



Promoting Sustainable Rural Development and Transformation in Africa



June 2015

Ghana Country Report

→ Raw products → Intermediate products → High-value products

Promoting Sustainable Rural Development & Transformation in
Africa-Ghana Country Report is a product of the African Center
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About the Study

Policy makers and development partners are keen to find interventions that are effective in improving smallholder productivity and raising the income and resilience (including food security) of smallholders. It is ACET’s view that linking the objective of increasing smallholder incomes and resilience to the broader economic transformation agenda will be mutually beneficial to agriculture and the rest of the economy, particularly the manufacturing sector (starting with agroprocessing). Such linkage is also likely to raise the profile of agriculture and engage the interest and participation of a wider segment of government and the general population, thereby increasing overall support for improvements in agriculture. This is the rationale for a grant given to ACET by the Bill and Melinda Gates Foundation (BMGF). ACET seeks, through the study of a number of national crop/livestock value chains, to help create this linkage. The poverty reduction objective of BMGF and the economic transformation objective of ACET led us to select the following value chain studies.

Crop/Livestock	Kenya	Uganda	Tanzania	Ghana	Burkina Faso
Sorghum	×	×			×
Millet	×	×			
Poultry	×			×	×
Cassava		×	×	×	
Cow	×	×	×		×
Rice			×	×	
Cotton			×		×
Cocoa				×	

The overall objective of the study is to identify, through the analyses, the policy measures, institutional reforms, and potential public investments that could: (a) help increase the productivity of traditional smallholders and improve post-production value (storage, processing, and market access—domestic or foreign) in order to increase their incomes and improve food security; (b) support the emergence of small-and medium-scale modern commercial farmers and foster linkages between them and traditional smallholders; and (c) increase agriculture’s contribution to an overall economic transformation through linkages with industry, starting with agroprocessing.

The Ghana country report is a synthesis of the four value chain studies (i.e., on poultry, cassava, rice, and cocoa) and will be the basis for convening policy forums that will bring together the finance, agriculture, and trade and industry ministries, as well as other stakeholders from the private sector and research and non-governmental sector representatives, to discuss and advocate for policy positions that can unlock the potential opportunities identified in this study. The study was sponsored by the Bill and Melinda Gates Foundation. The individual value chain studies can be downloaded from the ACET website: www.acetforafrica.org/agricultural-transformation.



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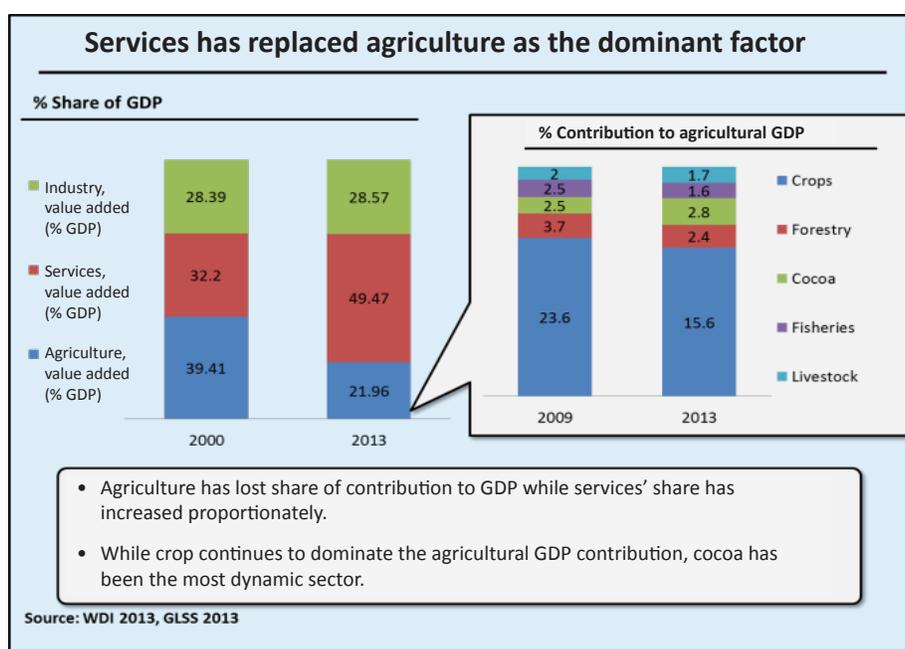


I. Background

While extractives are increasingly important to Ghana’s economy—with gold and (more recently) oil important exports—agriculture continues to be the dominant sector. The agricultural sector in Ghana employs over 71% of the rural populace,¹ and about 2.74 million households operate a farm or keep livestock. Cocoa also continues to be the leading export.

Still, the relative importance of the agricultural sector in Ghana’s GDP has been declining—from about 39% of GDP in 1980 to 39.4% in 2000 to 22% in 2013. The services sector has seen the highest growth (3%) over this period (2000–2013), followed by the industrial sector.

Figure 1.1: Comparison of Ghana’s agricultural sector to other sectors



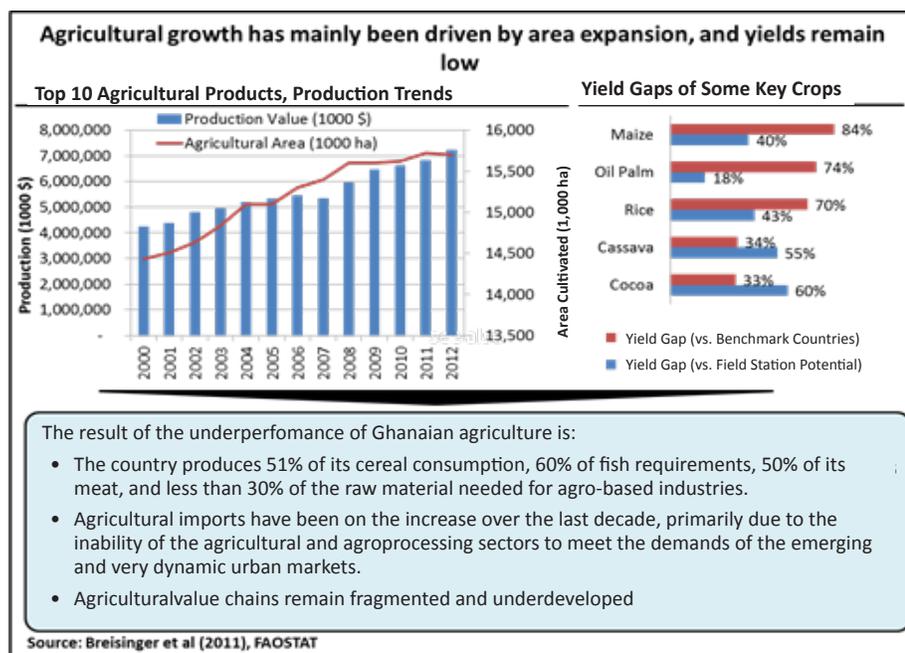
The decline of agriculture’s share of GDP does not necessarily mean it has diminished in importance. Agriculture plays a key role in powering industry through agroprocessing and increasingly in services through logistics, marketing, and distribution of agricultural goods. Indeed, as economies transform and value chains are upgraded, we expect to see agriculture continue to play a crucial role in the economy, as agroprocessing is a key pathway to transforming economies.² However, there is still much to be done before agriculture becomes the transformative engine of growth that it is capable of becoming.

¹ Ghana Living Standards Survey (GLSS) 2013.

² This is one of the findings of ACET’s 2014 African Transformation Report (ATR).

While agricultural production has shown steady growth, growing at an average of 5% annually by value over the past 10 years and reaching a gross value of about \$7 billion in 2012, the growth has mostly been due to expansion of land and the rise in commodity prices.

Figure 1.2: Ghana agricultural production trends



The sector is characterized by little use of modern technology and inputs, and, as a result, crop and animal productivity is low. As seen in figure 1.2, the yields of most crops in Ghana are significantly lower than what can be achieved using best practices. The average food crop producer is resource-poor and therefore uses little fertilizer, insecticides, high-yielding varieties, or irrigation-based cultivation.

The result of the underperformance of Ghanaian agriculture is:

- i). The country produces 51% of its potential cereal consumption, 60% of fish requirements, 50% of its meat, and less than 30% of the raw materials needed for agro-based industries.
- ii). Agricultural imports have been on the increase over the last decade, primarily due to the inability of the agricultural and agroprocessing sectors to meet the demands of the emerging and very dynamic urban markets.

All the same, the government recognizes agriculture's importance and potential for driving economic transformation. The government has put in place a number of policies to unlock the potential of its agriculture sector. To appreciate the evolution of governmental thinking, an overview of Ghana's agriculture and agro-industrial policies is given below.

Ghana Agricultural Policy Overview

Policy makers in Ghana agree that agricultural transformation and growth are of paramount importance to overall economic growth and development. According to the national development agenda, agriculture is expected to lead the structural transformation of the economy and maximize the benefits of accelerated growth.³ Various policies have been developed to help realize this vision.

In 2002, Ghana developed its first Food and Agriculture Sector Development Policy (FASDEP I), a framework for the implementation of strategies to modernize agriculture, with a focus on the private sector. This was abandoned in 2006 for FASDEP II, implemented in 2007, which aimed to address the loopholes and inefficiencies of FASDEP I and to galvanize all categories of farmers, while targeting poor and risk-prone producers. The main objective of FASDEP II was to improve food security, incomes, and sustainable management of land resources, while also increasing competitiveness and improving institutional coordination and the application of technology in agriculture.

FASDEP II is anchored by five strategic pillars, one of which is food security. To attain food security, the strategy identifies five staple crops (maize, rice, yams, cassava, and cowpea) as key to providing sufficient quantities year-round. The plan focuses on the development of two of these crops that have a comparative advantage in each agricultural zone based on their importance and availability in markets. Support will be provided in the form of inputs (irrigation, land, planting materials, etc.) to enhance productivity along the whole chain. In addition, to address the issue of declining growth in the incomes of smallholders, crops such as mango, cashew, oil palm, rubber, plantain, and citrus, as well as the raising of small ruminants (sheep and goats), poultry, and vegetables, will be promoted on the basis of the comparative and competitive advantages of agro-ecological zones and the availability of markets. This will be carried out through linkages with industry to improve productivity and contribute to poverty reduction.

The policy also looks at the potential for expanding domestic markets (including agro-industry) as incomes grow. The aim here is to enhance Ghana's comparative advantage in producing the needed volumes and quality of agricultural commodities for the international market. This may be achieved by addressing issues in the domestic markets (e.g., standardization and infrastructure); issues with agricultural exports (e.g., skills/knowledge requirements, market access/information, and a weak legal environment); and post-production issues (e.g., product development, institutional arrangements, and supply-side constraints). The government will partner with the private sector to increase investment in the sectors mentioned above and build the capacity of operators to compete in the global market.

In 2011, the government of Ghana developed a Medium-Term Agriculture Sector Investment Plan (METASIP 2011–15) as a five-year plan for agriculture development, with a vision of modernized agriculture, a transformed economy, food security, employment creation, and poverty reduction. METASIP was developed to implement medium-term programs in FASDEP II and to achieve the Comprehensive Africa Agriculture Development Program (CAADP) annual agricultural growth rate target of 6%, with a 10% allocation for agriculture expenditure in the national budget.⁴

³ *Ghana Agriculture Strategy, 2013.*

⁴ CAADP.

Policy Actions

A number of strategic actions were adopted in order to achieve the policy objectives of FASDEP II. These strategies ran in tandem with existing subsector and service sector policies, and thus were accepted as a framework for the implementation of FASDEP II.. A summary is given below.

Fertilizer Subsidy Program

Two key government responses to the food situation in 2007 were (1) the removal of import taxes on rice and edible oil and (2) the introduction of a nationwide fertilizer subsidy program (covering four types of inorganic fertilizer) in June 2008. At the time, unit fertilizer use in Ghana had declined from 21.9 kg/ha in 1978 to 8 kg/ha in 2006.⁵ The objective of the subsidy program was to forestall a further decrease in fertilizer use by restoring fertilizer prices to 2007 levels and ensuring uniformity in prices across the country. In 2008, the Ghanaian government subsidized 600,000 bags (50 kg each) of inorganic fertilizer at a cost of US\$14,067,964 (against a budgeted amount of US\$11,000,000). Under this program, farmers bought subsidized fertilizer with region-specific and fertilizer-specific coupons distributed by the Ministry of Food and Agriculture (MoFA) through its district directorates and extension officers. A study⁶ has shown that, so far, the program has caused an increase in application of fertilizers in Ghana; farmers who applied fertilizer on their farms obtained not only higher yield, which is expected, but also a positive net income compared to those farmers who did not use any. The program has also led to an increase in the volume of trade and number of private-sector actors in the market, despite the fact that the fertilizer distribution network to rural areas is still underdeveloped. The study further found that the overall future economic return of the program is positive, with an estimated benefit-cost ratio of 1.7, though this comes with high risks because costs associated with the program, over time, could easily take up a larger share of the MoFA budget (up to 35% by 2020).

National Food Buffer Stock Company (NAFCO) Program

To reduce food waste due to lack of storage, NAFCO has the mandate to mop up excess food supply and release it to the market at appropriate times to ensure a continuous food supply and stabilization of food prices. Produce is bought from farmers by Licensed Buying Companies (LBCs)⁷ at farm-gate prices, which are determined by a post-harvest committee. The main aim of these farm gate prices is to protect the Ghanaian farmer by guaranteeing a secured income. The post-harvest committee takes into consideration the production cost to the farmer plus a 10% profit margin. NAFCO currently has an operational stock of 15,000 (metric tons) of white maize and 15,000 MT of yellow maize. It also has 15,000 MT of paddy rice and 1,000 MT of soya beans. NAFCO has emergency government stock of 10,000 MT of white maize, 10,000 MT of milled rice, and 1,000 MT of soya beans.

⁵ MoFA, 2008.

⁶ This was done by Benin et al 2013.

⁷ Most farms in Ghana are located in remote areas, and it would be difficult for NAFCO to reach them all, which is the reason why NAFCO has employed the services of these LBCs. NAFCO currently has 73 LBCs. A margin is added to the farm-gate prices for the LBCs, prices. The committee takes into consideration factors like transportation, sacks for bagging, drying, sewing, and handling to come up with this margin.

Block Farms Program

The Block Farm Programs, which was launched in 2009 as a pilot in six regions of Ghana, is intended to bring in large tracts of arable land (in blocks) for the production of selected commodities in which the locations (regions and districts) have comparative advantage. The idea was to exploit economies of scale and ensure that the block farms benefited from subsidized mechanization services and inputs (fertilizers, improved seed, and pesticides) in the form of credit, as well as extension services that were delivered to the farms and farmers by MoFA. By bundling the delivery of inputs and services, it is envisaged that they are delivered on time and at a lower unit cost. Agricultural extension agents (AEAs) work closely with the farmers so that they follow recommended practices to meet yield expectations. After harvest, AEAs recover in kind the cost of the services and inputs provided by the government to the block farmers.⁸ In the 2009 pilot phase of the program, a total area of 14,186 ha was targeted for the six regions, only 11,577 ha (or 81.6%)⁹ was covered. Looking to scale up and to implement the program countrywide, a target of 150,000 ha was planned, which was perceived by the national review as overly ambitious, so the targets were revised downward. For the Northern Region, for example, an initial target of 47,400 ha was slashed to 20,688 ha, of which the region managed to achieve only 69%, focusing on rice and maize.

AMSEC Program

The Agricultural Mechanization Service Enterprise Centre (AMSEC) program is a credit facility to assist the private sector in purchasing agricultural machinery and setting up commercially viable firms in strategic locations. The facility is the government's response to the high entry barrier into the mechanization services industry as a result of high initial capital investments on farm machinery and high cost of borrowing from commercial banks. The aim of the program is to make mechanization services for farm activities available at farmers' doorsteps, with each district that has potential for mechanization having at least one AMSEC set up there. The idea is to raise the low tractor-to-farmer ratio, estimated at 1:1800, and reduce the high number of aged tractors, with an estimated average age of more than 15 years. AMSEC was piloted in 2007 with 12 centers in eight regions. A review of the program has shown that the newer type of tractors associated with the AMSEC program seems to break down more frequently than those operated by non-AMSEC agents, about 17–64% more often, due to lack of skilled operators, mechanics, and spare parts for the newer brand of tractors imported via the program. Also, poorly prepared fields with stumps have contributed greatly to most of the damage to all brands of tractors.

Ghana Value Chain Studies

Agriculture has the potential to drive transformation and make a positive impact on rural poverty. The ACET believes that linking the objective of increasing smallholder incomes and resilience with the broader economic transformation agenda will be mutually beneficial to agriculture and the rest of the economy, particularly the manufacturing sector (starting from agroprocessing). Such linkage is also likely to raise the profile of agriculture and engage the interest and participation of a wider segment of government and the population, thereby increasing support for agriculture.

