</th>
<th>Cameroon</th>
<th>Côte d’Ivoire</th>
<th>Ethiopia</th>
<th>Kenya</th>
<th>Tanzania</th>
<th>Uganda</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabica</td>
<td>37%</td>
<td>23%</td>
<td>12%</td>
<td>100%</td>
<td>54%</td>
<td>54%</td>
<td>0%</td>
</tr>
<tr>
<td>Robusta</td>
<td>63%</td>
<td>77%</td>
<td>100%</td>
<td>0%</td>
<td>40%</td>
<td>40%</td>
<td>0%</td>
</tr>
</tbody>
</table>
To capture a larger share of value, countries now focusing on Robusta production, such as Côte d’Ivoire and to less extent Uganda, could shift to processing with different economic and competitive dynamics.

- **Green coffee production.** Arabica and Robusta beans differ in their taste, growing conditions, and economics. Robusta produces an inferior tasting beverage with higher caffeine content than Arabica. Both types are often mixed by processors, so countries that can cultivate both varieties have an advantage in creating roasted and ground coffees. Since the 2008/09 growing season the production of Robusta coffees worldwide has increased by more than 20% to reach 3.7 million tons in the 2012/13 season while Arabica coffee production has grown only 4% to reach 5.3 million tons. The combined value of both Arabica and Robusta exports in 2012/13 is estimated at $26 billion. Africa’s share in world production has been in long-term decline, falling from 27% in 1980 to 13% in 2013, as volume growth stagnated against growth in Brazil and Vietnam’s emergence as a major Robusta producer.

- **Roast and ground processing.** About 80% of green coffee is processed into roast and ground coffee, almost 90% by processors in consumption markets. Processing is far more fragmented than instant coffee production, with a long tail of small players and specialists. Most processors tend to locate in the markets for final consumption, given the short shelf life of roast coffee (without high-cost packaging to preserve freshness) and the need to mix blends customized to local tastes. African countries have an 8% share of this sector by volume globally, and less than 1% of internationally traded roast and ground coffee volumes. Most African processors serve a small local market and supply international clients either with their own branded coffees or as contract manufacturers (known as “toll processors”).

- **Instant or soluble coffee.** Between 15% and 20% of green coffee is processed into instant coffee worldwide. The consumption of instant coffee has been growing, especially in emerging markets that do not have established roast and ground coffee culture, with current consumption hitting 1.1 million tons in 2012/13. Manufacturing powder and granules is capital-intensive, requiring high production volumes to achieve the minimum efficient scale in a single plant—and high levels of investment in marketing and branding to secure market share and availability among retailers. So a small number of large facilities are owned by a few major firms, particularly Mondelēz International (formerly Kraft Foods) and Nestlé. Geographically, however, facilities can feasibly be located in coffee-producing countries. For example, Nestlé operates factories for instant coffee in Africa. Even so, Africa has only a 2% share in the global production of instant coffee.

Countries engaged in green coffee production tend to earn about 15% of the final value of instant coffee and 25–30% of the final value of roast and ground coffee, the difference determined by the type of beans and the cost of processing. Instant coffees tend to use a high proportion of cheaper Robusta beans and high-cost processing methods, while roast and ground products use a higher proportion of Arabica beans but have lower processing costs.

To capture a larger share of value, countries now focusing on Robusta production, such as Côte d’Ivoire and to less extent Uganda, could shift to processing. Arabica processors also stand to gain from shifting to processing, as well as increasing the value of their green beans in the value chain.

**Increasing the value of green coffee**

African countries can increase the value of green coffee production by increasing volumes or by increasing value.

**Increasing volumes.** This can be achieved primarily by increasing areas under cultivation or increasing yields by using more fertilizer, pesticides, and fungicides, planting hybrid trees, and improving husbandry. In some countries this could lead to a 2.5-fold increase in production from the same planted area.

**Exploiting high-value niche markets.** While meeting an emerging supply gap, countries can also exploit high-value markets by processing coffee through efficient wet mills to produce specialty coffee. That would be a key lever to maximize the value of African Arabica production. More than 50% of Arabica coffee output from Africa is sold as “natural” parchment, without being washed. There is a 40% price premium for washed coffee, and efficient washing (using Tanzania as a benchmark) adds 25% in costs, for a net increase in margin of 15%. S Washing coffee enables classifying beans as “specialty single origin” and thus makes it easier to brand or promote them, even at the commodity level. There is a wide variety in price premiums, however, and gains can be substantially higher than this in some cases. In the 2010/11 season some of the highest grade washed Kenyan Arabicas realized an average price premium of well over 1,000% over “natural parchment” coffees.
Several other high-value niches exist, such as certified fair-trade and organic coffee beans—and single-origin or origin-branded beans, as in specialty coffees from East Africa and Colombia. But the opportunity needs to be carefully assessed, especially given the low penetration of fair-trade coffee (at less than 2% of consumption in green bean equivalent) after several decades of promotion.7

**Creating a “coffee hub.”** Several “natural” hubs exist for trading coffee, with entry generally driven either by leveraging high existing consumption or by leveraging existing commodity trading expertise—with some locations combining both capabilities.

The ability to source multiple bean origins, enabling roasters to match client taste profiles and recipes, is essential for servicing mainstream roasters, which will typically include more than 10 origins in a single roast. Hubs can thus help develop intermediate processing by providing access to a broad variety of beans, which can to some extent offset any disadvantage from the lack of a nearby consumption market. East Africa has logical locations for hubs in Mombasa and Dar es Salaam to serve Ethiopia, Kenya, Rwanda, Tanzania, and Uganda.

Creating such a hub would require:

- **Excellent logistics:** to enable regular, convenient, and cost-effective shipments of multiple size lots of coffee to consumers around the globe. This advantage is enjoyed by European Community hubs in the efficiency of their infrastructure and proximity to consumption markets. It is also enjoyed by Asian re-exporters, such as Singapore and Hong Kong SAR (China), which also have highly efficient port logistics. They can leverage a logistics network that already engages in high transport volumes to key consumption markets in North America and Europe to close much of the proximity advantage that European hubs enjoy. For locations such as Dar es Salaam and Mombasa, there is a substantial gap in efficiency with world-class ports and trading hubs. So in the short to medium term there may be value in focusing on some key areas with a proximity advantage—such as consumption markets in the Gulf and North Africa—while continuing to reduce or eliminate today’s key barriers to efficiency.

- **A well developed financial sector to provide the requisite skills in commodity trading and financing trading activity:** to enable hubs to hold large volumes of coffee while managing (and potentially even benefiting from) the volatility in coffee commodity markets, as enjoyed by Asian and European hubs. The emergence of Nairobi in East Africa and Lagos in West Africa as key professional service centers, as well as Johannesburg in the South, suggest multiple locations that could supply the requisite skills and knowhow. The key challenge is achieving sufficient market depth to gain critical mass in trading activity.

- **Proximity to a large market to enable moving large volumes of multiple-origin coffees at low marginal costs:** this advantage is enjoyed by such European hubs as Belgium, Germany, and Italy. East African producers enjoy proximity to growing consumption markets in the Gulf, and West African countries have proximity to North African markets (such as Algeria) and Southern Europe. Successfully aggregating African demand (currently 7% of global consumption) into an addressable market—by relaxing or eliminating regional barriers to trade—could create a sizable opportunity for local producers and traders.

**Producing instant coffee**

With a potentially viable consumption market of around 15,000 tons emerging for instant coffee in Africa, compared with production of about 4,000 tons, there is a possibility for producing more instant coffee to substitute for imports in the region.

African countries have several options for configuring instant coffee production and supply chains. Positioning plants close to Robusta production can minimize transport costs. Locating close to regional consumption markets offers the potential to mix beans from multiple origins—to optimize costs, blend to multiple recipes, and leverage local demand as a platform for entering export markets. And disaggregating instant coffee production from packaging (such as processing near a source of Robusta and packaging in a regional or international export market) can combine efficiencies in transport with customization to local demand.

**Toll processing of roast and ground coffee**

For the 80% of world coffee consumption rated as “average” or of nonspecialty quality, an African coffee processor can specialize in cost-competitive roasting close to origin (box 6.2) and still generate a positive return. But this would need to be compared with the cost of toll processing in traditional consumption markets, especially given the lower transport costs for green coffee than for packaged coffee. Roasted and packaged coffee costs about twice as much as green beans to transport, but the higher cost is just 2% of the wholesale coffee price.
Challenges for coffee processing

Instant coffee production in African countries is more expensive than in developed consumer markets. Processing in a country that produces its own coffee can provide some opportunities for raw material and transport cost-efficiencies for the upstream supply chain, but other costs tend to be high. Instant coffee production is highly intensive in energy and water, and both tend to be more expensive in Sub-Saharan countries. It is also intensive in capital and involves sophisticated production, which can require importing specialized capital goods and supplies of spare parts and hiring specialized labor, at substantial price premiums. Tariff escalation creates additional barriers for producers of processed coffee that intend to export to consumption markets.

Beyond processing economics, the consolidation of the instant coffee market, with substantial investments in branding and established relationships with key channels, creates barriers to entry by any new players based in African countries. Entry into international retail markets will likely require collaboration with a major multinational unless prospective African processors are willing and able to make very high upfront investments in brand building and establishing distribution channels. For toll processing a lack of skills in Africa will make it necessary to import knowhow, but the key issues are the number of coffee varieties and the efficiency of logistics to serve consumer markets. Toll roasters can lack access to the many varieties of Robusta and Arabica required at a cost that is competitive with roasters in key importing markets, which have established supply chains for a broad variety of beans. This is compounded by a lack of reliable logistics to enable just-in-time deliveries for key clients, which specify tight delivery windows. Roast coffee is a perishable product that does not travel well, so it can be vulnerable to spoilage during sea transport.

Policymakers working with farmers and firms

Based on the opportunities for value capture and the associated policy bottlenecks, a policy agenda to support a coffee value-addition strategy must be adapted to the needs and resources of each country, though some general themes are common. Beyond measures to improve the environment for agroprocessing in general—such as improving the reliability and cost-effectiveness of energy, improving road and port infrastructure, and providing investment incentives for industry—a few measures could be directed at the coffee industry.

- Stabilizing farmer incomes. The volatility of coffee prices and the long lead times between planting decisions and first harvests of coffee mean that farmers underinvest in coffee
production, so a small and contracting coffee supply precludes processing. Stabilizing farmer incomes through price guarantees or insurance can support stable and then rising production. But the feasibility of such schemes needs to be assessed in the light of marketing boards in the 1970s and 1980s to inform any related policy interventions.

- **Liberalizing coffee export markets—smartly.** Export markets are highly regulated, creating challenges for the efficient international and even regional export of green coffee. Processors note that being tied to a single origin can be a major constraint, especially when tied to high-cost sources (especially in high-quality production countries like Kenya). Policymakers should consider the net value of liberalizing regional green coffee trade to enable processors to reduce the cost of processing regional coffee blends. That would also allow more efficient arbitrage between highest quality coffees (where the most value can be realized through their direct export) versus lower quality coffees. This could allow processors to reduce prices and support local demand growth. Liberalization will also enable processors to source beans from multiple origins, including Brazil and Colombia, which will help an Africa-based hub provide a broader range of blends for domestic consumption and position African roasters to compete with international competitors.

- **Creating demand.** As Brazil’s experience of increasing local demand for coffee consumption shows, a strong or growing local market is a foundation for the processing sector. It also provides a way to capture the full value added from bean to cup. While at the regional level Sub-Saharan countries’ share of global consumption at 7% is low, if it were consolidated into a single addressable market it would constitute a scale commercial opportunity. There is, therefore, a regional opportunity that can be created if barriers to trading processed coffee products across borders in the region were eliminated.

Policymakers need to acknowledge that any sector-specific strategy must compete with many other overlapping, and potentially conflicting, priorities. For a coffee strategy the potential tradeoffs include:

- **Regulating or laissez-faire?** There is a choice between opting for a regime of strong regulator control of the market that may include, say, a restricted number of export agents for coffee beans—or a liberalized market where traders can purchase from producers and where producers can go directly to traders and processors. Limiting the number of exporters and consolidating country production could make it possible to earn more from coffee exports, but this shifts local market power to a few licensed exporters, enabling them to extract rents from the commodity at the expense of farmers.

- **Focusing on niche or commodity coffee exports?** Given limited resources, it may not be possible to simultaneously pursue a strategy of developing scale production of low-cost coffee and also target niche markets and earn higher value on small quantities through certification (for example, from groups including Fair Trade, UTZ Kapeh, Organic, and Rainforest Alliance) and branding in consuming countries.

- **Capturing value in processing or in branding and marketing?** When entering the processing segment of the coffee value chain, countries could choose to be a toll processor of coffee (a medium-capital, high-volume, and very low-margin sector) or to enable local businesses to enter into the branding, marketing, and distribution segment, which has higher capital demands and is a lower volume, higher margin activity, through partnerships with actors in traditional and emerging consuming markets.

- **Develop local capacity or leveraging international players?** For an export-oriented strategy, it may be critical to engage the expertise of international players, especially in the global market for instant coffee, given their strong positions in most major markets. But this must be weighed against the risk of fewer knowledge transfers and fewer spillovers to the economy.

**Processing fruit, a new export**

Much tropical fruit is wasted, with estimates ranging from 10% to 80%. Troubles along the entire supply chain contribute to the waste, either directly—from poor handling, transportation, and storage to retail loss—or indirectly—predominantly through low farmgate prices for farmers that make it commercially unviable for them to harvest their fruit crops, especially for low-quality grades and poorly known or regarded local varieties.

Processing presents an opportunity to mitigate this waste, add value to crops, increase prices and incomes realized by smallholder fruit farmers, and create employment in processing factories and associated services. While exports of fresh fruit...
can be constrained by the costs of shipping perishable produce over long distances and complying with food safety standards, processing offers an alternative route to market, especially for fresh fruit below export grade. Investing in processing facilities can thus be an important means to bring many labor-intensive fruit crops to the world market.