⁸ Benin et al, 2013.

⁹ MoFA, 2010b.

To better understand how this can be accomplished, four value chain studies were conducted under a grant from the BMGF. Using BMGF’s poverty reduction objective and ACET’s economic transformation objective as guidance, rice, poultry, cassava, and cocoa in Ghana were selected for detailed study. These products were chosen based on their potential to address food and nutritional security and to serve as inputs to agro-industry. Table 1.1 below discusses the rationale in more detail for each product.

Table 1.1: Rationale behind product studies

Ghana	
Poultry	<ul style="list-style-type: none"> • Poultry import quantities are large and growing (fourth biggest food import) • Village poultry production is carried out by both men and women in 66% of the households in Ghana, suggesting a great impact on poverty and food security. • Potential to stimulate a vibrant animal feeds sector to support poultry, using soya and palm oil as feedstock
Cassava	<ul style="list-style-type: none"> • Second most important staple (11% share of agriculture output) • Priority crop under FASDEP II • Being evaluated as feedstock for the agroprocessing industry, including in brewing, starch production, and animal feed production.
Rice	<ul style="list-style-type: none"> • Major food import at 500,000 MT with about US\$600 million spent annually on rice imports,¹⁰ although large areas of the country are suitable for growing rice. Yields are also very low (2.2 MT/ha compared to Rwanda at 4.4 MT/ha and Egypt at 9.1 MT/ha).
Cocoa	<ul style="list-style-type: none"> • The cocoa industry contributes about 8.2% of the country’s GDP, provides the second-largest source of export earnings (about 30% of the total), generates employment and income for around one-third of all Ghanaians throughout the chain, and accounts for about 50% of the agricultural labor force in Ghana. Cocoa is thus key to poverty reduction. However, yields are only 50% of potential. • Government has an ambitious target to increase local processing. A small confectionery industry exists, with much potential for development.

¹⁰ <http://www.myjoyonline.com/news/2014/February-15th/ghana-aims-to-stop-us1b-rice-food-imports-mahama.php>

The overall objective of the studies was to identify policy measures, institutional reforms, and potential public investments that could: (a) help increase the productivity of traditional smallholders and improve post-production value (storage and processing) and market access (domestic or foreign) in order to improve smallholder incomes and food security; (b) support the emergence of small- and medium-scale modern commercial farmers and foster linkages between them and traditional smallholders; and (c) increase agriculture's contribution to overall economic transformation through linkages with industry, starting with agroprocessing.

This report is organized as follows: Sections 2 through 5 provide an overview of the four value chain studies, including the value capture opportunities for each commodity and what it will take to succeed. Section 6 is a simulation exercise to better understand the role of market structure. Section 7 is a synthesis of the implications of emerging issues for rural transformation. Section 8 proposes a way forward.



II. Ghana Rice Value Chain

Rice has become a major food security and staple crop in Ghana due to the changing taste preferences of consumers, from households to social and official functions (Osei-Asare, 2010). Annual per capita consumption of rice is growing rapidly, from 17.5 kg in 1999–2001 to 22.4 kg in 2002–2004, to 24 kg in 2010–2011 (MoFA, 2011), and rice demand is projected to grow at a compound annual growth rate of 11.8%, while maize grown only is project to 2.6% in the medium term (MiDA, 2010). Indeed, rice consumption has far surpassed domestic supply, with the deficit now covered by imports.

In response to rising demand, rice farmers in Ghana continue to receive support, but most goes to smallholder farmers. In the last decade, there have been about 21 projects for the sector funded by government and other stakeholders, aimed at empowering smallholder farmers in the rice industry. In terms of policies, the Ghanaian rice sector is promoted by the 2009 Ghana National Rice Development Strategy (G-NRDS), which is supposed to run until 2018. The strategy aims to contribute to national food security, increased income, and reduced poverty. The objectives of the NRDS include:

- Increasing domestic production by 10% annually using gender-sensitive and productivity-enhancing innovations for smallholders, commercial rice producers, and entrepreneurs along the value chain;
- Promoting consumption of local rice through quality improvement by targeting both domestic and sub-regional markets;
- Enhancing capacity of stakeholders to utilize rice byproducts, thus contributing to sound environmental management practices;
- Promoting dialogue among rice stakeholders within the value chain in amove towards building efficient information sharing and linkages.

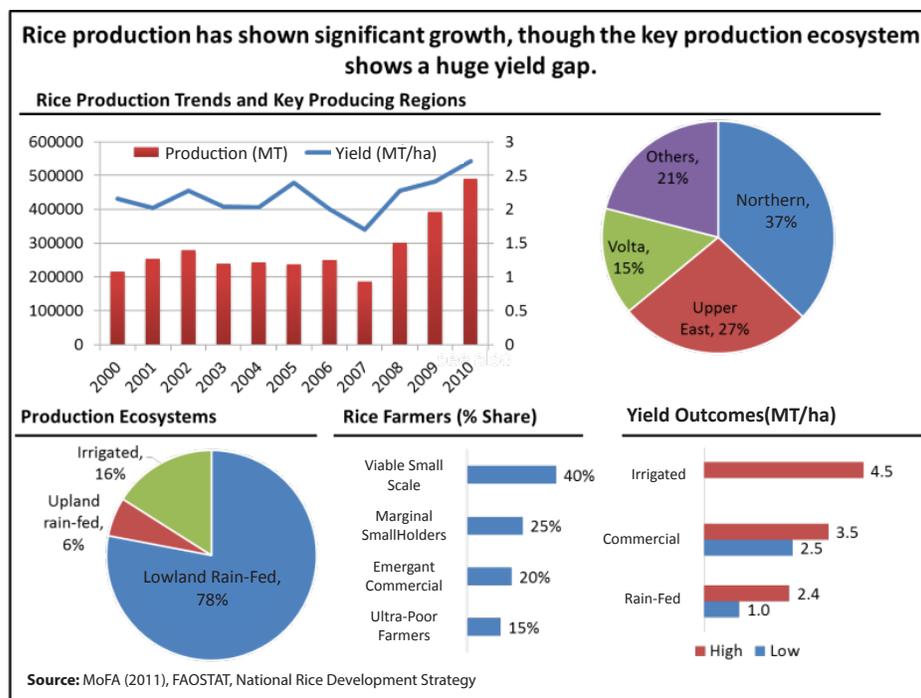
The sector has also received massive protection from the government with the imposition of nearly 40% import levies and other taxes on the value of rice imports.

Production

Total rice production is estimated to be 492,000 MT of paddy (MoFA, 2010). Rice is cultivated in Ghana as a food crop and a cash crop in three different ecological zones: the lowland rain-fed ecosystem (accounting for 78% of production), which includes rice planted in the receding waters of the Volta River and other rivers; the upland rain-fed ecosystem (6%); and the irrigated ecosystem (16%). The Northern Region accounts for 37% of production, the Upper East accounts for 27%, and Volta Region for 15% of the total, with about 20% coming from the other seven regions.

Figure 2.1 shows the production trends for 2000–2010. The rice production area was fairly stable at between 0.09 and 0.16 million ha while yields fluctuated between 1.7 and 2.7 MT per ha. However, it appears that rice production has been on the increase, with 2010 production at more than double 2007 levels (from 185,300 MT in 2007 to 491,600 MT in 2010) and with average annual growth of more than 15% over the period 2005–2010, despite the production drop experienced in 2007.

Figure 2.1: Main production figures for rice in Ghana (2000–2010)



Reasons for this increase could be attributed to many programs, including the 2008 fertilizer subsidy program and the Block Farms program of 2009, which are also contemplated in the Ghana rice strategy (Benin et al, 2011). Improved farm management and adoption of improved seeds have also been identified as drivers of rice yield improvement in Ghana (Ragasa et al, 2013)

As with other crops, most rice production in Ghana is done by smallholder farmers on farms of less than one hectare in size. The distribution of rice farmers is presented in Table 2.1, It stipulates that the majority of rice farmers in Ghana are viable smallholders. Emergent commercial rice growers constitute 20% of rice farmers and are described as growing rice as a cash crop, having a market orientation, and using hybrid seeds and fertilizers and/or hired labor for their activities.

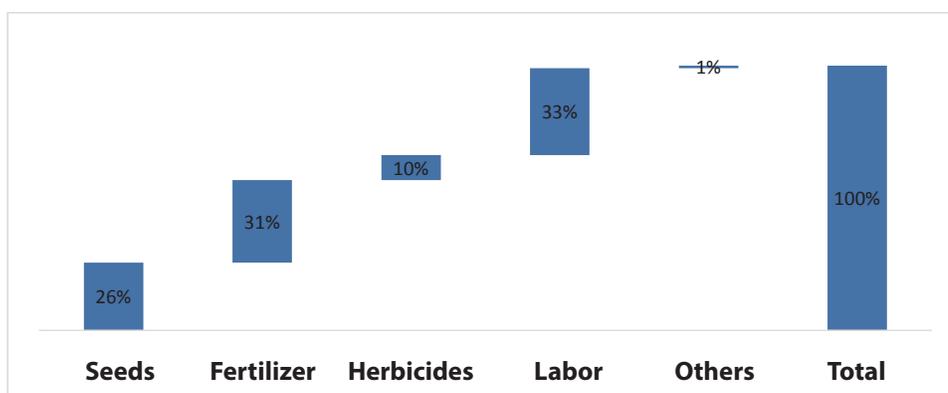
Table 2.1: Profile of Rice Farmers in Ghana

Type	Description	Percent
Ultra-Poor Rice Growers	Subsistence; often female-headed or elderly-headed households. Face labor constraints; have no resources to fall on in event of external shocks.	15%
Marginal Rice Smallholders	Could produce a small marketable surplus; may have some resources on which to fall (i.e., greater physical strength, better health, more land, small savings, etc.). Significant proportion of adult household members may migrate during off-season.	25%
Viable Small-Scale Rice Growers	Poor but potentially viable small-scale farmers. Not necessarily factor-constrained (have land and/or labor). Often have assets that are used inefficiently because of lack of access to markets, poor infrastructure, or weather-related risks. Limited access to technologies. Willingness to take some risks.	40%
Emergent Commercial Rice Growers	Grow rice mainly as cash crop; market orientation; could own small equipment like tractors; use hybrid seed and fertilizer; a few have irrigation; have household labor with some hired labor.	20%

Source: National Rice Development Strategy (2009)

As can be seen, yields show significant variation across farmer types and also across production ecosystems. More importantly even among the rain fed system yields may vary by 114%. Part of this variation can be attributed to weather; however, farming system is also a key driver of productivity. As orientation moves towards commercial farming, productivity goes up.

Figure 2.2: Rice production cost structure



Rice Production Cost Structure

Inputs—in particular seeds and fertilizers—are the key costs. Labor, especially for weeding, is also an important cost. The labor cost comes mainly from application of herbicides, while manual weeding cost is just a small fraction. Incidentally, harvesting is a small part of the cost, yet this is where most of the value of local rice is lost through manual harvesting methods.

Commercial Rice Farming

Large-scale commercial cultivation of rice is undertaken by a few private firms, who undertake farming mainly to feed their rice mills. These private firms (AVNASH, GADCO, Prairie Volta, Brazil Agro Investment) also engage the services of out growers farmer. Government also undertakes large-scale commercial rice farming through established institutions such as the Irrigation Company of Upper Region (ICOUR).

Commercial rice farmers are relatively more efficient and are said to produce double the output of non-commercial rice farmers in Ghana. Outputs of commercial rice farmers range between 2.5–3.5 MT/ha, compared to 1.4–1.8 MT/ha from other farmers. Yield differences are attributed to a combination of factors, most notably the ability and willingness to adopt improved technologies and production methods. Technology adoption may be precluded for smallholders by a number of factors, which have been extensively studied in the literature.

Commercial rice farmers are targeted by government policies. The Ghana Commercial Agricultural Project (GCAP) is one of several such agricultural packages that aim to strengthen investment promotion and infrastructure and facilitate secured access to land. The project also seeks to secure partnerships and smallholder linkages. Linkages by commercial farms to smaller farms are mostly in the form of outgrower schemes run by the commercial players. Under such conditions, the commercial players extend some incentives to the smallerholders in the form of improved seeds.

Constraints to Rice Production

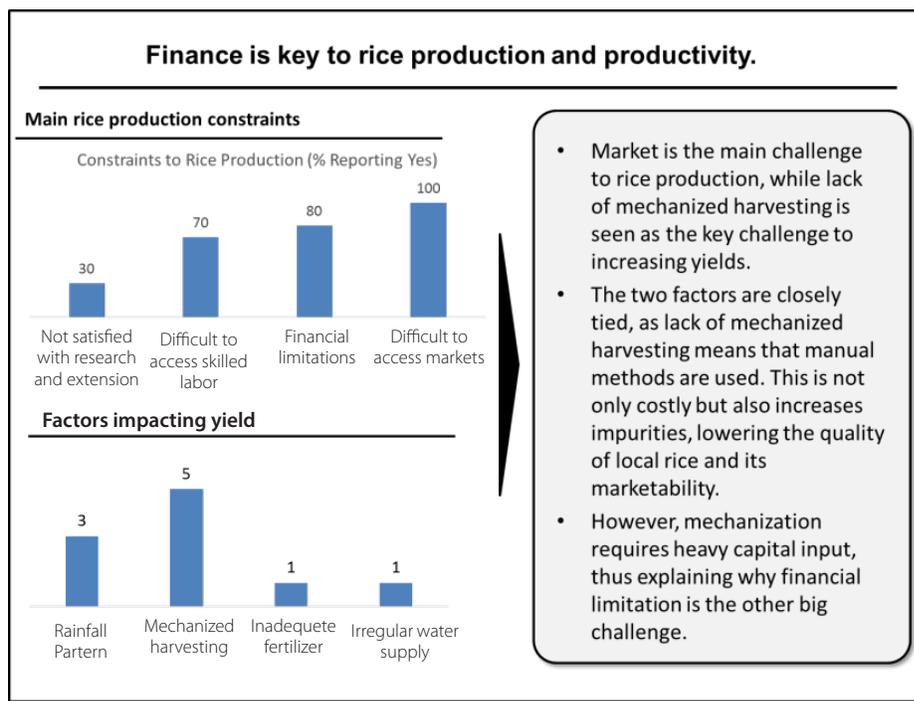
In general, productivity and efficiency levels remain low. Gaps between achievable yields (under best farmer practices) and actual yields are 42% (MoFA, 2010). The results from our field study found a gap of 57% between the means of actual and potential yield.

Figure 2.3 shows the main constraints to rice production experienced by farmers surveyed. Access to markets and financial limitations were reported as the most pressing constraints. Labor also came up as an important constraint.

Of the factors affecting productivity (yields), lack of mechanization came out on top. Unavailability of machines for mechanized harvesting is the major challenge, accounting for the high differences in output levels between smallholders and commercial rice farmers. This was followed by rainfall pattern. Inadequate fertilizers and water supply were found to have minimal impact on actual output.

Lack of mechanization is closely tied to labor and market challenges. Lack of mechanization means use of labor-intensive methods, especially threshing, which introduce impurities and lower the marketability of local rice.

Figure 2.3: Constraints to rice production and productivity



Source: Field survey, 2014

Quality

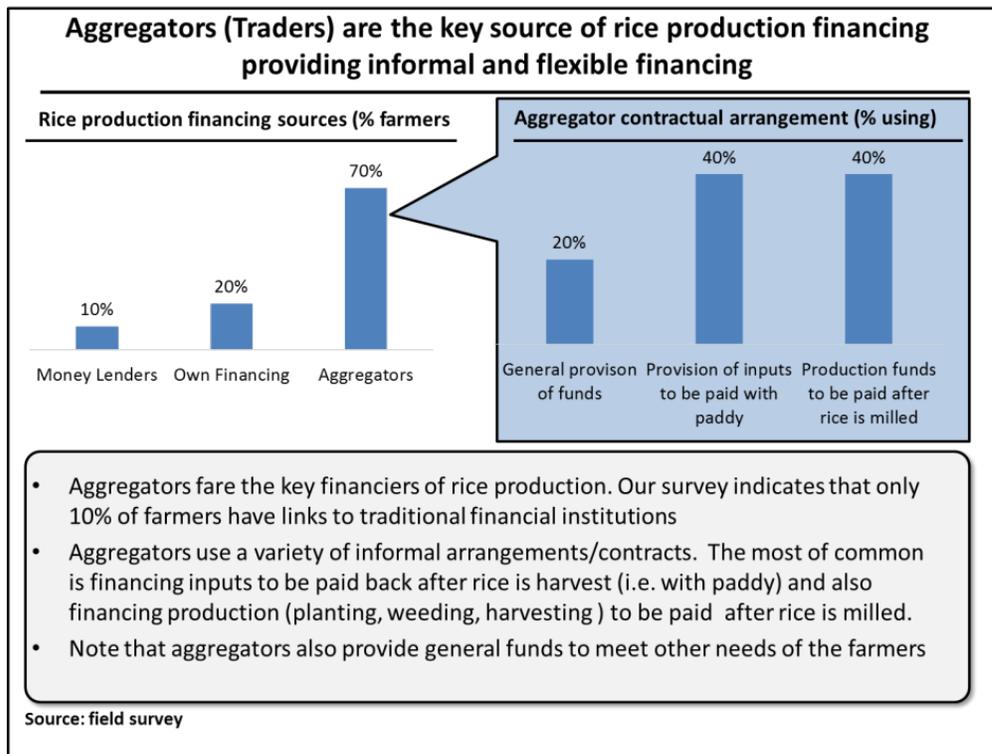
Marketing is the biggest challenge for rice producers in Ghana, largely due to the low quality of local rice. Most of the rice is cultivated from impure seeds, with mixed varieties, which brings about uneven maturity at harvest and wide variations in the size and shape of rice grains. Paddy is sun-dried on mats and concrete floors for processing, negatively affecting the quality of the end product. Generally, this results in a significant gap between the quality of local and imported rice.