**Structure of fruit processing in Africa**

South Africa, with its well-developed agroprocessing sector and focus on horticulture, accounted for almost 60% of processed fruit in Sub-Saharan Africa by volume in 2011, with orange juice (especially grapefruit and concentrated orange juice), and canned fruit (especially pineapple) the most significant products (figure 6.2). Major fruit processors include Ceres, which produces a range of juices and fruit of the right quality at a low cost, and face substantial challenges in scaling up, including access to finance and sourcing enough fruit of the right quality at a low enough cost. The same is true for Uganda. Nigeria's juice processing has grown rapidly in response to an import ban on single-serve or consumer-size juice products—but it is difficult to disentangle how much of the growth has involved manufacturing juice versus repackaging bulk juice manufactured elsewhere.

Kenya, another major fruit processor, accounted for 20% of total processed volumes in Sub-Saharan Africa in 2011. Kenya produces substantial quantities of canned pineapple through Del Monte's operations in Thika and has several domestic fruit processors. Countries such as Nigeria, with a ban on importing fruit juice in individual consumer-size packaging, appear to be understated in the data on juice production. However, a domestic sector involved in repackaging fruit juice and mixing concentrate is growing rapidly with rising domestic demand.

Sub-Saharan Africa's fruit juice consumption is estimated to be growing at more than 7% a year, a good opportunity for processors. The sector comprises largely informal processors, but volumes are shifting toward the formal sector, driven by the growth of organized retail and the broader reach of branded juice manufacturers.

The ACET 15 fall into three main groups:

- **Fruit producers.** Ethiopia, Ghana, Nigeria, Rwanda, Senegal, and Tanzania all produce more than 250,000 metric tons of fruit a year, but they do not add value to a large share of output through processing or exporting, the opportunities for value addition. They typically have a limited degree of processing and face substantial challenges in scaling up, including access to finance and sourcing enough fruit of the right quality at a low enough cost. The same is true for Uganda. Nigeria's juice processing has grown rapidly in response to an import ban on single-serve or consumer-size juice products—but it is difficult to disentangle how much of the growth has involved manufacturing juice versus repackaging bulk juice manufactured elsewhere.

- **Integrated fruit processors.** Kenya and South Africa extract value from fruit by exporting “export-quality” fruits to other African countries and worldwide and by processing fruits locally, especially for juice.

An additional category—nonplayers—includes countries that do not have a significant volume of fruit

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**Figure 6.2 Processed fruit production in Sub-Saharan Africa, 2011**

<table>
<thead>
<tr>
<th>Country</th>
<th>Dried</th>
<th>Juice</th>
<th>Canned/other</th>
<th>Total Processed Fruit Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>678</td>
<td>235</td>
<td>321</td>
<td>1,176</td>
</tr>
<tr>
<td>Kenya</td>
<td>9%</td>
<td>37%</td>
<td>62%</td>
<td>235</td>
</tr>
<tr>
<td>Angola</td>
<td>1%</td>
<td>28%</td>
<td>33%</td>
<td>117</td>
</tr>
<tr>
<td>Ghana</td>
<td>3%</td>
<td>3%</td>
<td>7%</td>
<td>321</td>
</tr>
<tr>
<td>Madagascar</td>
<td>34%</td>
<td>25%</td>
<td>41%</td>
<td>222</td>
</tr>
<tr>
<td>Swaziland</td>
<td>6%</td>
<td>3%</td>
<td>6%</td>
<td>69</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>69</td>
</tr>
</tbody>
</table>

*Source: ACET fruit study prepared for this report.*
production today. It includes Botswana, Burkina Faso, Mauritius, and Zambia, which may well have opportunities to add value to fruit. But fruit processing may not justify more attention than other commodities, such as cotton for Burkina Faso or soybean for Zambia.

The domestic processed fruit market in Sub-Saharan Africa includes juice, dried fruit, and canned fruit. Demand is difficult to quantify, but it is likely growing fast, with juice consumption estimated to be growing more than twice as fast as fresh fruit.8

The opportunity may be larger than the market estimate of less than $1 billion across the region, for two main reasons. First, low-cost processing technologies, such as solar drying, can be easily and cost-effectively adopted by smallholder farmers and cooperatives to add value to or efficiently store harvested fruit. Solar drying allows farmers to extend the commercial cycle beyond the natural harvest cycle and thus address demand that is completely unserved out of season. Second, a large informal sector, particularly in juice processing, exists in most Sub-Saharan countries, and informal juice processing could account for 70% of total volumes. The informal sector caters largely to out-of-home occasions (such as informal roadside juice makers). The formal sector is growing, as modern retail grows and as brands from multinational players and local processors extend their coverage of formal and informal outlets.

Malian mango nectar shows the scale of the value addition opportunity for processors, even if they are focused on the domestic market opportunity alone. Processing mango into pulp increased its value by a factor of 2.8,9 while conversion to a ready-to-drink beverage at the factory gate raised its value 17.8 times.10

**Opportunities in the fruit value chain**

Fruit processing has three segments:

- **Canned and preserved fruit** accounted for 58% of total global processed fruit volumes in 2011. African countries are well placed to have a major role in the sector, and in some cases they are already in it, such as Del Monte’s canned pineapple production in Kenya and Dole’s substantial operations in South Africa. But the sector can be unattractive for new entrants given the high entry costs and low margins. Working with large multinational fruit processors is one of the best ways to realize the value available.

- **Juice**, the highest value processed fruit category, accounted for around 42% of processed fruit by volume in 2011. Juice is very attractive prospect for Sub-Saharan Africa, with fast global demand growth (3.7% a year from 2009 to 2011 versus 2.7% a year for fresh fruit), particularly for tropical fruit juices, thanks to theinterest in new tropical flavors in mature markets and the growth of demand in emerging markets. Sub-Saharan Africa has a large informal domestic sector, allowing processors to scale up first for the local market because of less challenging health and safety requirements before addressing the international market. Juice processing has the advantage of combining sophisticated agroprocessing with a large number of low-skilled jobs involved in sorting, cutting, and preparing fruit, especially during harvest seasons.

- **Specialty fruit**, a tiny segment, serves the needs of specific food processors for ingredients in dairy (fruit chunks and flavors for yogurts), baby food, prepared dishes, and instant desserts. Clients typically have precise requirements for water content, color, and flavor, making the sector highly challenging for new entrants if they cannot already leverage highly sophisticated food-processing capabilities. But margins can be quite high in some areas. Overall, specialty fruit constitutes an attractive set of niche areas, but it typically requires an established food-processing sector. Sub-Saharan Africa is hardly a player in this market.

The focus here is on juice since it is the main manufacturing and value-adding activity in the value chain. Juice processing involves two businesses with different activities, means of value addition, and economics:

- **Fruit processing** converts fresh fruit into intermediate products (pulp, puree, and concentrate). Pulps and purees are direct outputs from processes that break down the flesh of fruits, while concentrates are created by eliminating excess fibers in the pulp or puree and evaporating naturally occurring water.

- **Juice manufacturing** involves mixing pulp, puree, or concentrate with water, sugar, and stabilizers to create bulk beverages. The mixture is then packaged for the market into cartons, plastic pouches, or plastic or glass bottles. There can be a broad assortment of pack sizes and types, ranging from small single-serve cans to large plastic bottles for families to consume at home. Juicers use a variety of methods to create intermediate and final products.