There are in-country quality variations as well. In the Tamale metropolitan area of the Northern Region of Ghana, the whole stem is cut and is only roughly separated from the grain when most paddy is harvested. The processed rice is brown in color, with many dirt particles. In Bolgatanga, in the Upper East Region, however, the panicle is severed directly, and much less extraneous matter gets into the processed product. The resulting rice is white and can sometimes pass as imported (Winrock International, 2011). Diffusing practices used in Bolgatanga into other rice-growing areas can have tremendous impact.

Finance

Finance is a major challenge for rice farmers. Interestingly, the biggest source of financing comes from aggregators, who pre-finance close to 70% of the farmers. Aggregators are the de facto financiers of rice farming in Ghana. Only 10% of farmers reported having links to traditional financial institutions. As one can see from Figure 2.4, aggregators provide informal and flexible financing, allowing farmers to pay with produce if need be.

Figure 2.4: Aggregators and rice production



Source: Field survey, 2014

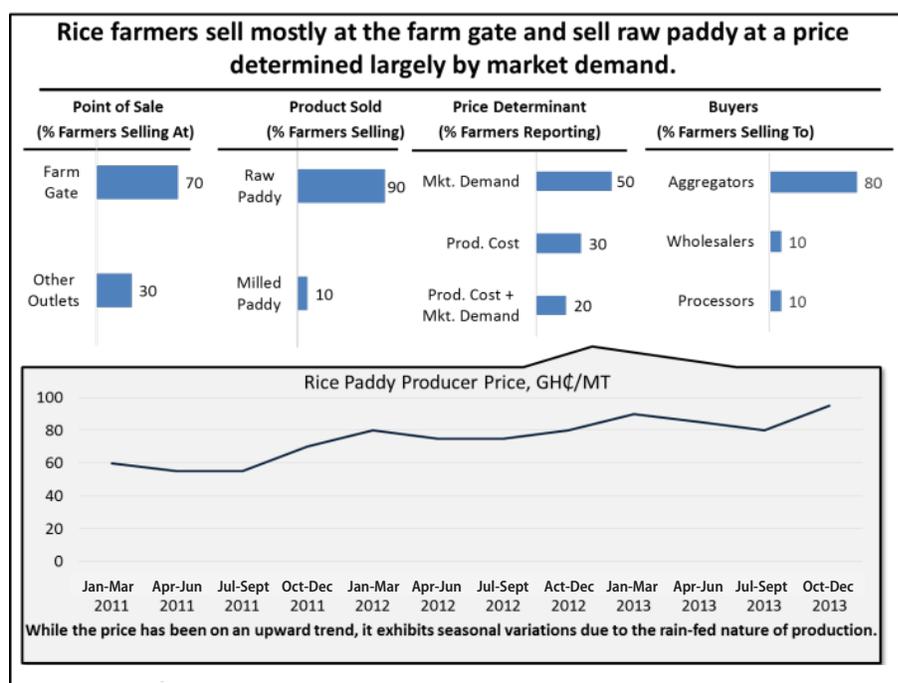
Inputs

Our survey revealed that most of the farmers have direct links to input markets. One hundred percent of farmers have access to improved seeds for paddy rice production, while 80% of farmers have access to fertilizer and herbicides. Since 2008, the government of Ghana has provided fertilizer and seed subsidies, including for the high-yielding NERIC improved seed, to rice farmers in its bid to promote the local industry. This is done mostly through MoFA; other outgrower schemes target small-scale farmers to increase and improve their yields. The program initially operated a 50% subsidized voucher system that targeted small farmers only, but it was changed in 2010 to a waybill system, where in the subsidy is applied at port of entry and accessible to all classes of farmers who can afford the subsidized price—about 64% of the retail market price (Benin et al, 2011).

From Farm to Market: Rice Trading

As Figure 2.5 shows, rice paddy is usually sold at farm-gate markets to aggregators for further milling and sale. As indicated earlier, there exists a strong relationship between aggregators and farmers. Aggregators are the dominant buyers of rice from farmers, based on strong informal contractual agreements. Indeed, 80% of paddy rice producers sell to aggregators, who in turn finance their production. This intimate relationship may perhaps explain the fact that, for half of the farmers, cost of production is the key factor in determining the sale price, as opposed to a pure market transaction, where market forces would be the key determinant.

Figure 2.5: Rice trading



Source: Field survey, 2014

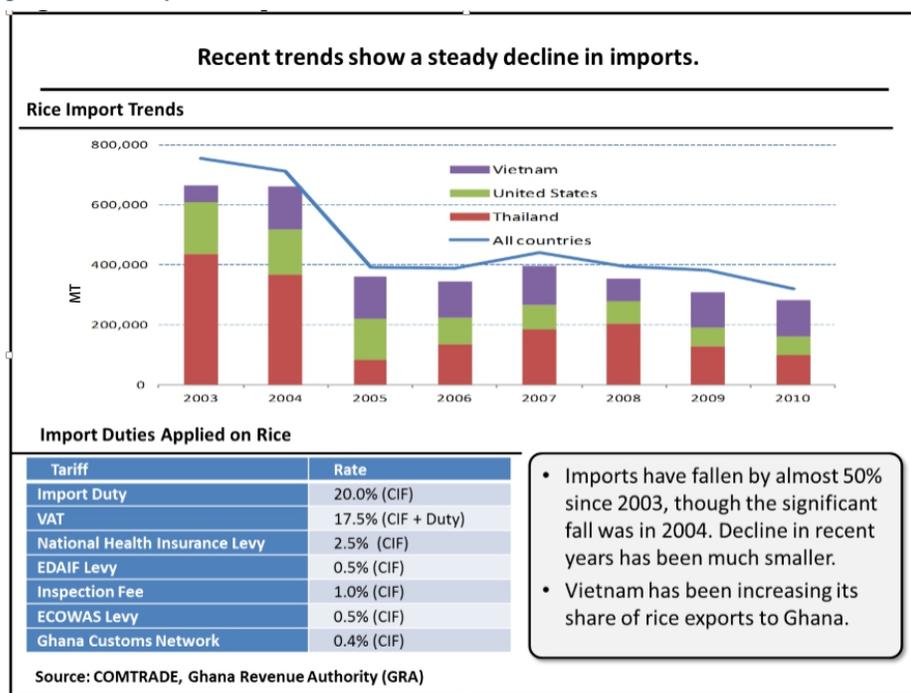
However, some have argued that since market women/aggregators usually offer access to capital and credit for input purchases as well as transportation for farmers, this gives them unfair competitive advantage and creates an oligopolistic system that constrains the market and limits innovation (ODI, 2003).¹² Due to this power, market women often determine and dictate the price of produce and measurement of rice. Paddy rice is sold in sacks of 85 kg in Ghana, and the absence of standard measurements means that market women sometimes take advantage of the fragmented system and bring larger sacks than the standard 85 kg to collect the paddy from farmers at harvest time (ODI, 2003). This disproportionately works to the disadvantage and detriment of producers, who are usually less-educated small-scale farmers.

¹² Further discussion on this will be given at the end of the document.

Imports

Though volume has dropped from about 750,000 MT in 2003 to almost half of that, rice imports are significant. However, rising commodity prices mean that the importation bill has remained high. Ghana currently spends about US\$600 million annually on total rice imports.¹³

Figure 2.6: Rice imports into Ghana



Rice importation is driven by urban dwellers and the middle class. This category of the population prefers imported rice to local rice as a result of the perceived poor quality of local rice.

Rice importers tend to purchase on the international commodity market, but may also deal directly with mills in the major rice-exporting countries. A large number of smaller importers bring in rice one shipping container load at a time, as the opportunity arises. An importer, however, needs a permit from the Ghana Food and Drugs authority to clear the rice from the ports. Imported rice is also subject to duties and levies. This has risen to 40% of the CIF value.

Processing

It is estimated that 30% of locally produced paddy is milled by five large millers, and the remaining 68% by a large number of small-scale millers (with less than 0.5 MT per hour capacity) scattered around the country, with a high concentration in the three northernmost regions.

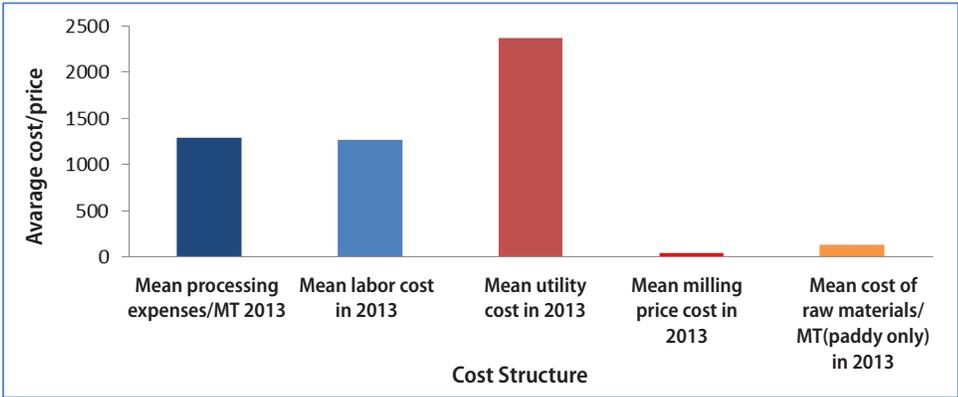
¹³ <http://www.myjoyonline.com/news/2014/February-15th/ghana-aims-to-stop-us1b-rice-food-imports-mahama.php>

The exact number of small rice mills operating in Ghana is not known. These small-scale millers lack standardized techniques and equipment, and processing thus varies from one mill to another. Most are also unable to destone or grade. Most mills operate as a service and do not buy or sell rice. In general, the milling out-turn ratio of non-parboiled rice is about 50–60%, whereas that of parboiled paddy is about 70% (Apori, 2009). The service fee makes no distinction for quality of output. However, these service millers provide additional services beyond milling. These include selling rice on behalf of farmers and paddy traders, rice storage services, provision of loans, and credit services.

There are only two modern milling facilities: the Prairie Volta facility at Aveyime (10 MT/hour) and Gadco Rice Mill at Fiave (6 MT/hour) in the Volta Region of Ghana, where the bulk of high-value rice produced in the south is processed. The largest mill in the northern part of the country is at Nasia, with a capacity of 4 MT/hour. However, this mill is very old as it was installed in 1977.

The bigger mills remain underutilized due to lack of sufficient supply. Further, the high cost of power makes them high-cost operations. As the cost structure of a rice processing mill shows, the utility cost is almost double that of the second biggest cost (labor).

Figure 2.7: Rice processing cost structure



Source: Field Survey, 2014

From Processor to Markets

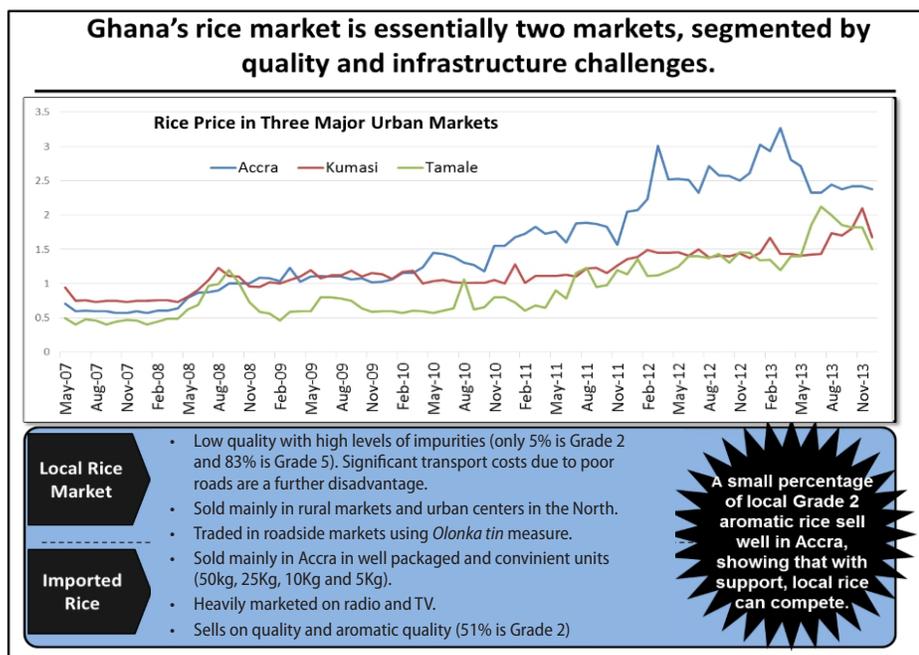
Local rice is usually sold through a fragmented chain that includes aggregators, traders, retailers, and wholesalers. Some farmers also sell directly to consumers. Imported rice, however, can be sold to wholesalers, retailers, or directly to consumers, even though middlemen are often used to link wholesalers to consumers (Angelucci et al, 2013).

There are essentially two rice markets in Ghana, imported rice and one for local rice. The highlights of the two products are described below.

- Grade 1 rice accounts for about 6% of total imports, while Grade 2 rice accounts for about 51% of total imports. Aromatic rice in particular is increasingly popular and now accounts for 81% of overall rice imports. In fact, consumers are willing to pay a price premium of 113% for imported Thai rice over premium local rice (Rogers, 2012).
- There is no Grade 1 rice produced in Ghana, while grade 2 rice represents only 4% of total production. Most of the domestic production (83%) is Grade 5 rice (USAID, 2009).

Transportation plays a major role in market accessibility and segmentation. Often, local rice producers find themselves in areas with poor road networks, and this affects pricing and easy access to the market. In contrast, importers are usually located in the cities with improved road networks, which reduces the cost of transport. Further, poor internal infrastructure means that the cost of importation by sea to Accra is lower than the cost of transporting rice from the key northern producing areas in Ghana. In essence, poor infrastructure further segments the markets for local rice and imported rice beyond the quality issues mentioned. This is confirmed by data on retail prices, which show that prices are consistently high in Accra compared to Tamale.

Figure 2.8: Ghana consumer rice markets



Source: GIEWS Online; Field study, 2014

There is, however, a small percentage of locally produced improved aromatic rice sold in Accra and Kumasi that competes with imported rice. This rice is Grade 2 rice and represents about 4% of Ghanaian rice production (USAID, 2009). This is a testimony to the idea that with the right support and marketing, local rice can meet the demand of urban markets.

Packaging, Pricing, and Marketing

The imported rice distribution market is highly consolidated, with major rice importers such as Finatrade and OLAM dominating distribution channels. Finatrade has a market share of about 35%, followed by OLAM and Stallion with 25% and 10%, respectively.

Imported rice is packaged in smaller packs of 50 kg, 25 kg, 10 kg, and 5 kg bags and sold to retailers and consumers. These bags are usually handy, attractive, and appealing. Wholesale pricing of a bag of rice depends on the grade. There is also significant differentiation within the import market. The price for a 50 kg bag of rice, depending on the grade (from Grade 1 to 70% broken), was as follows:

- US rice ranges between GH¢80 and GH¢100;
- Thai rice ranges between GH¢120 and GH¢150; and
- Chinese rice range between GH¢60 and GH¢70.

Margins along the chain are not large, with a maximum of 2–3% at the retail stage. Marketing of imported rice (in particular rice from the US) is done through television, radio, and print media advertisements all over the country (ODI, 2003).