The two businesses do not have to be vertically integrated. The juice manufacturing industry in both East Africa (Kenya and Uganda) and West...
Box 6.3 Ghana’s Blue Skies

Blue Skies exports $40 million worth of 100% natural juice with no preservatives from Ghana to the United Kingdom and other European countries each year. Each day, the company flies about 20 tons of bottled juice and packs of fresh cut fruit from Ghana. This, in the face of most of the major challenges of agroprocessing in Africa: consistency of inputs, quality control, infrastructure, logistics, rising energy prices, declining farming, and many more. With a shelf life of five days, the margin for error is thin. And government can do more to remove these constraints. As a company spokesperson put it, “An enterprising spirit can make a real difference when given support and encouragement.”

At the height of an aviation fuel shortage in Ghana in February 2013, the company reported losing some $750,000 in exports in one week. Fortunately for the company, Ghanaians were there to drink up some of the juice. Led by its employees through informal market tests, the company had discovered a local market for its products. Domestic sales are around $2 million a year.

Blue Skies engages more than 150 Ghanaians and more than 1,500 Ghanaian factory workers picking fruit and packing juice.

Source: ACET fruit study prepared for this report.

Juice processors face high energy costs, high transport and logistics costs, and the difficulties in accessing finance that characterize agroprocessing throughout Sub-Saharan Africa

Africa (Ghana and Nigeria) includes players that either process local fruit or import concentrate and mix and package it locally, or do both, depending on the season (box 6.3).

Challenges in processing juice

For juice processors, three key sets of challenges need to be addressed:

Managing seasonality. Most fresh fruits for production are seasonal. In some cases fruit may be harvested in just a few months, while in others it may be harvested continually but only in small quantities in any month. A short time from harvest-to-pulp is critical, due to the challenges and expense of storing substantial inventories of fruit for extended periods, so throughput needs to match the crop cycles for fruit inputs. Fruit processors manage this by:

• Processing a portfolio of fruits. An example is Jakana Foods of Uganda, which processes bananas, which can be harvested throughout the year, to make banana juice. It also processes mangoes, which have a short and high-volume season. Other East African processors include vegetables, especially tomatoes, in their portfolio of processed outputs.

• Storage. Processed fruit that is pasteurized appropriately, concentrates with high sugar content, and fruit juice packaged appropriately can typically be stored for extended periods. For example, pasteurized mango juice packaged in 200-milliliter Tetra Pak cartons or sterile aseptic pouches can be stored at ambient temperature for more than a year. Processors can then manage their production capacity closer to their products’ crop cycles. However, this requires access to affordable finance to fund the required buildup in working capital.

• Right-sizing capacity. To build the right-size plant, the minimum efficient scale of plant, the costs of inputs, and the costs to upscale and downscale capacity (including the impact of adding shifts and the knock-on impact of increasing throughput on all aspects of the processing chain—from intake to loading for distribution) should be considered. Setting the right capacity can be difficult before a processor has operating experience.

Building an effective supply chain. Acquiring sufficient volumes of fruit—of the right varieties, of the right quality, at the right time—is critical. Fruit production is often spread across a large base of smallholder farmers, many lacking commercial orientation and the understanding or ability to meet requirements. Processors can focus on aggregators as their key source of supply, but this carries a cost and can make enforcing quality standards more difficult.

Meeting (international) standards. Substantial quantities of intermediates and juice are exported to North American and EU markets, which enforce rigorous standards for quality of process and product specification. Plants need to have Hazard Analysis and Critical Control Points or ISO 22000 certification and adhere to the General Principles of Food Hygiene recommended by Codex Alimentarius.

Beyond these challenges, juice processors face high energy costs, high transport and logistics costs, and the difficulties in accessing finance that characterize agroprocessing throughout Sub-Saharan Africa.
A generic roadmap for private players and policymakers to develop an internationally competitive processing sector could focus initially on fruits with easier entry (box 6.4).

Developing fruit processing at scale requires efficient and high-volume domestic production, efficient domestic logistics, and basic adherence to quality standards. So the sector might first focus on identifying the local or regional sources with the most naturally abundant processing sector could focus initially on fruits with easier entry (box 6.4).

A generic roadmap for private players and policymakers to develop an internationally competitive processing sector could focus initially on fruits with easier entry (box 6.4).

Box 6.4 China—moving from fresh apples to apple juice

China is the world’s leading supplier of concentrated apple juice, thanks to direct government intervention in fruit production and agroprocessing as part of a deliberate strategy to develop a commercial basis for exporting labor-intensive agricultural commodities. China’s horticulture faces challenges in the export market for fresh fruit, given the cost of long-distance logistics for perishable products and sanitary and phytosanitary concerns. Concentrated apple juice, an alternative to exporting fresh apples, circumvents these challenges.

Substantial financial incentives and government intervention have been important for developing the industry, as has China’s ability to integrate fruit producers with processors to provide high volumes of low-cost raw materials, access to finance, high-quality logistics, and skilled management. The most critical factors for adding value in fruit processing include:

- **Incentives for investment and access to finance.** Although juice processing requires investing in plant and machinery, the critical bottleneck for most juice processors is working capital.

- **Market links between producers and processors.** Chinese government support to the processing sector in forming direct links with farmers created the dual benefit of eliminating consolidator margins from processor costs, while also ensuring that processors could capture a more reliable supply of fruit and incentivize farmers to produce fruit of the appropriate quality.

- **Scale, low-cost production.** The cost of fruit is a major determinant of the economics of juice processing. Processors often compete for local production with other sectors—especially domestic and export markets for fresh fruit but also other processing sectors—and are unable to offer the highest prices for fruit. Processors are thus one of the last in line to buy fruit.

- **Efficient logistics.** Before processing, fruit is vulnerable to spoilage and heavier than final juice or concentrate. Potential losses in transport and the high cost of transporting whole fruit to the processing site result in processing economics highly sensitive to the efficiency and cost of logistics.

- **Capability and credibility in meeting safety standards and quality requirements.** Although the domestic informal juice production sector can be viable for developing a juice processing sector, long-term transformation will require that processors export to key markets such as the European Union and the United States. To export to these markets, the local sector must evaluate, implement, and enforce international standards of food safety and meet client requirements in color, taste, sugar content, and packaging.

- **Large domestic market to support early stage sector growth.** China is an exception, not an example. The country’s “market” has from the outset been an export sector, with an aim to develop a channel for capturing value from fruit that was difficult to export in fresh form. An alternative development path—already open for African countries—is to have the informal juice processing sector serve the domestic market for juice.

While the Chinese government had a high level of direct intervention in developing the juice sector, key success factors such as the availability of finance, integration of production with processors, and the availability of abundant and low-cost fruit do not necessarily require government support. Still, the Chinese model demonstrates that targeted support to these areas can be highly effective in making a transformational change in value addition in the fruit sector.

Source: ACET fruit study prepared for this report.
Given the importance (and cost) of packaging for a viable fresh fruit export sector, there likely are synergies in combining packaging with dairy processing

fruits while looking for additional niches for high-value fruits that can be grown in the local climate, such as berries. This naturally has implications for removing the intra-African barriers to trade. Outgrower schemes with a large producer sourcing from neighboring smallholders and facilitating their production and transportation of produce should also be encouraged. Examples include Cameroon and Mozambique, which have leveraged international players to help develop contract farming around nucleus farms.