The Gender Dimension in Rice Production

The data from the field survey revealed that, from rice production to rice marketing, the ratio of females to males is 59:100. This implies that there are almost twice as many men as women in the rice industry. As evident from Figure 2.9 below, 90% of producers and retailers surveyed, and approximately 93% of processors and 86% of wholesalers, were males. The extremely high number of men in the rice industry can be partly attributed to the intensive use of productive inputs such as fertilizer, land, labor, credit, extension training, and education rather than into differences in efficiency or management styles of men and women.

Figure 2.10: Gender of respondents



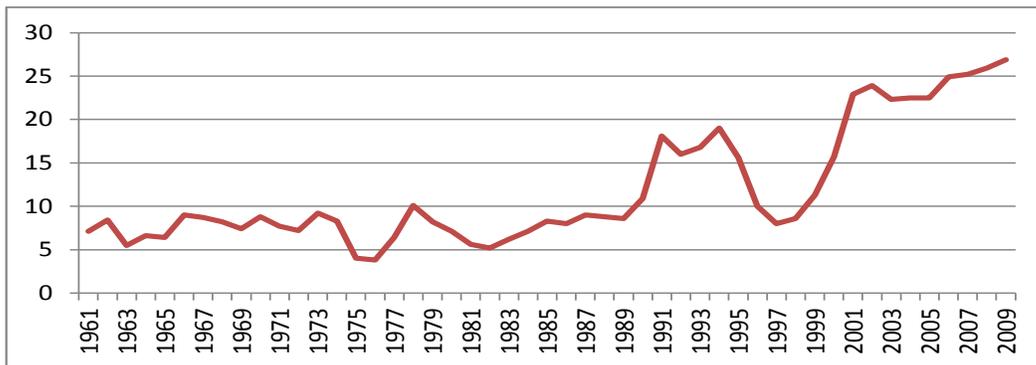
Source: Author's construct (2014)

The difficulty for female farmers in accessing cash and/or credit to acquire modern yield-increasing inputs of production, as well as processing equipment, contributes to lower production and leads to more of their crops being consumed within the family (Gladwin, 2002). The processing of paddy by first parboiling is a female dominated activity due to a kitchenette nature of processing that does not require significant capital investment. Note that women also dominate roadside trading, which requires few resources. The limited role of women in some parts of the value chain reinforces the need for greater advocacy and integration of gender issues into the rice value chain channel.

Value Capture Opportunities

Growing trends in rice consumption are not limited to Ghana, as similar trends are seen in other West African countries. The region as a whole imports up to 40% of its rice supply. The annual rice demand in Ghana stands at about 600,000 MT and is expected to increase to about 1,700,000 MT by this year, with the growing middle class the main driver of this forecasted growth. This is a significant opportunity for local rice producers.

Figure 2.10: Rice consumption in Ghana, Kg/capita/year

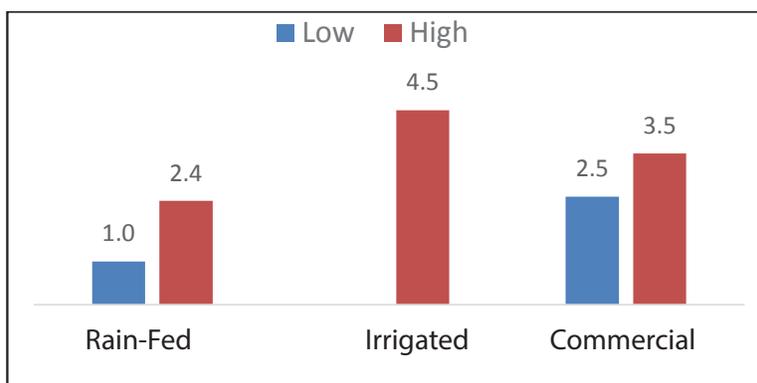


Source: FAOSTAT Online

Improving Yields

Figure 2.11 shows potential yields across various rice production systems. There are clear opportunities for raising yields even under the smallholder rain-fed system, where variation between low and high recorded yields is more than 100%.

Figure 2.11: Rice yields by production system, MT/ha



While some of this variation is climatic (rainfall variation), significant variation can be attributed to husbandry and use of poor varieties. A performed simulation indicates that a 1% increase in uptake of improved varieties can increase yields 0.42%. Thus, efforts to increase uptake of improved varieties can have significant payoff. Further yield improvement can be derived from movement towards more commercial rice production. Irrigation has the potential to quadruple yields.

However, all these options have their own challenges. Increasing uptake of improved varieties may seem straightforward, but usually it is not. NERICA rice, a breakthrough technology, has yet to see significant uptake in Ghana. Innovation in adapting new technologies is needed. Lessons from Benin on the success of adoption of NERICA may provide insights moving forward.

Scientists from the Africa Rice Center managed to cross-breed African rice with Asian rice varieties to produce an interspecific cultivar called NERICA (New Rice for Africa), which can yield 3–4 MT/ha at a maturity of 100 days. The government of Ghana has tried to promote adoption of NERICA. It is estimated that at the end of the NERICA rice adoption project, which lasted from 2005 to 2010, about 1.1% of total paddy in harvested areas had been cultivated using the NERICA breed. There is thus still some way to go before adoption is widespread. Here are some lessons from Benin, where the uptake of NERICA has been rapid:

- The critical role traders can play in diffusing new technologies. In Benin, highly motivated traders were critical in educating farmers about the new variety and distributing the seed. The farmers had trust in the traders and were sure of the market for the rice, since the trader had made guarantees about it. The presence of a trusted intermediary who was well versed in the market was key in reducing risk perception among the new adopters.

- A series of farmer-to-farmer videos was instrumental in diffusing the new rice. The video “Cashing in with Parboiled Rice” was developed in collaboration with female rice processors. The video reached three times more women than the conventional training workshops. The public video screenings also helped overcome the common male-oriented bias of development interventions in many rural settings; women farmers were no longer restricted by social norms about communicating with men outside their families. Another advantage of the video was that it reduced the negativity sometimes associated with information ownership, since the entire village community received information at the same time. The impact of the video was tremendous:
 - Women who watched the video enhanced their creativity and adapted the learning to their environment by developing appropriate technologies. They improved their rice parboiling, leading to better-quality rice.
 - As well as triggering local NGOs to improve their training methodology, the farmer-to-farmer video also strengthened NGO relations with rural communities and relationships between the women rice processors and input and output markets.
 - As the women gained experience and built confidence, they began to sell their services in parboiling to NGOs and traders, who started to promote their parboiled rice in urban areas.
 - Responding to women’s requests after the video show, NGO facilitators helped women strengthen their marketing capacities (processing, packaging, labeling, and commercialization). Local NGOs also started facilitating women’s access to microfinance institutions and to informal credit providers, who proved more responsive due to the trust being created.
 - Rice producers who attended screenings became more willing to sell rice to women on credit.

The overall impact has been huge. In Benin, female adopters have a production surplus of 850 kg of paddy per hectare, compared to 517 kg of paddy per hectare for men.

Source: West Africa Trends Newsletter, Issue 5, 2012. See www.acetforafrica.org

Moving farmers towards commercial orientation will mostly involve developing new farmers with the resources needed to invest in commercial farming and instances of developing contract farming. Existing commercial farmers already face challenges with contract farming due to farmers reneging on contracts. Again, innovations are needed to ensure that contracts are honored, and the solutions are probably within. As we have seen, aggregators finance farmers through informal contracts and are able to enforce them. Perhaps it is these aggregators who should be supported to integrate backwards, develop nucleus farms, and further expand the informal contract models they already have to more formal models.

Irrigation is costly, so it can be only a longer-term strategy. Already the government of Ghana, with the support of development partners, is developing rice irrigation projects. Indeed, the government has set up the Irrigation Company of Upper Region to spearhead irrigation efforts in the north, and the Irrigation Development Authority has over 22 projects, which means that the focus should now be on helping existing projects work.

Rethinking the contract farming approach

Over the years, a number of large-scale millers have been introduced in Ghana. Their business model consists of linking up with smallholder farmers by ways of contract farming. However, current experience suggests that, under this model, farmers have been shirking their contract promises, and this is affecting the expected capacity. From the farmers' perspective, they would rather engage with a miller that they know, one with whom they have built a relationship. This situation casts doubts about the large-scale miller model and suggests that these large millers should rather engage aggregators, who already have a strong trust relationship, to be intermediaries between them and farmers.

Financing

Our analysis indicates that the key bottleneck in production is financing, and this could well be the reason why uptake of improved varieties is low, as improved varieties demand higher levels of inputs. Therefore, efforts at finding innovative financing solutions for farmers could be the low-hanging fruit. Again, here the solution may already be at hand. Farmers rely on aggregators for financing, and since aggregators already have a good idea of the creditworthiness of various farmers and have mechanisms for channeling farmers' finances, perhaps they, rather than agricultural banks or microfinance institutions, can solve the challenges of financing farmers.

Quality Opportunity

Quality is a fairly addressable opportunity in the rice value chain. Some simple measures will not only reduce losses but will also increase the marketability of Ghana's rice. Quality requires that farmers plant a single variety so that the rice all matures at the same time. Currently farmers plant a mix of varieties, which means the rice is harvested at different levels of maturity. This means more broken rice during milling and a negative impact on taste. This is further compounded by manual threshing and winnowing, which introduce impurities. Old rice milling and processing machines further deteriorate the quality of rice.

Improving quality will require a multi-pronged approach. At the farm level, farmers must be educated about consistency in varieties planted. Also, farmers need easy access to threshing equipment, and processors, improved processing equipment, including packaging. Some approaches are listed below:

- Access to farm-level equipment can be facilitated through the establishment of youth groups that can be equipped to provide harvesting and threshing services. Some of the subsidies given to farmers can be diverted to support these types of groups.
- Since aggregators buy rice for further processing, they need to be able to access modern machinery rather than the old service mills that dominate the landscape. Upgrading the mills is a highly capital-intensive operation and may require innovative financing. One way would be for government and development partners to establish mills and organize aggregators into groups that can run the mills for a fee (perhaps with the option to buy the mill later).
- The fact that there is a Ghanaian aromatic rice of good grade competing in the Accra market means that a platform upon which to build has been established. The producers of this rice need to be given extra support to help diffuse their knowhow and expand production. Similarly, the harvesting methods used by farmers in Bolgatanga that produce higher-quality rice should be promoted in other rice-growing regions.
- Quality also means developing standards. Standards help to lower risk, increase credibility and trust, and facilitate predictability for buyers and sellers. They also create a good image for companies, associations, and individuals and provide an element of certainty in exchange (Casella, 2001). The criteria for standardization in the rice industry should include moisture content, foreign material, defective, seeds, and discolored (damaged) grains. This will encourage better threshing and drying, and improve storage facilities to meet the required standard.
- Quality will also require the setting up of a payment system that pays for quality. Currently farmers are not paid on quality, and millers charge the same service fee irrespective of the quality of the output of their machines. Supporting the emergence of a bigger player that can combine buying, milling, and marketing paddy can encourage the use of quality as a criteria on, the seller can capture the benefits of improving quality. Again, the model of supporting aggregators in owning mills and distributing can enhance quality.

Marketing

Rebranding Local Rice as Nutritious

Given the rise of the health-conscious middle-class consumers group, Ghana's brown rice and parboiled rice can be promoted as nutritional foods and sold at a premium to these urban consumers. This will require good attention to quality and packaging. This is likely to be a very small, niche opportunity, and the group of farmers already producing high-quality rice, which competes with imported products, should be supported to exploit this niche with help in branding and packaging.

Structured Markets

Markets for local rice can also be developed with more aggressive marketing to institutions. A good starting point would be for the school feeding program and government-assisted secondary schools to purchase all their rice from local producers. That would mean a ready market for local rice and would help schoolchildren acquire a taste for local rice.

Policy Recommendations

The current policy framework under FASDEP II and METASIP provides a good starting point for further refining Ghana's rice policies. Most of the value capture opportunity can be addressed under the existing policy.

What this study has brought into sharper focus is the critical role that aggregators can play in upgrading the rice value chain. They already play a critical role today, yet policies seem silent on the aggregators role in rice sector development. A policy that helps re-orient the sector so that it can tap into this dynamic group would include the creation of a fund that can help to upgrade aggregators to processors and "downgrade" to become medium-scale farmers that can subcontract. Aggregators can also play a critical role in diffusing new varieties and encouraging their adoption. The government extension service can be extended to include aggregators, who can be the first line of support backstopped by professional extension officers.

Producers already producing high quality rice need support to develop niche markets. Subsidies for fertilizers can be redirected to support marketing. The government should set aside funds to help in a launching campaign to market premium rice, which includes the possibility of exporting it¹⁴.

A quality enhancement fund can also fund capacity building and help farmers access more modern tools and equipment say by financing the setting up of Youth Agricultural Services Provider groups. This fund can be financed by levying taxes on imported rice.



III. Ghana Poultry Value Chain

The Ministry of Food and Agriculture estimates that the poultry industry contributed 7.1% to Ghana's agricultural GDP in 2011 (MoFA, 2011). However, Ghana's poultry industry has experienced massive decline during the last two decades. This is despite deliberate government policy to improve both local and commercial poultry production.

At the same time, chicken consumption has risen rapidly. Poultry meat is now an important part of the Ghanaian diet. TechnoServe (2011) estimated that Ghana's chicken consumption grew at an annual rate of 12.6% between 1997 and 2011, from 21 million MT to 110 million MT. However, only 42% of domestic consumption is supplied by domestic production, well below the West African average of 86%.

The domestic poultry sector remains largely uncompetitive against imports; rising demand has been met by rising imports. Imported poultry products tend to be 30–40% cheaper than locally produced chicken. This is due primarily to the high cost of production (e.g., feed and drugs), inefficient production methods, limited knowledge of modern poultry management, and lack of processing facilities.

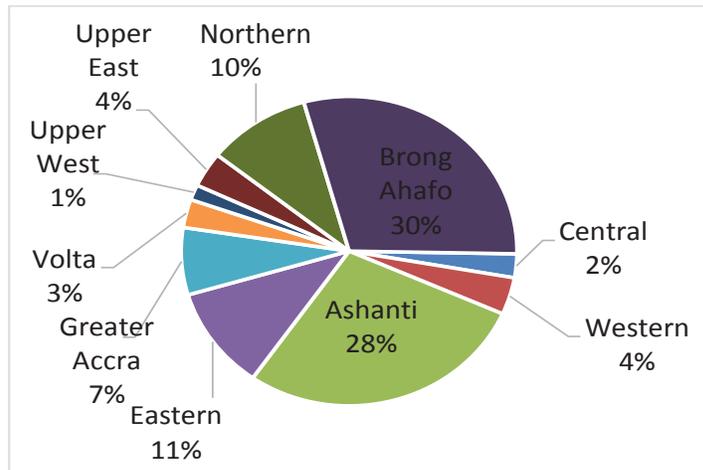
The government of Ghana has taken some action to help the sector. Two notable actions include:

- The Animal Production Department (APD) of MoFA currently runs a cockerel program, in which improved cockerels are supplied to selected beneficiary farmers at a subsidized price. Since 2009, 100,000 cockerels have been reared and 86,042 have been distributed to 5,620 farmers in 114 districts in seven regions of the country at a 25% subsidy rate.
- The Veterinary Services Directorate (VSD) of MoFA also currently runs a vaccination program targeted at village poultry production. This project, known as the I-2 Vaccination Program, commenced in 2012. The village poultry are vaccinated against Newcastle disease, a major problem facing farmers in village poultry production. The program aims to improve poultry survival rates at the village level, inadvertently enhancing food security.

Production Trends

According to the VSD of MoFA, Ghana has about 36 million birds. The largest number of poultry flocks belong to the Brong-Ahafo Region, which accounted for 30% of the total poultry population of Ghana.

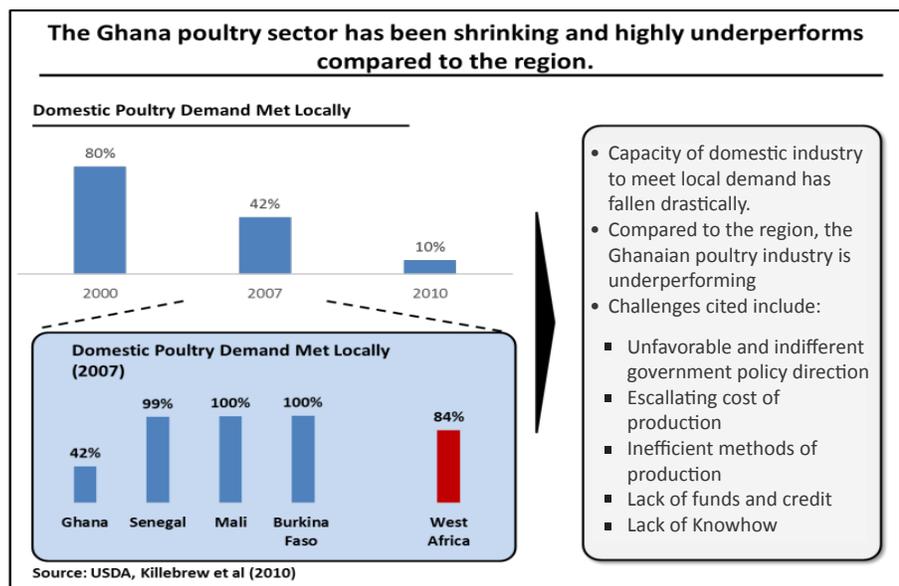
Figure 3.1: Share of Poultry Production



Source: Veterinary Services Directorate, 2010

Trends indicate a steady decline in the poultry industry during the last decade. USDA (2011) reports that broiler production in Ghana dropped from 80% of the market supply in 2000 to only 10% in 2010. Compared to the rest of the region, the sector has performed poorly in Ghana. The percentage of domestic poultry consumption supplied by domestic production was 41.7% in Ghana in 2007 versus 99.9% for Burkina Faso, 99.7% for Mali, and 98.6% for Senegal; that is also significantly below West Africa's average of 86.3% (Killebrew et al, 2010).

Figure 3.2: Ghana poultry production trends

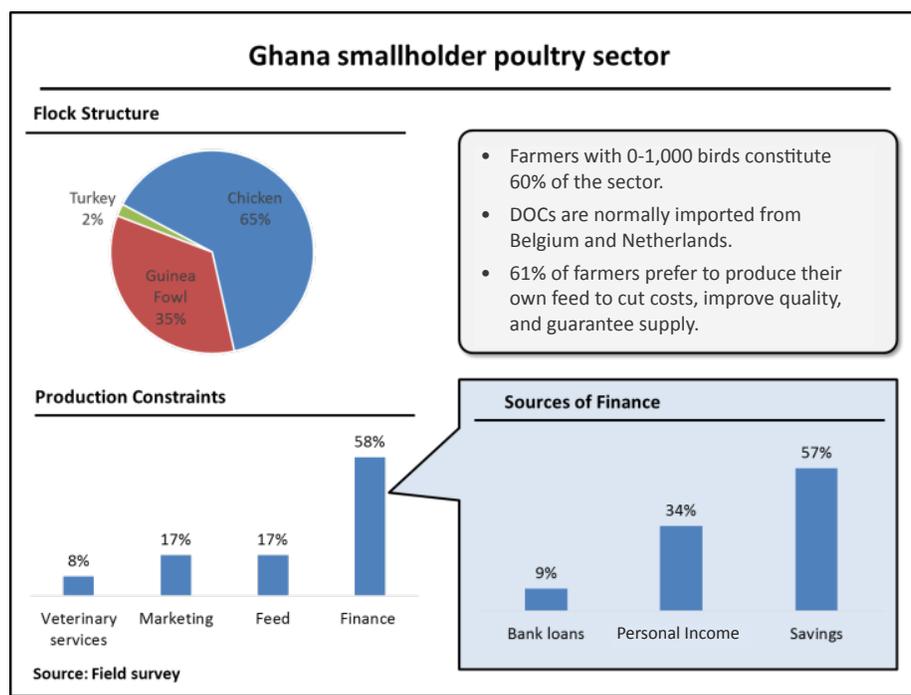


The factors put forward by Akosah-Darteh (2012) to explain the reversal in fortune for domestic poultry production include unfair competition from subsidized poultry producers from advanced countries, unfavorable and indifferent government policy direction, escalating costs of production, inefficient methods of production, lack of funds and credit, inadequate knowledge in poultry management, socio-cultural factors, lack of information on the part of small-scale poultry farmers, inadequate access to market, lack of processing facilities, and high rates of perishability.

Production Structure

The poultry industry in Ghana consists of two types of farming systems: traditional or village poultry and commercial poultry farming. The traditional or village poultry production system, comprising 66% of the 3.7 million households in Ghana, makes up about 80% of the sector. Poultry is raised for food and income supplementation. The key production challenge is finance, followed by feed and marketing. Inability to get financing, or financing that follows the birds' growth cycle, and high interest rates are the main challenges. Farmers mostly rely on savings. About one-third of these farmers use income from other sources to finance poultry farming, indicating that for a significant number of smallholder farmers, poultry farming is a side activity.

Figure 3.3: Ghana smallholder poultry sector



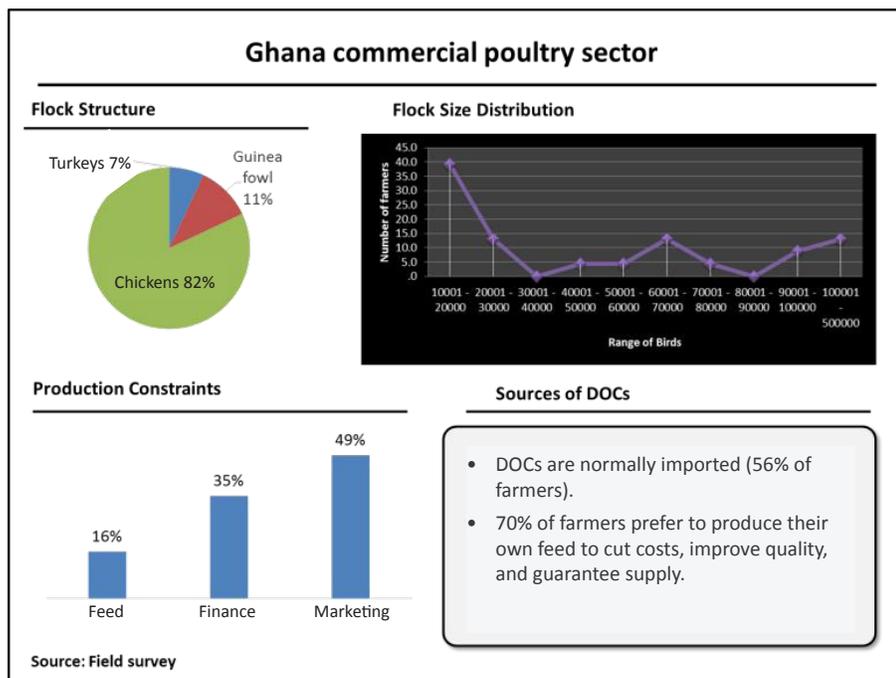
Commercial Poultry Farming

Commercial poultry production in Ghana can be divided into three categories: large-scale (over 10,000 birds), medium-scale (5,000–10,000 birds), and small-scale (50–5,000 birds). Currently there are fewer than 20 large-scale commercial poultry operators, producing mainly eggs, with limited production of broilers (meat). Broiler birds produced by commercial poultry farmers are targeted at festive seasons, such as Christmas and Easter, when Ghanaians normally buy live chickens. The large commercial poultry farms are privately owned by individuals or families, and most operate their own feed mills.

The majority of commercial poultry farms in Ghana, about 82% of farmers interviewed, kept chickens on their farms. Roughly 11% reared guinea fowl, and only 7% reared turkeys. Chickens kept were mainly for table eggs; broiler meat production was almost nonexistent in the study area.

Findings from our survey indicate that most commercial-scale poultry farmers are producing 10,000–20,000 birds. These farmers form the plurality of commercial-scale farmers in Ghana, with a percentage of about 39%. The next largest group of farmers, with representation summing up to about 13%, have bird populations of 60,000–70,000. This is shown below.

Figure 3.4: Ghana commercial poultry sector

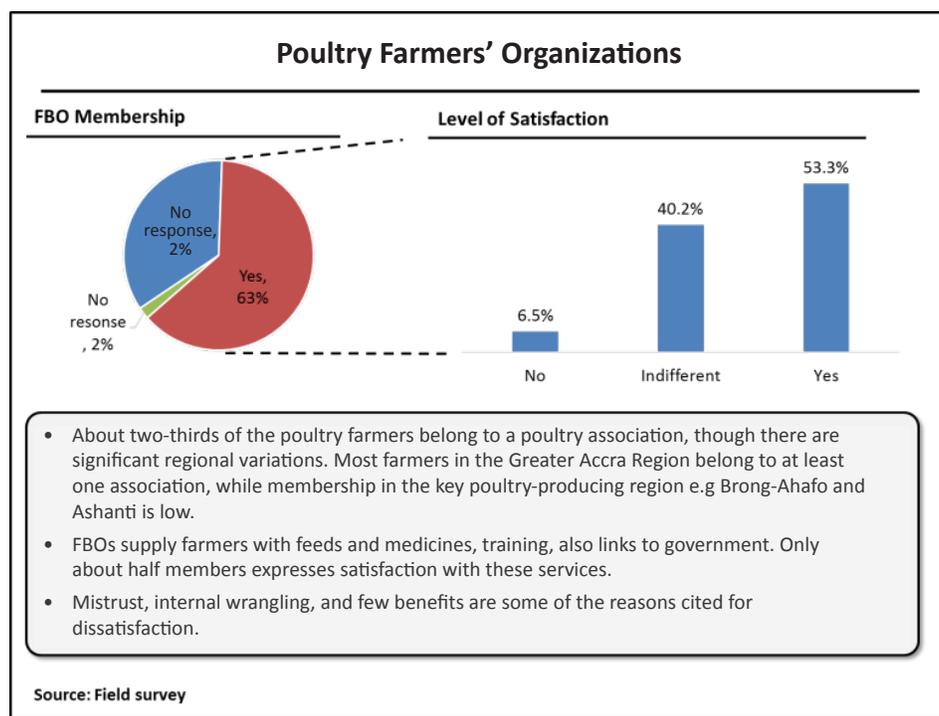


Most commercial poultry production adopts the deep litter system, which is capital-intensive. The subsector is growing and seems to be complementing the small-scale poultry farming sector.

Farmers' Organizations

About 63% of poultry farmers belong to a farmer-based organization (FBO), though there are significant regional variations. For instance, almost all respondents in the Greater Accra Region belong to an association, as compared to the Ashanti, Brong-Ahafo, and Upper East regions, where most do not. FBOs supply feed and medications and also train and build the capacity of members. They are a link between farmers and government. About half of the farmers expressed satisfaction with FBOs, services. Reasons cited for dissatisfaction included mistrust, internal wrangling, and no tangible benefit accruing from belonging to the association.

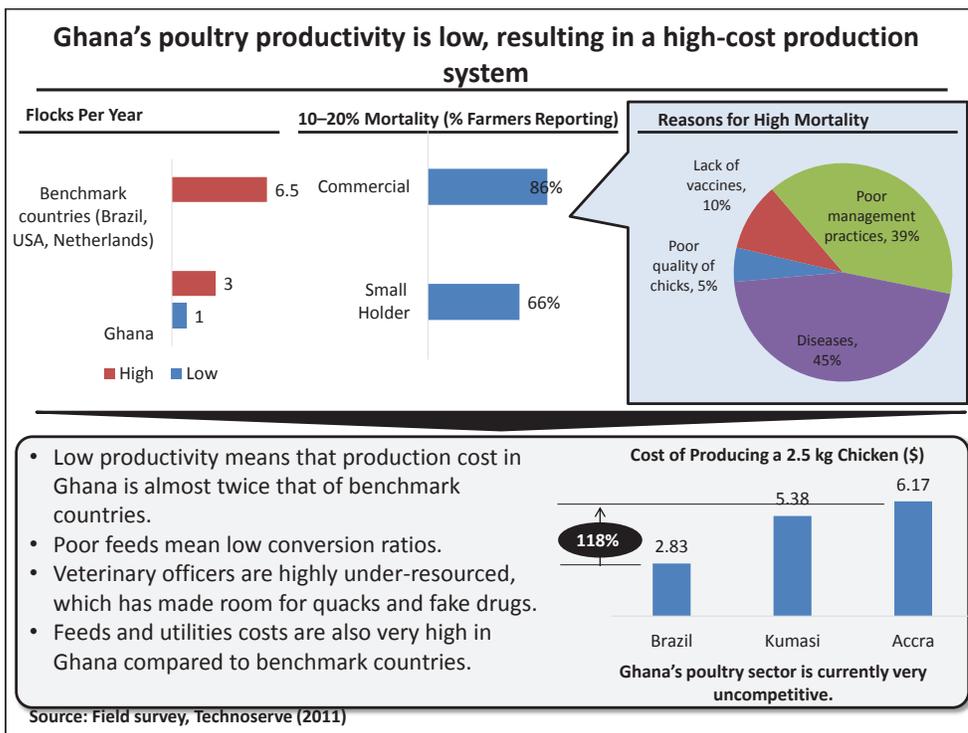
Figure 3.5: Poultry farmers' organization



Productivity

Productivity of poultry production in Ghana is usually assessed based on egg production, chick survival, and hatchability. Productivity of Ghanaian commercial farms of 5,000 to 40,000 birds is estimated at 1–3 flocks per year, versus 6.5 flocks for benchmark countries such as Brazil, the US, and the Netherlands (TechnoServe, 2011). Our survey found that only 66% of smallholder farmers and 86% of commercial farmers recorded 0–20% mortality during brooding stages. Lack of knowhow, poor feeds, and diseases are the main causes of low productivity.

Figure 3.6: Ghana poultry productivity



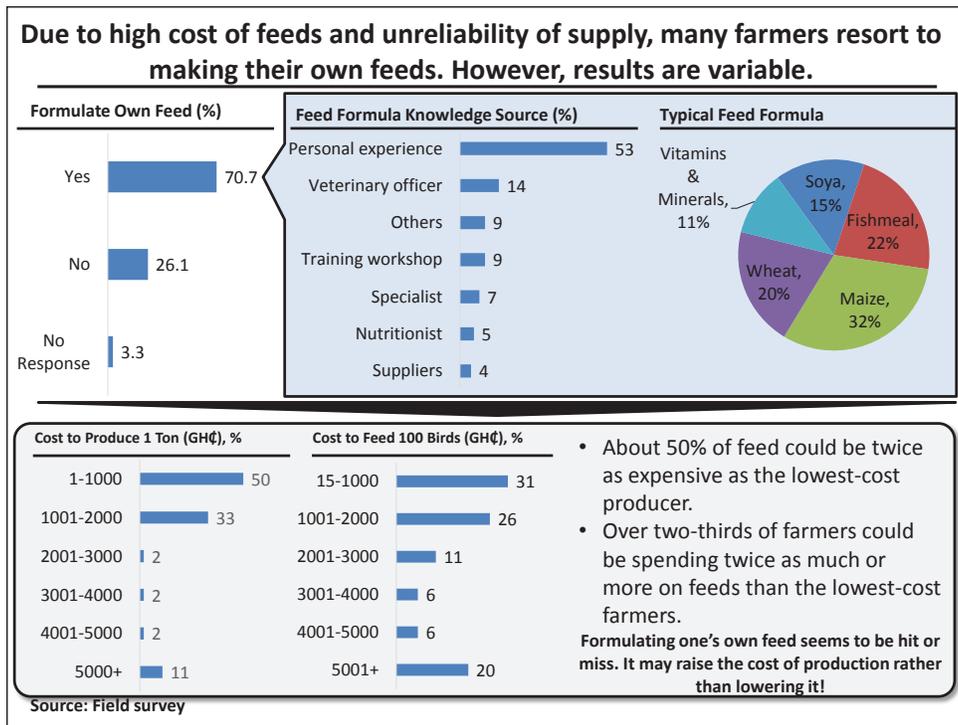
Due to low productivity, it costs more than twice as much to produce a 2.5 kg bird in Accra (\$6.17) as it does in Brazil (\$2.83). The cost of producing the same bird is lower in Kumasi (\$5.38), but is still almost twice that of Brazil (TechnoServe, 2011). Further, the time to sale shows very high variation (see Figure 3.6, above). Production of poultry in Ghana is not currently competitive.

Feed

Feed is a key ingredient in poultry production, accounting for up to 90% of the cost of production. Lowering the cost of feed is thus of paramount importance for poultry farmers. Maize, wheat bran, fish meal, and vitamins and minerals are ingredients used in formulating feed on farms. Some inputs, such as maize and soya cake, are produced domestically; however, the industry has to rely on imports when there is a shortage. The other inputs, such as minerals and vitamins, are imported. The sources for both soya and fish meal are sometimes not reliable in terms of stocking a particular brand of product. To this effect, farmers keep switching between different brands, which, the farmers surveyed complained, affects the consistency of their end products.

Our survey indicated that Ghana poultry farmers are faced with high costs, low quality, and unreliable supply of feed. In an attempt to manage this, many have resorted to formulating their own feeds rather than sourcing from commercial feed manufacturers. Our survey indicated that close to three-quarters of the farmers made their own feed. Large poultry farms had their own mills, whereas the smaller farms had to rely on third-party feed mills.