Once basic production and infrastructure are in place, the fruit processing sector may transition to a more sophisticated approach of segmenting production into two or three submarkets by quality and monetizing each level:

- **Export-grade fruit** involves developing capabilities in compliance and monitoring adherence to minimum residue levels, sorting and separating fruit that adheres to international client quality specifications, and developing cost-effective international logistics.

- **Local and regional consumption-grade fruit** is not export-grade and can be diverted to regional exports or local markets to realize value.

Developing an internationally competitive processing sector requires adhering to standards. For example, the Hazard Analysis of Critical Control Points for juice processors involves monitoring and control points across the entire supply chain from farm to packaged output. Also required is building on capabilities in sorting, quality control, and domestic and international logistics developed in prior steps.

Ensuring availability of the right varieties of fruit or using the right taste profile is also important. Similar to the export market for fresh fruit, exporting processed fruit requires that processors use varieties that match client tastes. Countries need to ensure that they can meet client requirements either by ensuring a supply of the right varieties or by using local varieties that have a similar taste profile. There may also be opportunities to promote special varieties of common fruits. Tropicana, for example, has developed a broad range of special orange juices that use niche varieties as alternative products to its standard juice.

Given the importance (and cost) of packaging for a viable fresh fruit export sector, there likely are synergies in combining packaging with dairy processing since the underlying Tetra Pak technology is the same as in Eastern Europe and South Asia.

**Processing soy, to substitute imports and supply the poultry industry**

Africa is a net importer of both soybean and processed soy products, but it has the capacity to produce substantial soybean volumes. True, major soybean producing and processing countries have low unit costs, but domestic production in Africa is not necessarily at a significant price disadvantage to imports. So, soybean offers an import-substitution opportunity. It can also facilitate entry into generally high-price elastic markets for meat production, particularly poultry, in Sub-Saharan Africa.

**Structure of the African market**

Sub-Saharan Africa accounts for less than 1% of the global soybean industry. Soybean is mainly a crop for processing—rather than for consuming raw or cooked—and imports from key producers such as Argentina, Brazil, and the United States can serve African markets below the local cost of production, hindering a domestic soybean industry.

Soybean production in the region has been growing slightly faster than global production, at 9% a year over 2008–12 compared with 2% for the rest of the world. Much of this recent growth has been driven by South Africa, which has increased soybean production by an average of 32% a year over this period (figure 6.3). Even so, Africa’s share remains inconsequential at less than 1% of global production in 2012.

South Africa’s soybean production reflects its highly developed agro-processing sector (with substantial poultry production). It is also a destination market for regional producers like Zambia and Zimbabwe. Nigeria, Uganda, and Zambia also produce substantial amounts of soybean, with poultry playing a similar role in driving demand. In all these markets, processing is typically done by animal feed and livestock producers rather than general oilseed processors.

Roughly 60% of Sub-Saharan soybean production is processed in the region, with more than half in Nigeria and South Africa.11 Of the main African soybean producers, Nigeria has a conversion rate into processed soybean of 60%, compared with South Africa at 73% and Uganda at more than 90%. But the true scale of processing is hard to determine, since a large proportion of soybean may well be processed locally in a rudimentary fashion to generate meal and edible cake and oils, especially in Nigeria where there is a domestic market for human soybean consumption.

Demand for soy, cake, and oil is growing rapidly across the region, driven largely by growth in demand
for poultry and, to less extent, human consumption in such markets as Malawi and Nigeria. Production has not kept up with the growth in demand, resulting in a rapid increase in imports.

The ACET 15 can be grouped in three market segments:

- **Major soybean producers.** South Africa and Nigeria are the biggest soybean producers. Growth is driven largely by demand for feed for the domestic poultry industry and stocks for domestic vegetable oil producers. Nigeria protects both sectors with a ban on imports. South Africa has a relatively efficient and globally competitive agroprocessing sector with a particularly fast growing demand for poultry. Zambia and Uganda are also key producers, with Zambia rapidly emerging as a future key player in soybean and poultry, given recent very high rates of growth (box 6.5). All these countries process much of their production for oil and cake, with cake demand largely for poultry and a small but fast-growing market for human consumption.

- **Cake consumption markets.** Cameroon, Kenya, Mauritius, and Mozambique import significant quantities of soy cake (more than 10,000 tons), much as poultry feed. In Ethiopia, Ghana, Senegal, and Tanzania soy cake is not yet a major part of poultry feed, but it offers opportunities to processors who can source domestic or international supplies of soybean at sufficiently low costs.

- **Tactical consumption markets.** Botswana, Kenya, and Mozambique do not have domestic poultry production industries on par with Nigeria, but they may provide export opportunities for processors from key processing countries in the region.

**Opportunities in the soy value chain**

Given Sub-Saharan Africa’s low overall soybean production and processing in the global soybean market and the substantial imports of soybean products into the region, opportunities for capturing value need to focus on local opportunities for displacing imports and catering to domestic growth sectors. These opportunities fall into three groups (figure 6.4).

**Substitute soy imports.** Sub-Saharan countries imported $1.5 billion in soybean and processed soy products in 2011, with soybean oil the largest import sector at $945 million, followed by imported cake at $552 million. Imports of soybeans have been in decline, while those of processed soybean in the form of both cake and oil have been increasing. South Africa is the largest import market at more than $700 million, a good opportunity for players in East and Southern Africa such as Uganda and Zambia. Angola and Senegal may present opportunities for processors in Nigeria (figure 6.5).

**Displace other oils and meals in the African market.** Within the broader oilseed market, soybean competes

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*Figure 6.3 Recent soybean production and processing growth in Sub-Saharan Africa*

<table>
<thead>
<tr>
<th>Soybean production by country</th>
<th>Soybean processing by country</th>
<th>Processing as a share of soybean production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thousands of tons</td>
<td>thousands of tons</td>
<td>%</td>
</tr>
<tr>
<td>Soybean production by country</td>
<td>Soybean processing by country</td>
<td>Soybean production as a share of global production</td>
</tr>
<tr>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Compound annual growth rate</td>
<td>Compound annual growth rate</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>Nigeria</td>
<td>Uganda</td>
</tr>
<tr>
<td>2,025</td>
<td>262</td>
<td>72</td>
</tr>
<tr>
<td>9.1%</td>
<td>0.6%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Malawi</td>
<td>Zambia</td>
<td>Other</td>
</tr>
<tr>
<td>1,428</td>
<td>94</td>
<td>64</td>
</tr>
<tr>
<td>64%</td>
<td>9%</td>
<td>64%</td>
</tr>
<tr>
<td>Uganda</td>
<td>Zimbabwe</td>
<td>South Africa</td>
</tr>
<tr>
<td>178</td>
<td>131</td>
<td>133</td>
</tr>
<tr>
<td>6.6%</td>
<td>9.1%</td>
<td>56%</td>
</tr>
<tr>
<td>Zambia</td>
<td>Nigeria</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td>591</td>
<td>1,247</td>
<td>56%</td>
</tr>
<tr>
<td>31.8%</td>
<td>15.6%</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Estimate based on FAOSTAT data on soybean oil production by country and the assumption that 18% of the total volume of processed soybean is oil.*

*Source: ACET soy study prepared for this report.*
South Africa is the largest import market at more than $700 million, a good opportunity for players in East and Southern Africa such as Uganda and Zambia.

African imports of oilseed products are broadly reflective of global flows of processed oilseeds: soybean dominates Sub-Saharan imports of cake, accounting for 88% of the value of total cake imports in 2011 but only 17% of total edible oil imports (figure 6.6).

Palm oil dominates Sub-Saharan imports of edible oil, claiming a 68% share of total edible oil imports into the region by value and 72% by volume in 2011. Soybean oil is the second largest imported vegetable oil, at 17% by value and 15% by volume. Across Sub-Saharan Africa, palm oil import prices averaged $1,131 a metric ton, compared with $1,337 for soybean oil in 2011, an 18% premium. In low-income consumer segments this price differential needs to be overcome in order to compete with palm oil.

**Target growth markets for soy cake.** The substitution opportunity in soybean oil processing depends on finding markets for the associated soybean cake. The typical output from a crushing facility is 82% cake, so for every ton of oil sold processors need to sell approximately 4 tons of cake. In Sub-Saharan Africa exploiting the oil substitution opportunity is currently constrained by a lack of cake markets, a challenge for prospective processors. There appear to be at least two growth segments for processors to realize value from cake production:

- **Animal feed.** Although animal feed is a key application for oilseeds, a key application for soybean cake is as a high-quality feed ingredient. While most feed manufacturers focus on soy meal and soy protein concentrates, there is considerable demand for whole soybean cake in Africa, where high-quality feed is scarce.

**Box 6.5 Zambia— a midsize soybean producer and processor**

Largely self-sufficient in soybean production, Zambia produced 112,000 metric tons of soybean and processed 90,000 metric tons in 2010. Only 2% of the soybean supply in 2010 came from imports. Around 85% of the supply comes from commercial farmers, characterized by use of irrigation, high input use, and fairly high yields of more than 2.9 metric tons a hectare. The processing sector has an installed crushing capacity of roughly 155,000 metric tons, more than enough for domestic demand, making Zambia a net exporter regionally.

- Integrated feed manufacturers produce animal feed and are often vertically integrated into livestock production. Zamanita, the former parastatal organization now owned by Zambeef, sells cake to Novatek and exports cake to Zimbabwe. It has the largest capacity in Zambia, some 50,000–60,000 metric tons a year. Quality Commodities, Agri Options, and National Milling Company are also important players (with 20,000, 12,000, and 12,000 metric tons of capacity).

- Oil producers refine edible oils, are often involved in oilseed crushing, and trade cake to other players. Key players include Unified Chemical, which focuses solely on refining both domestic and imported oils (mainly from Argentina), and Hi-Protein, a smaller player that refines palm oil and small quantities of soybean oil. Zamanita is also a key player in the refined soybean oil sector, with a 30% market share.

Animal feed accounted for 89% of soybean consumption in 2010, with most used for the poultry sector, which has recently grown 20% a year. Human consumption, as soy chunks and soy products such as “Yummy Soy,” account for the remaining 11%. This fast-growing sector is expected to expand 8% a year through 2020.

The Zambian soybean sector appears positioned for growth. Given its location, Zambia can export soybean and processed soybean products to regional markets like South Africa and Zimbabwe, especially given the exclusive use of non–genetically modified strains. Most Zambian land with agricultural potential is still uncultivated and well suited to soybean production.

However, the soybean sector faces challenges in delivering viable financial returns. Best-in-class soybean cultivation by commercial farmers appears to be only marginally attractive, with farmgate prices of $350 a metric ton, almost the same as the breakeven price of $349. And smallholder farmers are unable to achieve attractive returns, perceiving soybean to be a riskier crop than maize, which has a guaranteed price from the government’s Food Reserve Agency. The government keeps tight control over import and export permits, so only a few traders can trade internationally. Traders and processors are thus cautious when developing import and export strategies.

Source: ACET soy study prepared for this report.
The substitution opportunity in soybean oil processing depends on finding markets for the associated soybean cake.

- Sub-Saharan countries imported 1.4 million tons of cake, 700,000 tons of oil, and 30,000 tons of soybeans in 2011.
- Represents a $1.5 billion import substitution market opportunity.
- Largely localized in South Africa, although Senegal and Angola may be addressable opportunities for nearby Nigeria.

- Total imports of oilseed cakes and edible oils were worth $0.6 billion and $5.6 billion into Sub-Saharan Africa respectively in 2011.
- Soybean cake was the second most expensive product in its category (after groundnut cake), but was more than 80% of all cake imports by volume, implying robust demand for this product.
- Conversely, soybean oil is a low share of imported oils and more expensive than palm oil, the main competing product.

- Growth in poultry consumption largely determines which geographical markets are the most attractive to target.
- Some local niches in terms of human consumption (Malawi) and nonpoultry feed (Zambia), but these remain fairly small.

Source: ACET soy study prepared for this report.

Figure 6.4 Key value capture opportunities in soybean

1. **Substitute soy imports**
   - Sub-Saharan countries imported 1.4 million tons of cake, 700,000 tons of oil, and 30,000 tons of soybeans in 2011.
   - Represents a $1.5 billion import substitution market opportunity.
   - Largely localized in South Africa, although Senegal and Angola may be addressable opportunities for nearby Nigeria.

2. **Displace other oils and meals in the African market**
   - Total imports of oilseed cakes and edible oils were worth $0.6 billion and $5.6 billion into Sub-Saharan Africa respectively in 2011.
   - Soybean cake was the second most expensive product in its category (after groundnut cake), but was more than 80% of all cake imports by volume, implying robust demand for this product.
   - Conversely, soybean oil is a low share of imported oils and more expensive than palm oil, the main competing product.

3. **Target growth markets for soy**
   - Growth in poultry consumption largely determines which geographical markets are the most attractive to target.
   - Some local niches in terms of human consumption (Malawi) and nonpoultry feed (Zambia), but these remain fairly small.

Source: ACET soy study prepared for this report.

Figure 6.5 The soy import-substitution opportunity by country

Table: Total Sub-Saharan Africa soybean and derivatives import market, by volume (Millions of tons, 2011)

<table>
<thead>
<tr>
<th>Country</th>
<th>Soybean</th>
<th>Oil</th>
<th>Cake</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>0.3</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Mozambique</td>
<td>0.1</td>
<td>0.1</td>
<td>0.03</td>
</tr>
<tr>
<td>Angola</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Other</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Table: Total Sub-Saharan Africa soybean and derivatives import market, by value ($ millions at import prices, 2011)

<table>
<thead>
<tr>
<th>Country</th>
<th>Soybean</th>
<th>Oil</th>
<th>Cake</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>1515</td>
<td>737</td>
<td>37</td>
</tr>
<tr>
<td>Mozambique</td>
<td>190</td>
<td>119</td>
<td>190</td>
</tr>
<tr>
<td>Angola</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>96</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>Other</td>
<td>470</td>
<td>470</td>
<td>470</td>
</tr>
</tbody>
</table>

Note: Figures include trade between Sub-Saharan countries.

Source: ACET soy study prepared for this report.