Figure 3.7: Poultry feed access



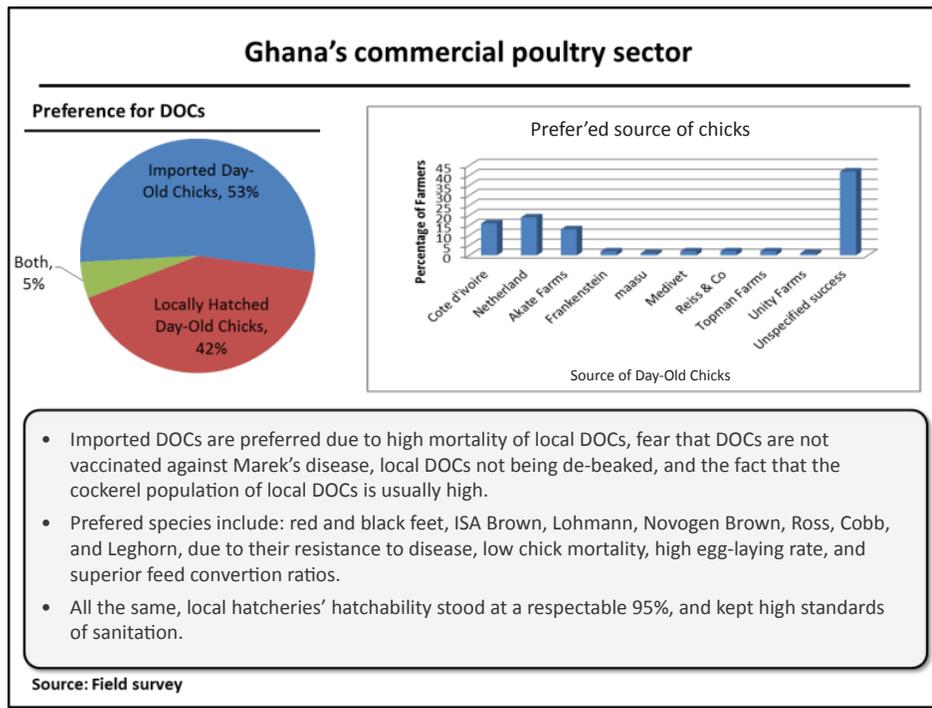
Own-feed formulation has its challenges in delivering cost and quality. Farmers show significant variation in cost of production and in quality (as measured by cost to feed 100 birds). It means that own-feed production largely remains a trial-and-error exercise with significant room for improvement. For some farmers, own-feed formulation may actually be achieving the opposite of the intended impact, raising the cost of production rather than lowering it. It is not clear whether farmers, especially smallholders, can acquire the skills needed to master the art.

Day-Old Chicks (DOCs)

Farmers have a great preference for imported day-old chicks (DOCs). Reasons for this, according to survey respondents, were high mortality rates of local chicks, in some instances, they believed local hatcheries fail to vaccinate against Marek's disease. Finally, the local hatcheries do not de-beak the birds.

A few local hatcheries exist but struggle to compete with the foreign ones. In the study area of Brong-Ahafo, only one local hatchery, located in Dormaa-Ahenkro, was serving the entire region, while the Ashanti Region had three functioning ones owned by large commercial farms. There was only one automated hatchery in the Upper East Region.

Figure 3.8: Preference for day-old chicks



The reasons for farmers' preference for foreign-hatched chicks include high mortality rates of the locally hatched DOCs; fear that local DOCS are not vaccinated against Marek's disease; local hatcheries, failure to de-beak DOCs; and the usually high cockerel population in local DOCs.

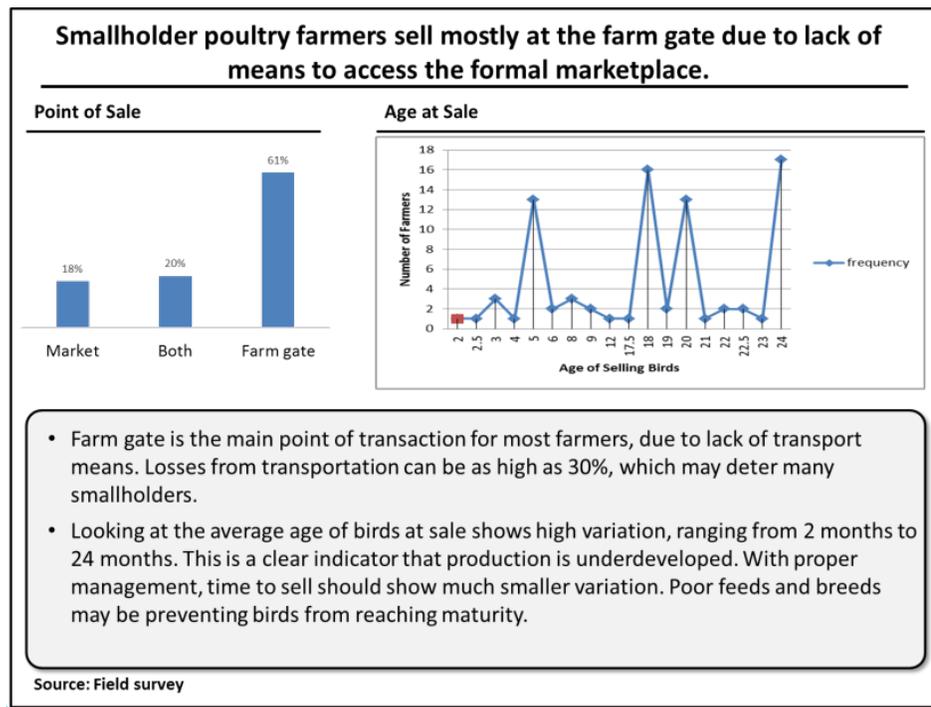
Financing

As discussed, finance was cited as the biggest challenge to the poultry sector, especially for smallholders. Banks are not keen to lend to the sector and, as a result, only about 9% of the smallholder farmers surveyed stated that they accessed bank loans. High interest rates and short repayment periods that do not correspond with production and the period of returns that could service the loans also deterred many from accessing bank loans.

From Farm to Market

Farmers surveyed mostly sell poultry produce at farm gate (about 60%). One-fifth sell at the market and the rest use both channels. Many smallholders lack means of transport to take products to market, and losses from transportation can be as high as 30% (this is what was reported by commercial farmers who owned transport). This is due to poor packaging, poor modes of transportation, and the poor nature of the roads. Selling at farm gate may be preferred.

Figure 3.9: Poultry trading



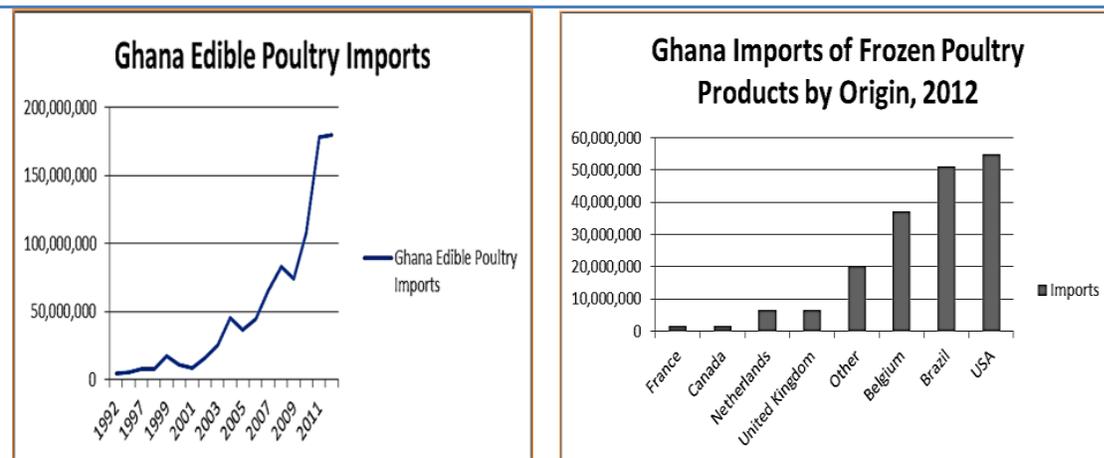
From the survey findings, there is no standard pricing mechanism regulating poultry products of both village and commercial farms in Ghana. This implies that price fluctuates, and mostly at the discretion of market operators such as producers, aggregators, and traders. In some instances, the aggregators dictate prices of products to producers. Respondents suggested that the farmers' associations can play a leading role in determining price to benefit its members. This has yet to happen, implying that existing FBOs are weak and may need capacity building to make them more effective in negotiations.

Imports

TechnoServe (2011) points out that importation of poultry products from Europe and America reached an estimated US\$179 million in 2012, up from US\$4.5 million two years before. This 40-fold increase can be partially attributed to the challenges confronting local producers of poultry products and the huge domestic deficit from consumer demand for poultry products.

Importers of poultry products range from individual importers, to groups, to cartels. About 80% of all poultry imports in the country come from five importers: Francopat Co. Ltd., Succatrade Ltd., Silver Platter, Coca Impex, and Servistar. Their activities have contributed to a fourfold increase in importation of poultry products to Ghana (Technoserve, 2011; USDA, 2013).

Figure 3.10: Poultry imports into Ghana (MT)



Source: UN Comtrade Database

According to Akoto (1995) and Gyau (2011), imported poultry products are well dressed—with the cut portions categorized into thigh, breast, drumstick, and wings—and packaged to look attractive.

There have been various duties, taxes, and regulations on importation of poultry in the past to curb the rise in imports and protect and support local industry such as the 20% special tax on importation of poultry products from 1999 to 2002. Yet these special taxes and regulations did not last due to the country’s commitment to trade liberalization and international protest (Aning, 2006).

Processing

The commonest forms of processing poultry includes producing dressed whole birds and cutting into essential parts based on orders from the customer. Our survey found very little processing capacity in Ghana as shown in the table below.

Table 3.1: Poultry processing capacity

Product type	No.	Installed processing capacity (birds per hour)
Grilled poultry	1	6
Sausage	0	0
Dressed birds	3	15–10,000
Drum sticks, breasts, and wings	1	800

There was only one automated dressing plant identified. This plant, known as the Darko Farms processor, is located in Akropong in the Ashanti Region and has an installed processing capacity of 10–15,000 birds/hour for dressed birds. It is currently underutilized because of unavailability of broiler birds. Other processors identified were Akate Farms and Nasone and Sufix farms. These farms had semiautomated processors.

The poultry processing sector is still very underdeveloped, and significant investment is needed to develop it. However, for this to happen, the supply sector needs to lower the cost of production and which guarantee supply to ensure high utilization.

Markets

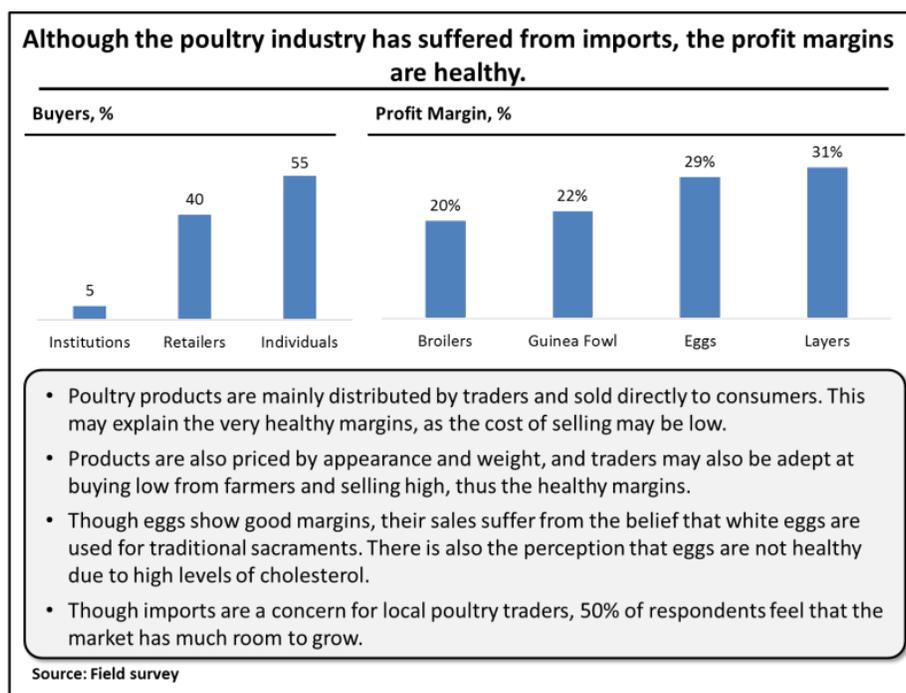
Local poultry products are usually marketed by traders through traditional markets. Individual consumers are the biggest customer segment, taking about a 55% share, followed by retailers, which constitute about 40% of the customers. Note that traders surveyed reported very healthy profit margins, ranging from 20% to 31%.

The fact that poultry products are mainly distributed by traders and sold directly to consumers may explain the very healthy margins, as the cost of selling is very low. Products are also priced by appearance and weight, and traders who have significant experience may also be adept at buying low from farmers and selling high, thus the healthy margins.

Though eggs show good margins, their sales suffer from the belief that white eggs are used for traditional sacraments. There is also the perception that eggs are not healthy due to high levels of cholesterol.

Though imports are a concern for local poultry traders, 50% of respondents feel that the market has much room to grow.

Figure 3.11: Poultry marketing



Value Capture Opportunities

While chicken consumption has been rising, the domestic consumption of poultry products per person stands at 12 eggs and 1.2 kg of meat per annum, significantly below the world average of 154 eggs and 9.7 kg of meat per annum. There is much room for further expansion of the sector.

However, capturing this opportunity will be an uphill battle. The Ghana poultry industry has a very high cost structure that makes it very uncompetitive. A strategy for Ghana could look at three stages of development: (a) in the short run, developing the local chicken market and commercial eggs' value through a social marketing campaign that promotes healthy eating; (b) in the medium term, improve the productivity of the poultry chain and upgrade its value; (c) in the long term, develop a Ghana breed that is suited to local conditions and a homegrown hatchery equipment fabrication market.

Social Marketing

The consumption of eggs remains low due to consumer perception that eggs are not healthy because they contain high levels of cholesterol, as well as the notion that white eggs are used for traditional sacraments. Social marketing campaigns involving religious and traditional leaders can help people appreciate the critical role eggs play in nutrition.

Further, local/indigenous chicken is usually preferred and, in soup, is actually seen as having medicinal properties. People pay a premium price for the indigenous chicken. Small improvements, like housing, vaccination, and feed supplementation can greatly improve the productivity of local chicken, as has been seen in Kenya. This has become a key income earner for youth groups. Another example is "Chicken Biskilet" in Burkina Faso, which is preferred to broilers at eateries.

Local chicken addresses a different market segment from imported chicken and has great room for expansion. It is instructive that this has been done successfully for guinea fowl.

Upgrading the Poultry Value Chain

In the medium term, the poultry value chain can be upgraded by increasing productivity on the supply side and developing linkages to modern marketing channels.

Productivity Improvement

Productivity improvement requires: (i) improving feed quality and lowering its cost; (ii) improving the performance of local DOCs; and (iii) improving disease management.

i. Feeds

Improving feed quality will require efforts from the veterinary and standards authorities to standardize feed formulation based on localities (as different regions are competitive in different crops), so that farmers

do not have to use trial and error in feed formulation. FBOs can be supported to take a greater role in developing feeds and distributing to their members; not only does this increase quality, but bulk buying can save on costs. However, supporting the emergence of strong private-sector feed production may actually be the better option. The private sector can do more to lower costs, especially if the sector is competitive. Since private feed manufacturers also manufacture other items—e.g., cotton gins—and have a ready-made distribution network, they may be better than FBOs at delivering feeds.

Research and development efforts should also look for alternatives to help lower the cost of feed. This will require strong linkages between feed manufacturers and universities. In the north, the University of Development Studies can link up with cotton ginneries, shea nut processors, and breweries (using cassava and sorghum for making beer) to develop cost-effective feeds.

Subsidizing feeds—similar to the way the crops sector gets subsidized fertilizer—can also lower costs. Some feeds are partially subsidized indirectly as inputs, like maize and soya, but there is still room for additional feed subsidies, since minerals and vitamins are critical inputs to poultry production and are a significant part of the cost.