Soy cake in Sub-Saharan Africa, livestock feed often uses local sources of cake, such as groundnut and cottonseed. These are lower in quality, with lower protein content, but as by-products of other production processes, they can be available at low cost. Beyond displacing lower cost substitutes, fast-growing poultry sectors in Ghana, Senegal, and Zimbabwe present growth opportunities for high soy cake content feeds. As incomes increase and the urban
Converting soybean protein to poultry is a key opportunity for value addition.

Middle class expands, demand for poultry is set to grow rapidly.

- **Human consumption.** Soy products for human consumption such as texturized soy protein, soy milk, or corn-soy blends present an opportunity to substantially improve nutrition for low-income households. Human consumption of soy products is fairly low in Sub-Saharan Africa, with Malawi and Nigeria as key exceptions. Where there is no market for human consumption, deliberate demand-creation programs, such as those driven by the International Institute of Tropical Agriculture in Nigeria in the late 1980s and early 1990s, show that it can be stimulated. Zambia, with only a budding human consumption market, can expect to see demand growth of more than 8% a year.

**Converting soybean to poultry**

Simply processing soybean into oil and cake does not offer large returns. Per metric ton, soybean oil sells at a substantially higher price than cake. The combined sales value tends to generate a positive gross processing margin. But margins are volatile and do not set the stage for a meaningful increase in value capture, and the simplicity of soybean crushing does not create the prospect of significant broader positive spillovers, especially in fostering a broader industrial base.

But converting soybean protein to poultry is a key opportunity for value addition. Soybean is just one component of producing poultry, but it can be the largest production cost. For Mozambique, $1.50 of soybean cake is required to produce a kilogram of poultry, which can be sold at a minimum breakeven price of $2.25. In many Sub-Saharan markets, demand for poultry is highly price-elastic. A reduction in soybean input costs through efficient local production could increase poultry meat affordability and lead to a substantial increase in local demand—and thus foster both the expansion of the sector and better nutritional outcomes for Sub-Saharan African populations.

**Challenges for soy processing**

Raw material costs—in this case for raw soybean—dominate the cost structure of soybean processors. So, prices for soybean cake and soybean oil are tied closely to soybean production costs, and processors that cannot source competitively priced raw inputs will find it hard to produce processed products at competitive prices.

African production appears to have recently become cost-competitive with international imports. South African production is 30% cheaper than Argentine soybean on the same basis (figure 6.7). With the cost of soybean processing dominated by the raw input cost of soybean, this suggests that African countries could substitute for imported processed soybean products.

Local producers may now be able to produce meal and oil for the local market at a cost advantage over

---

**Figure 6.6 Sub-Saharan Africa’s broader oilcake and edible oils import-substitution opportunity**

<table>
<thead>
<tr>
<th>Total Sub-Saharan Africa cake import market, 2011</th>
<th>Total Sub-Saharan Africa edible oils import market, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume (thousands of tons)</strong></td>
<td><strong>Value ($ millions)</strong></td>
</tr>
<tr>
<td>Soybean</td>
<td>1,686</td>
</tr>
<tr>
<td>Sunflower</td>
<td>627</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Volume (thousands of tons)</strong></td>
<td><strong>Value ($ millions)</strong></td>
</tr>
<tr>
<td>Soybean</td>
<td>4,688</td>
</tr>
<tr>
<td>Sunflower</td>
<td>886</td>
</tr>
<tr>
<td>Other</td>
<td>15%</td>
</tr>
<tr>
<td>Palm</td>
<td>2%</td>
</tr>
</tbody>
</table>

**Note:** Figures include trade between Sub-Saharan countries.

Source: ACET soy study prepared for this report.
Local producers may now be able to produce meal and oil for the local market at a cost advantage over imports. Import tariffs of 8–10% on soybean meal are no longer a material factor in determining Sub-Saharan Africa’s local competitiveness in the soybean sector.

But uncertainties remain. It is not clear whether the emerging cost-competitiveness of the domestic sector will be stable over time as Argentina, Brazil, and the United States continue to invest in production efficiency—especially with better genetically modified strains of soybean. Nor is it clear whether the cost advantages will remain if production in Sub-Saharan Africa were to rise to a level capable of addressing all regional demand or whether local capacity constraints and challenges in such areas as domestic logistics would more than offset any production efficiencies.

Policymakers working with firms and farms

Developing soybean processing should be understood mainly as a means to reduce expensive imports and to increase the dietary protein of citizens (consumed directly or as poultry). Policymakers need to work with producers to develop an approach that can foster a fledgling industry that could—despite indications of emerging price competitiveness in African production—face some price competition in its development phase before reaching a minimum efficient scale.

Policymakers also need to decide whether to work with multinational oilseed traders and processors or to develop the processing capabilities of local firms. The development of local capabilities has many broad benefits, including employment, skills development, and income generation. But the fairly low value added from soybean processing suggests that a detailed analysis of country-specific impacts is required to determine the appropriate policy balance. A full case for soybean

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**Box 6.6 Brazil—converting soy into poultry**

Brazil is a leading player in the global market for production and processing. It is an important example of applying seed technology and government support to develop the sector. It also has leveraged its scale and low-cost soybean production into the poultry sector, becoming one of the world’s highest volume and lowest priced exporters of poultry meat.

The Brazilian experience demonstrates many of the success factors for countries to capture value at more advanced stages in the soybean value chain.

- **Seed technologies, good practices, and technology transfers.** Developing strains well suited to cultivation in the Cerrado allowed the industry to take advantage of a latent bank of agricultural land—a precursor to exploiting massive economies of scale. For seed technology an area of debate is whether the use of genetically modified strains is an important success factor. Traits of genetically modified soybeans reduce the level of inputs required and increase farmer convenience, thus increasing yields and reducing costs. Several alternative approaches to genetically modified seed also exist—such as applying lime and using irrigation—that can deliver comparable gains. But the dominance of genetically modified soybean production both in Brazil and in the other major producers appears to be indicative of its importance for internationally competitive costs.

- **Low input costs.** Efficient soybean cultivation requires using inputs appropriately, such as inoculants to deliver economically viable yields.

- **Efficient logistics.** Strong transport infrastructure is required to aggregate cost-effectively as well as to bulk and deliver soybean to processing plants.

- **Strong domestic demand, mainly from the poultry sector.** Although Brazilian soybean producers were able to exploit massive economies of scale in production, a substantial addressable market was necessary to absorb these volumes.

- **Public support focused on higher value final consumption goods sectors, especially poultry.** Government support of poultry production, rather than soybean production, stimulated the entire vertically integrated soybean-to-poultry sector. Providing low-cost finance and promoting exports supported both the efficiency and the expansion of the poultry sector, thus driving domestic demand for processed soybean.

Source: ACET soy study prepared for this report.
The public sector can promote better organization of the soybean supply chain to improve efficiency and minimize the number of market intermediaries.

Ensure the availability of soybean supply for processors. The cost of raw soybean is most important for processors. To be viable, a soybean processor needs sufficient quantities of quality soybean at a reasonable cost. Local crop cycles can require large stocks, leading to high demand for working capital and storage facilities.

For countries that cultivate soybean largely through commercial farming, such as Zambia, processors that source soybean need to interact with only a small number of commercial farmers. But for countries with highly fragmented production, processors typically need to source soybean from traders that will consolidate volumes at a markup, reducing margins. The public sector can promote better organization of the soybean supply chain to improve efficiency and minimize the number of market intermediaries in aggregating soybean. One option is for producers to organize in groups or cooperatives that can trade their volumes in bulk directly with processors.

Assess regional opportunities. Although it may be possible to stimulate soybean processing domestically, producing countries can also assess the available regional processing opportunities, which may justify a much larger response or higher priority for the sector. Zambia’s ability to export to regional markets like South Africa, as well as potentially nascent local markets, presents an important opportunity, especially given the expected continuation of rapid growth in South Africa’s poultry sector. Nigeria is well placed to serve markets in Angola and Senegal, with both likely to see rising demand from their local livestock sectors.

For non-soybean-producing countries or countries with existing processing capabilities in soybean or other oilseed markets, greater regional soybean production could provide feedstock for a new business line. South African oilseed processors serving local demand for sunflower oil could also be viable partners for regional soybean producers that lack the ability or interest to invest in soybean processing facilities.

Address potential policy trade-offs. Policy tradeoffs specific to the soybean sector need to be addressed when determining an overall approach for defining a soybean strategy:

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Figure 6.7 How South Africa measures up to Argentina

Sources of imports for South Africa and Senegal: soybean cake
Tons, 2011

<table>
<thead>
<tr>
<th>Country</th>
<th>Soybean Cake Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>945,544</td>
</tr>
<tr>
<td>Senegal</td>
<td>1,977</td>
</tr>
</tbody>
</table>

Comparison of imported soybean vs. local production for South Africa and Zambia
$ per ton, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Farmgate Price</th>
<th>CIF to South Africa</th>
<th>CIF to Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina CIF to South Africa</td>
<td>428</td>
<td>733</td>
<td></td>
</tr>
<tr>
<td>South Africa local production</td>
<td>383</td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>Argentina CIF to Zambia</td>
<td>575</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>Zambia local production</td>
<td>1,977</td>
<td>733</td>
<td></td>
</tr>
</tbody>
</table>

Note: CIF is cost, insurance, and freight.
Source: ACET soy study prepared for this report.
• Planting genetically or non-genetically modified soybean? Although genetically modified soybean is usually assumed to be adapted to deliver higher yields, this is not the case. The traits for genetically modified soybean, focused mainly on enhancing farmer convenience and lowering input costs, do not directly increase yields, but they can contribute to yield increases by reducing pest damage and weeds. This indirect effect has recently been estimated to generate a 12% increase in yields.\textsuperscript{14} But applying good agronomic practices and conventional agricultural technologies can deliver equivalent or greater yield increases. Irrigation can increase yields 20–100%, while using inoculants and lime can increase them more than 10%.\textsuperscript{15}

• Promoting soybean or alternative crops? Given limited agricultural resources and constrained public sector management capacity and finances, any decision to accelerate the soybean sector needs to consider the net impact on other crops, especially if direct support to the soybean sector creates market-distorting incentives rather than business-enabling policies that support agroprocessing generally.

• Protecting infant industries or protecting consumers? With tariffs or import bans, or more general support of a domestic sector for substituting for imports, governments must assess a tradeoff between the potential positive effects on the industry and the negative effects on consumers and clients who would need to pay higher prices. The need to weigh these considerations with the potential dynamic development of the sector over time adds further complexity to the tradeoffs in formulating policy to protect an infant industry.

• Leveraging the expertise of key international players or developing local knowhow? Major international players—such as Archer Daniels Midland, Cargill, and Bunge—have extensive knowhow in producing, processing, marketing, and trading soybeans, and they are likely to expand into Sub-Saharan Africa over the medium term. Rapid expansion of the sector could be achieved by governments that work with such players to leverage their knowhow and access to capital and markets. But this could be at the expense of developing domestic businesses in the sector, unless deliberate strategies to promote spillovers and links between the international players and domestic businesses are promoted.

The analysis of the three crops points to many opportunities in Sub-Saharan Africa for adding value to agricultural production through processing and other measures. Representing traditional exports, nontraditional exports, and import substitution, the discussions on coffee, fruits, and soybean have identified the opportunities. The analysis has also shown that for countries to take advantage of them would require several specific initiatives from governments, in addition to improvements in the general business environment, in order to help the budding processors and commercial farmers as well as the smallholders in the region.

Many of the policy issues and initiatives identified as required for promoting the three products in fact would also facilitate processing and value addition in other agricultural products. For example, promoting the establishment of coffee hubs would require improved port logistics, deepening of financial services, and a more liberalized interregional trade. As the chapter shows, progress in these areas would also help fruit processing as well as development of soybean processing together with the associated poultry industry. Clearly, these improvements would also benefit processing and value addition in other agricultural products, and indeed those outside agriculture. Similarly, value addition in fruits and soybean requires initiatives to link processors and disbursed small farmers, including in outgrower schemes. A country that learns how to organize this effectively in one agricultural product can certainly extend the approach to other agricultural products with considerable smallholder involvement.

As a last example, the discussions of all three products raised the issues of the tradeoff between expanding the volume of exports and branding and niche exports and the tradeoff between linking up with the big multinationals for quick results and export entry and the slower but perhaps more enduring process of developing domestic firms. These are issues germane to the whole economic transformation process.

Notes
1. ACET soy study prepared for this report.
2. The discussions of coffee, fruits, and soy are drawn from agro-processing studies commissioned by ACET and conducted by Dalberg Associates. Other studies conducted by Dalberg Associates and ACET staff cover cocoa, cotton, palm oil, and sugar.
4. Based on an estimate of 160 million 60-kilogram bags—or 9.6 million tons—of coffee that could be absorbed (that is, traded) by 2020 according to the International Coffee Association and Nestlé. The Fairtrade Foundation (2012) estimates that
global consumption could reach 9.09 million tons by 2019.

5. USDA 2011.

6. At free-on-board export prices.

7. Based on an estimate of total exports of green coffee of 6.3 million tons in the 2010/11 season by the International Coffee Organization (ICO 2013) and an estimate of global Fairtrade certified coffee sold of 88,000 tons in 2010, according to the Fairtrade Foundation (2012).

8. Based on estimates of consumption demand for fruit juice in Sub-Saharan Africa of 7.1% a year over 2007–12, versus 2.7% a year for fresh fruit.


10. Based on the fact that raw mango accounts for only 4.5% of the total retail value of the product and that pulp and nectar in pouches account for 12.6% and 80% of the value, respectively. The factor-level increase in converting raw mango to pulp is calculated by dividing the share of retail value of pulp (12.6%) by the share of retail value of the raw mango (4.5%).

11. Processing volumes are estimated from FAO (2011) data by using soybean oil production data, assuming that 18% of the total volume of crushed soybean is oil.


13. As an example, based on a small 36,000 metric ton crushing facility in Rwanda, soybean meal prices were 0.9 times the cost of raw soybeans, while soybean oil was sold at 4.3 times the price of raw soybean.

14. Yield gains for herbicide-tolerant soybean versus conventional soybean have been estimated at 12.4% globally (Sexton and Zilberman 2010).


References