That said, the key to lower feed prices is higher productivity of the crops sector, and thus efforts to raise crop productivity will have an important spillover effect on feeds. Cassava, soya, and sorghum should be given particular attention to reduce overreliance on maize, which is becoming increasingly prone to shortages.

ii. Improving DOCs

Local hatcheries already have good hatching rates and high sanitation standards, which shows that they have the ability to improve their performance in other aspects. Efforts should be made to diffuse technologies for de-beaking and sex selection to reduce the number of cockerels. This may require linking them with foreign hatcheries and sponsoring them for study tours and support for equipment acquisition. The free government vaccination program should be extended to hatcheries to allay fears that local DOCs are not vaccinated.

iii. Improving Disease Management

Veterinary resources are limited in Ghana; only farmers in Greater Accra can access adequate services. The limited resources of government mean that alternative models for delivering these services are needed. With capacity building and supply of needed provisions, FBOs can be trained to deliver some of the simpler services. An alternative is training youths with science backgrounds to deliver basic services' i.e., as the equivalent of paramedics. This could provide a more attractive pathway to involve youth in agriculture. Youth can be trained while on National Service and then helped through youth funds to become veterinary service providers.

Linking Poultry with Modern Retail Channels

Ghana has both homegrown and international fast food franchises. Papaye is now a well-known brand, as is Chicken Republic. The international franchise KFC has opened a few stores. There are also emerging pizza franchises, such as Papa's Pizza.

The local franchises in particular provide a very good opportunity for upgrading the poultry value chain. Linking them to some of the bigger commercial farms and providing subsidies so that these farms can compete is one approach in the short term. Subsidies can be in the form of subsidized feeds and medicines. Another approach could be rebates to franchises that buy locally to make them more inclined to source locally. Tax breaks can also be provided to franchises that make efforts to develop locally based supply chains.

Currently, international franchises like KFC import their chicken from globally vetted suppliers because of the very stringent requirements in quality, taste, and volumes they demand. It will take much longer to bring Ghana poultry farmers to the level demanded by these international brands. However, it can be very rewarding to be part of KFC and other international brands, and if farmers can successfully work with them, they will gain access to the regional and global markets where the franchises operate. First, they can work with local franchises to gain experience and start ascending the very steep learning curve.

Developing Fully Integrated Production and Marketing Franchises

Big local farms or processors can be incentivized to develop marketing outlets. For instance, Kenchic in Kenya has franchises that sell their chicken and other foods. Kenchic has also developed an outgrower system to supplement the supply of chicken to its franchises. This integrated approach can solve the marketing challenge that commercial farms face.

Another option is to encourage one of the local franchises, like Papaye to develop its own chicken supply chains through an outgrower model. It can buy one of the larger farms and a processor and develop an out-grower farm around them.

However, developing these value chains will require significant resources for upgrading production systems and developing capacity to meet stringent requirements that supplying to franchises entails. This is where partnerships with NGOs and development partners working in this sector can help, bringing specialized support to different aspects of the value chain. A coordinated approach can be leveraged through the numerous resources being developed in the sector in a fragmented way. There are many social entrepreneurs, such as Root Capital, that specialize in supporting development of value chains. The government has set up the Export Development and Agricultural Investment Fund (EDAIF) to support development of agroprocessing, and there are many funds being set up to engage youth in agriculture. A concerted effort by various actors can make the poultry value chain a healthy generator of jobs.

Research and Development

Breeding

Recent data on poultry species and regional distribution in Ghana is unavailable. The VSD of the Ministry of Food and Agriculture should update the data on poultry species and its regional distribution (last done in 2009) on a regular basis and undertake a livestock census every five years.

Regular data can help the development of local high-productivity species through breeding. Combining traits that are adapted to local conditions with high-productivity traits from abroad can create species that do well locally, as has been done in Kenya. This will require support for research and development and greater industry and research collaboration to commercialize locally developed breeds.

Hatchery Fabrication

Another related area of R&D that has potential to upgrade the poultry industry is the development of incubators. Locally developed incubators can spur the development of local hatcheries and reduce the imports of DOCs. Locally made hatcheries can be fabricated from old refrigerators (and Ghana imports many used refrigerators). The success of locally based fabrication of cassava processing equipment from scrap metal by local artisans shows that Ghana has what it takes to develop cheap local hatcheries. Government-funded research institutions, such as the Kwame Nkurumah University of Science and Technology (KNUST) can work with local fabricators to develop their capacity to develop hatcheries. A poultry R&D fund can be set up by imposing a special levy on imports of poultry products.

Developing high-quality and larger-size hatcheries can help Ghana capture some market share in the export of DOCs and eggs to hatch in the ECOWAS sub-region. Ghana has a natural comparative advantage compared to inland countries such as Burkina Faso, Mali, and Niger (USDA, 2011).

Policy Recommendations

There is much to be done to support poultry development. The use of import duties and even partial bans, as in Nigeria, is one end of the continuum of policy actions Ghana can take. At the other end, Ghana can provide support to lower production costs by subsidizing feeds, DOCs, and utilities, an option that is likely to be costly. A balance of the two extremes is needed.

Given the rising level of poultry imports and potential for poultry to create jobs, a poultry development fund can be developed by levying taxes on imports. This was done to create the EDAIF; however, the nature of the poultry industry calls for a specialized fund. Perhaps the funds levied on poultry imports and collected by EDAIF can be carved out into this separate fund. Alternatively EDAIF can be reformed so that it supports a number of specialized funds to develop critical sectors impacted by imports, e.g., poultry and rice.

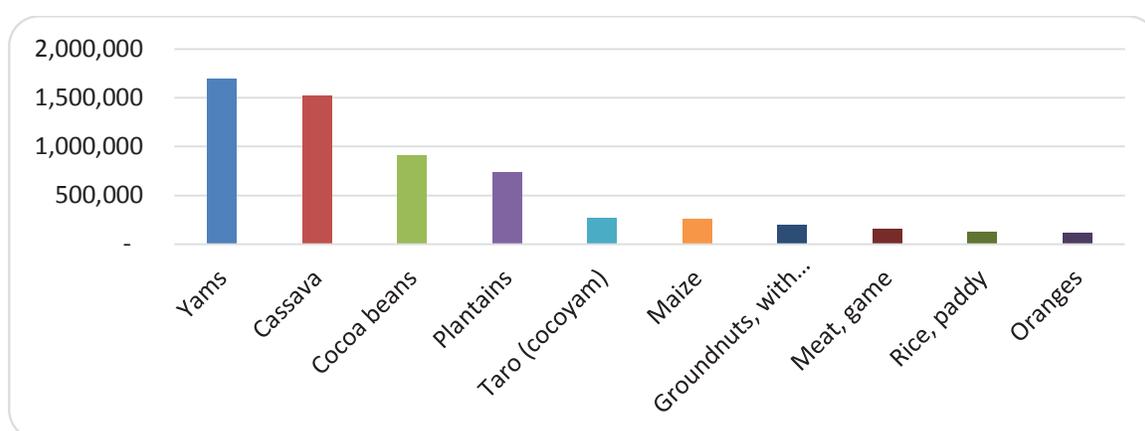
Government already supports development of a machinery fabrication sector through the Gratis Foundation. This can be leveraged and supported to develop incubators and other equipment needed by the poultry industry.



III. Ghana Cassava Value Chain

Cassava is the largest staple crop in Ghana, with an estimated average production of over 12 million MT a year (MoFA/SRID, 2012). It is the second most important crop by value and constitutes about 22% of the country's agricultural GDP (Angelucci, 2013). About 83% of farming households in Ghana are involved in the production of cassava (GLSS, 1987), underscoring its central role in rural households.

Figure 4.1: Top 10 agricultural products in Ghana by value (\$1,000), 2012



Source: FAOSTAT

Cassava is a particularly attractive crop for resource-poor farmers. Cassava has a low production cost. It is very efficient in the production of energy. It can produce 250 x 10³ calories/ha/day, compared to 176 x 10³ for rice, 110 x 10³ for wheat, 200 x 10³ for maize, and 114 x 10³ for sorghum (Okigbo, 2000; Dosoo and Amoa-Awua, 1992). But perhaps the most important quality of cassava is its resilience in the face of drought and its ability to grow on marginal lands. Cassava became firmly established in most areas of Ghana after the serious drought of 1983, when all other crops failed completely (Korang-Amoakoh, Cudjoe, and Adams, 1987). Cassava's resilience will become increasingly important as climate change effects become more pronounced.

Further, cassava can usually be planted any time of the year and harvested year-round (for some varieties, harvesting can be "piecemeal" and take place for up to four years). The wide flexibility in planting and harvesting time enables farmers to allocate their spare time to cassava after attending to more season-bound crops. This flexibility is especially important for women, who need to balance many chores. It is thus the crop of choice for most resource-constrained farmers.

Though cassava beers have recently been launched in Ghana, they still command a small share of the market. There are concerted efforts to develop a high quality cassava flour (HQCF) industry, which could be key to cassava becoming a substitute for wheat imports in food manufacturing and in developing new cassava products for local markets. There also exist potentially bigger export markets for cassava as an industrial input—including cassava chips for the animal feeds industry, cassava starch, and cassava ethanol—but they are yet to be addressed. Ghana actually imports these products. The potential of cassava has yet to be fully tapped as a food and as an industrial input. Unlocking the full value of cassava can have significant implications for rural transformation and general economic transformation by increasing rural incomes and fostering a processing sector. This will, however, require concerted, coordinated, and sustained agricultural and industrial policies to ensure the emergence of strong production and processing sectors.

Efforts to unlock this potential have been ongoing, with perhaps the most famous being the Presidential Special Initiative (PSI), launched in 2003 to catalyze the industrial cassava processing sector. Under the PSI, Ayensu Starch-factory (ASCo) was set up with the objective of exporting starch. An outgrower scheme that contracted small-scale farmers to supply it with cassava was also setup. However, by 2006, the factory had to close due to a lack of supply of fresh cassava roots. ASCo had challenges enforcing contracts, and farmers engaged in side-selling in the traditional markets when prices were higher. Farmers also preferred to grow varieties that they liked to eat or that had good value in the traditional markets rather than varieties optimized for starch production. While it has since reopened and is operating at a very low capacity, it has had challenges getting enough cassava as well as spare parts. Other significant ongoing initiatives that are looking to upgrade the cassava value chain include:

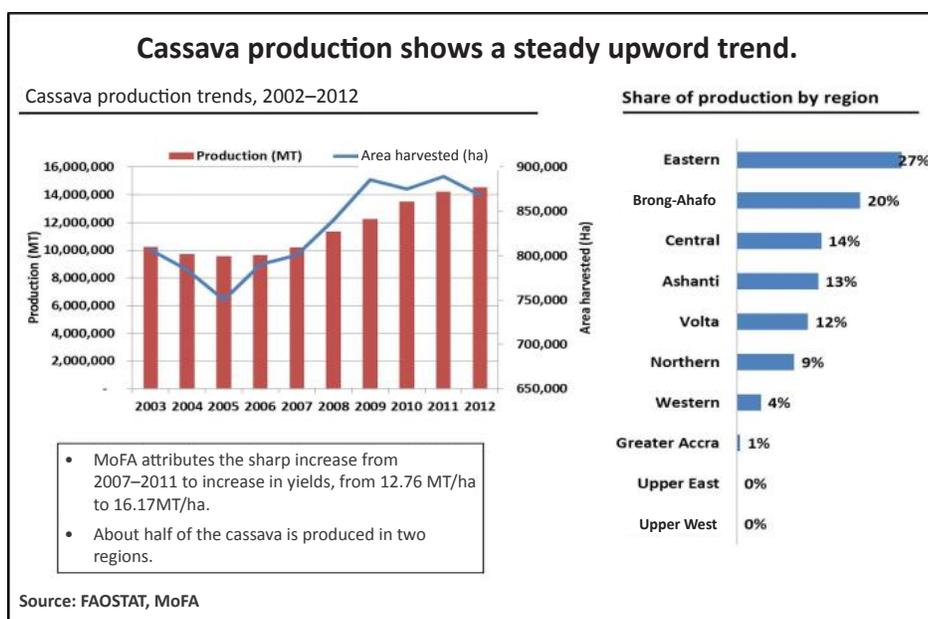
- The Root and Tuber Improvement and Marketing Programme (RTIMP), a joint effort between the government of Ghana and the International Fund for Agricultural Development (IFAD). RTIMP supports production and upgrading of arts.
- Cassava: Adding Value for Africa (C:AVA) a project being run by the Natural Research Institute of the University of Greenwich and supported by the Council for Scientific and Research-Food Research Institute (CSIR-FRI) in Ghana. The goal of the C:AVA project is to use innovative interventions to capacitate farmers, village processing units, and market intermediaries to competitively deliver high-quality cassava-based products to a well-sensitized market.
- The West African Agricultural Productivity Program (WAAPP), a two-phase, 10-year program by the World Bank to support the implementation of the Comprehensive Africa Agriculture Development Program's (CAADP's) agricultural research and development pillar. The overall goal of WAAPP is to contribute to an increase in agricultural productivity for Ghana's priority crops. The current focus is on root and tuber crops: cassava, yam, sweet potato, and cocoyam.

Production

Cassava production stands at about 14 million MT. While cassava is grown in most regions of Ghana, the main producing regions are Eastern, Brong-Ahafo, Ashanti, Central, and Volta. The five regions account for about 86% of the output (see Figure 4.2).

As Figure 4.2 shows, production of cassava roots has been rising steadily, with a sharp increase (almost 40%) from 2007 to 2011. MoFA attributes this mainly to an increase in average yield per hectare of 26% over the period, from 12.76 to 16.17 MT per hectare.¹⁶ The amount of land under cultivation increased 11% in that period.

Figure 4.2: Cassava production trends, 2002–2012

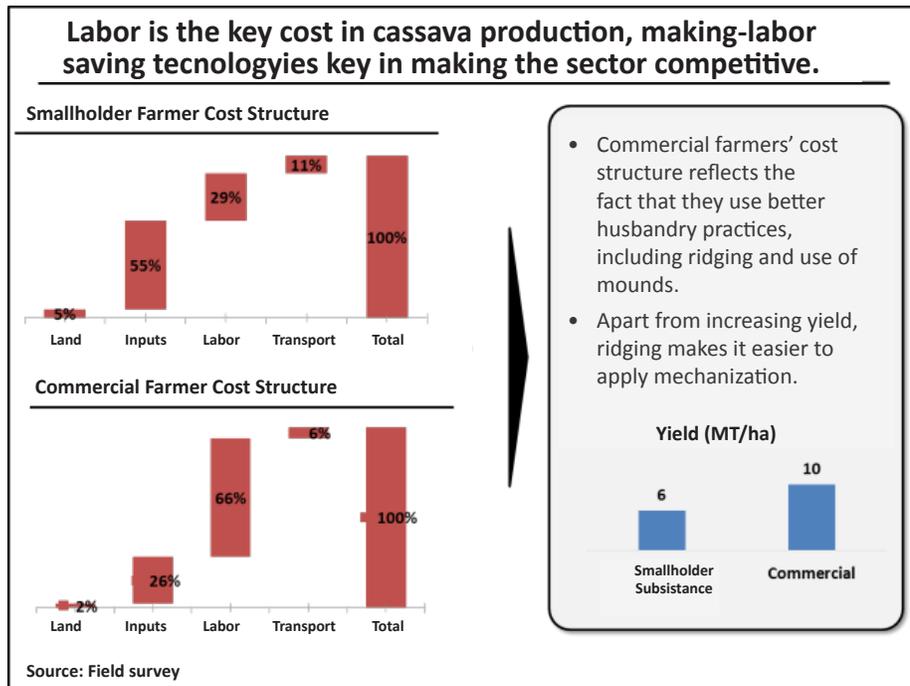


Cassava production in Ghana is characterized by smallholder subsistence farmers, who account for about 95% of total cassava farmers. A survey done for this study found that 70% of the farmers surveyed had less than five acres and a further 20% had less than 10 acres of land.

However, apart from these smallholder farmers with a subsistence orientation, there are also commercial cassava farmers. The cost structures of the two types of cassava farmers are shown in Figure 4.3. Commercial farmers had a very different cost structure, which reflects their different approach to farming. For commercial farmers, 66% of production cost is attributed to labor, whereas it is only 29% for smallholder subsistence farmers. This is because commercial farmers observe good agronomic practices, key of which are ridging and mounding. Ridging and mounding can be costly and can easily double the cost of land preparation. In addition to increasing yield, this practice also makes it easier to use tractors to plow the land and harvest. Further, subsistence smallholders do not generally harvest their cassava, but rather sell to buyers while the crop is still in the field.

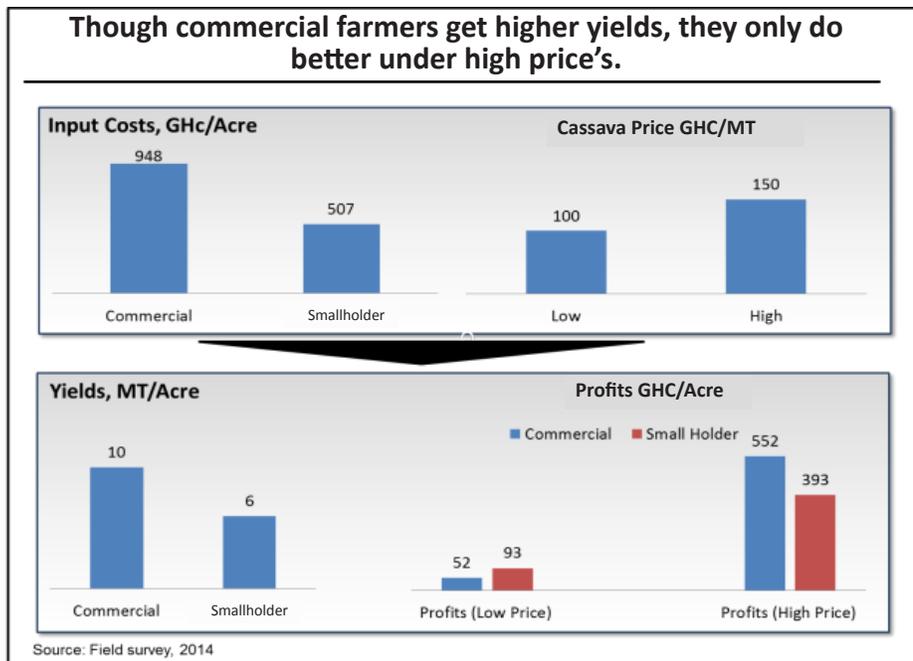
¹⁶ However, FAO data shows that land harvested increased sharply, which differs from MoFA's position that

Figure 4.3: Cassava farmers' cost structure



In terms of profit margins, the survey found that smallholders did slightly better than commercial farmers when the prices were at the lower boundary. This is due to the much higher input costs commercial farmers incur for improved seeds and good agronomic practices (948 GH¢/acre vs. 507 GH¢/acre). Though this delivers higher yields for commercial farmers (25 MT/ha vs. 20 MT/ha), their higher yields do not result in higher profits when prices are low.

Fig 4.4: Profit margin (commercial vs. smallholder)



The fact that, without very high prices, the smallholder was getting a better return than a commercial farmer beats the logic of looking for higher yields and makes establishing an industrial processing sector challenging. Key success factors for cassava-driven industrialization include low input prices through higher yields. To reach this level of success, commercial farmers must lower costs. This calls attention to the need for labor-saving technologies.

Outgrower Farming

There are a number of outgrower models being employed by commercial cassava farms and processors (16% of farmers surveyed belonged to such schemes). In these models, farmers farm their own land and are contracted to supply their output to an off-taker. Two variations of outgrower schemes were observed in this survey. In the traditional outgrower model, farmers own the land. In the second model, known as block farming, a buyer owns the land and leases it to farmers. Under this arrangement, buyers have greater control as the land owners, and the land is easier to monitor, being in one block.

- Caltech Ventures in the Volta Region has abandoned the traditional outgrower model due to management challenges and moved to a block model, where it is providing farmers with land for them to farm. Caltech has provided each farmer with five acres of their own land. Under this arrangement, farmers sign a written agreement with Caltech; they are also supported with land preparation, planting material, and other inputs, along with some capital to maintain their cassava farm. In addition to the greater control by the owner, block farms tend to be big contiguous pieces of land, which makes it easier to use machinery in a cost-effective manner (as one tractor can farm all the parcels).
- ASCo is promoting such a model. Using its 1,400 acres of land, it has contracted about 56 farmers with farms ranging from five to 200 acres, depending on the means of the farmer. ASCo is not providing farmers with much support, and the ability of the farmer to demonstrate capacity to farm is the main criteria on being used to assign blocks.¹⁷

Farmers' Organizations

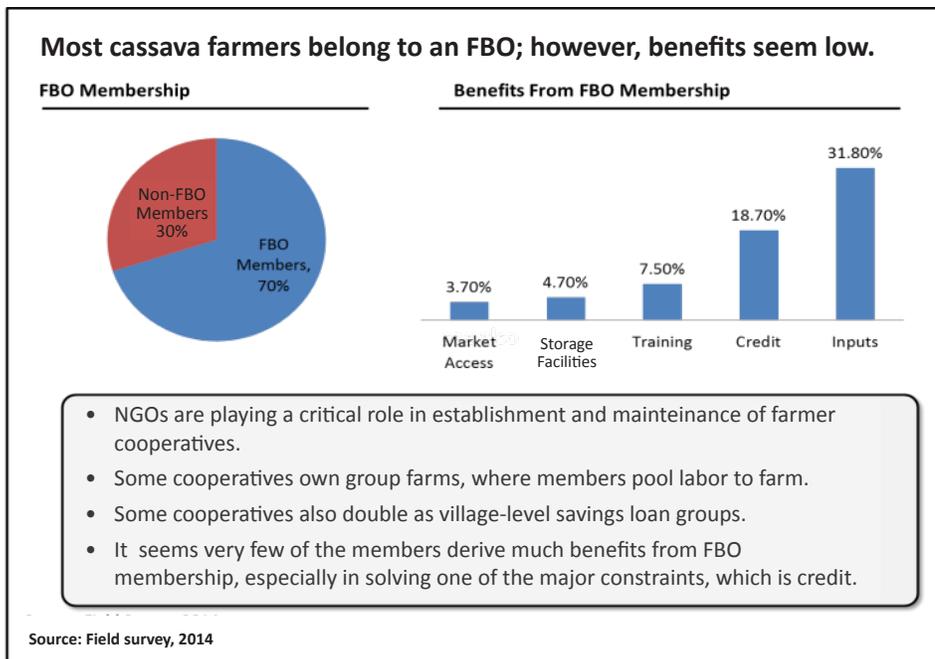
Most of the farmers surveyed (70%) belong to an FBO. Though there are variations of FBOs, in general they tend to have a similar design. Some common models of cassava-based FBOs include:

- Some of the groups have a common farm that serves as a demonstration farm for all of them to learn from. Labor is pooled from members for the group farm.
- Some of the cooperatives also double as village-level savings and loan groups, which give loans to their members at 5% interest rates. The profit accrued to the group is disbursed to members at the start of the production period.

¹⁷ ASCo is also trying to rebuild the outgrower model. Its trying to reconnect with the original outgrowers and has hired consultants to drive the process.

With regard to the benefits farmers obtain from these grassroots institutions, 18.7% of farmers cited credit facilities, 31.8% obtained inputs, 4.7% obtained storage facilities, 3.7% were helped to access markets, and 7.5% indicated they received training.

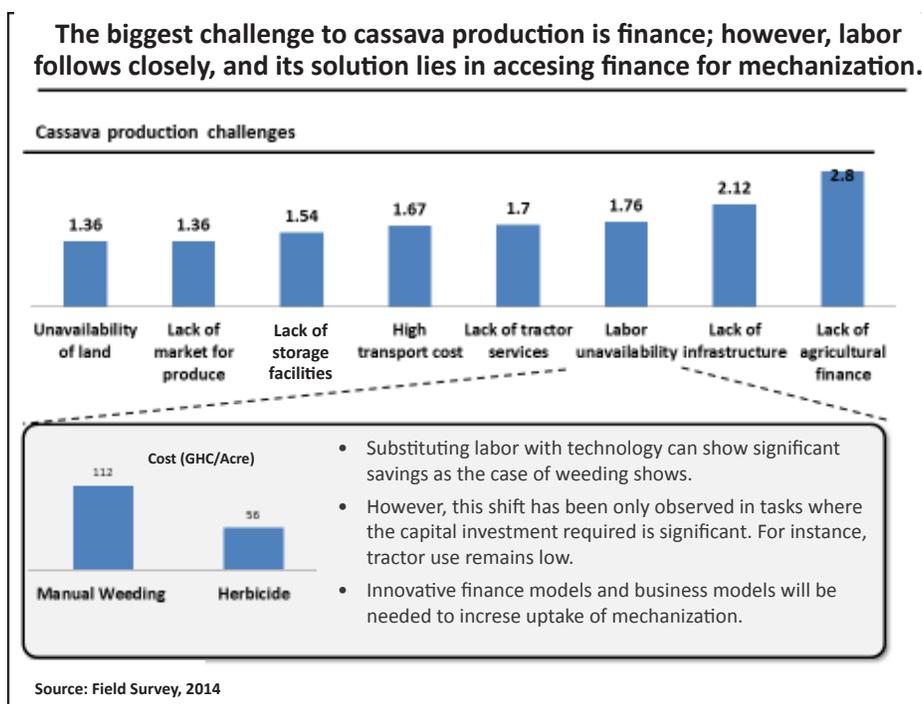
Figure 4.5: Membership in FBOs



Cassava Production Constraints

The major constraints faced by cassava farmers surveyed are shown in Figure 4.6. These are the usual culprits that one tends to find in the literature. However, an interesting constraint is labor, which ranks very high (only credit and infrastructure are seen as more serious). This is contrary to the expectation that labor is readily available in rural areas. This is indeed a crucial challenge, as labor is the biggest cost in cassava production. Surprisingly, land availability was not seen as a key challenge, despite the fact that almost two-thirds of the farmers interviewed indicated that they leased, rented, or participated in sharecropping to own land. This is probably an indication that land markets in cassava areas function well despite the challenges of securing formal tenure in Ghana. Indeed, our interviews confirmed that; in the Ashanti Region, where many migrant farmers from the north farm cassava, they indicated that they could easily access land for a small token fee (a bag of maize every year) from the local chiefs.

Figure 4.6: Constraints faced by farmers (mean score)



Scored on a scale of 1–3, where 1 = Not Serious; 2 = Serious; 3 = Very Serious

For cassava farmers, managing the cost of labor is key. The choice for many seems to be minimizing labor input by (i) eschewing manual weeding for weedicides (i.e., substituting labor with technology), or (ii) outsourcing harvesting to the buyer.

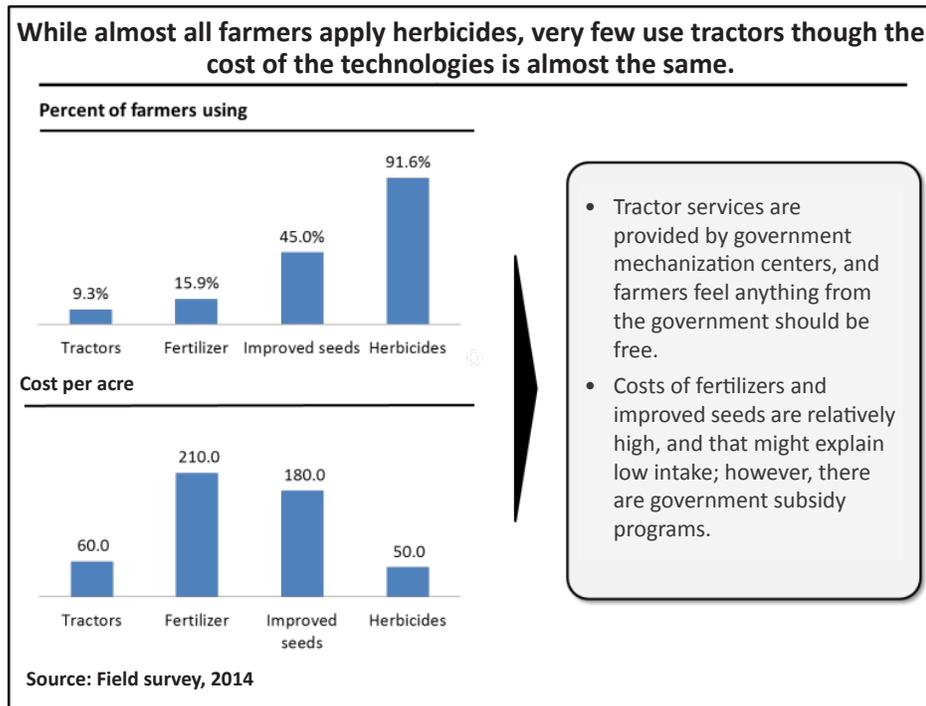
The challenge of financing is seen only at low levels if technology is applied. But technology use among the surveyed farmers was generally low, as Figure 4.7 shows. Only 15.9% of farmers surveyed used fertilizers. Fertilizer is the biggest input cost, at more than double the cost of stem cutting (the next biggest input cost),¹⁸ and this may explain the low uptake. The only technology that seems to see high use is herbicides, which 92% of the farms responded as using.¹⁹ The reason given for high use of herbicides²⁰ is cost-effectiveness when compared to manual labor.

18 Osei-Adu found the cost of stem cutting at GH¢16 per acre, while the cost of fertilizer was GH¢40 per acre.

19 33.6% of farmers reported using a knapsack sprayer. This contrasts sharply with the high level of herbicides use, indicating the farmers are employing manual or other improvisations to spray.

20 FAO points out that, for cassava weed control, application of the pre-emergence herbicide Diuron, at the rate of 1.5 kg/ha, caused no crop injury for either vertical or horizontal planting methods of cassava and was three times as effective as hand weeding. See <http://www.fao.org/docrep/009/y1177e/y1177e04.htm>

Figure 4.7: Percentage of farmers employing various farm technologies



The labor argument that farmers use to adopt weedicides does not seem to apply to the more labor-intensive activities, such as planting, land preparation, and harvesting. Only 9.3% of the farmers use tractors. This is despite the fact that they can be leased at low prices from government mechanization centers. Indeed, where tractor hire services were available, farmers were found to use the services if credit was provided. However, service providers, especially government-sponsored mechanization centers, indicated that they had difficulties collecting debts, as there is a perception that since the centers are government-owned, they should be provided for free. As a result, many have stopped providing tractor services on credit.

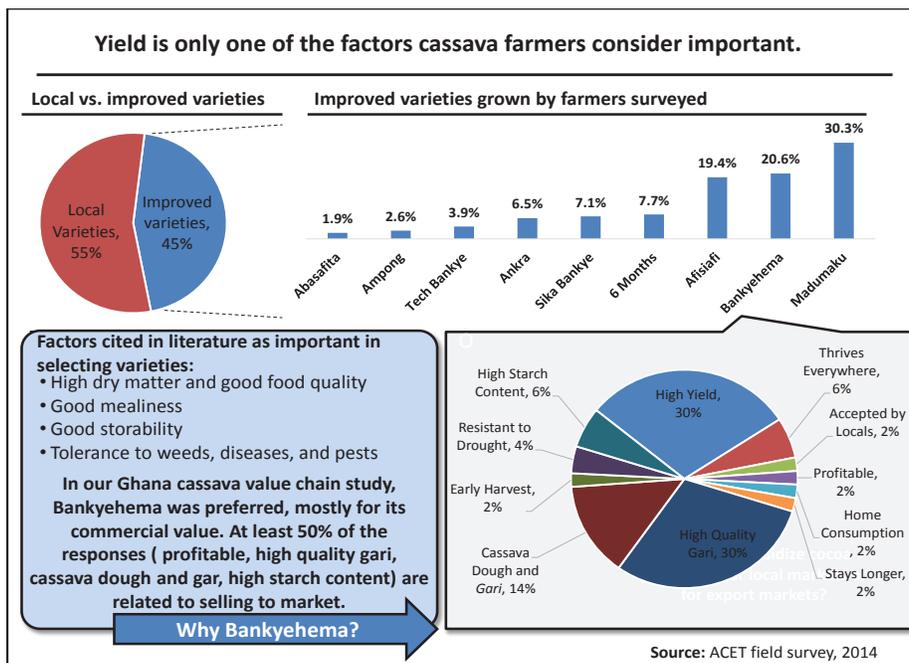
Most land has not been cleared of tree stumps and thus can pose difficulties for tractors, affecting usage. Tree stumps are expensive to remove and require bulldozers that are expensive to transport, and they need to work on at least 100 acres to make economic sense. Removal of tree stumps is further impeded by the fact that a majority of farmers (37%) work on leased land, so they will be unwilling to incur the heavy cost of stumping.

Yields

Officially reported yields of cassava range from 15 MT/ha to 20 MT/ha; this is well below the potential yields of around 30 MT/ha achieved in top cassava-producing countries, such as Thailand. Only 45% of the farmers use high-yield varieties. This is partly due to higher costs (the varieties cost more and demand more intensive use of inputs, e.g., fertilizers) and lack of credit. However, it is more complicated. Farmers

choose varieties for many reasons, as Figure 4.8 shows. Only about a third of the farmers cite yield as the reason for using the second most preferred variety, Bankyeheema. In the region surveyed, Madumaku was the most preferred variety, with 30.3% of farmers growing it.²¹

Figure 4.8: Improved cassava varieties grown in Ghana



Farm to Market: Cassava Trading

Our survey found that about 84% of cassava produced on farms is sold in the market, with 16% retained at households for consumption and household processing.

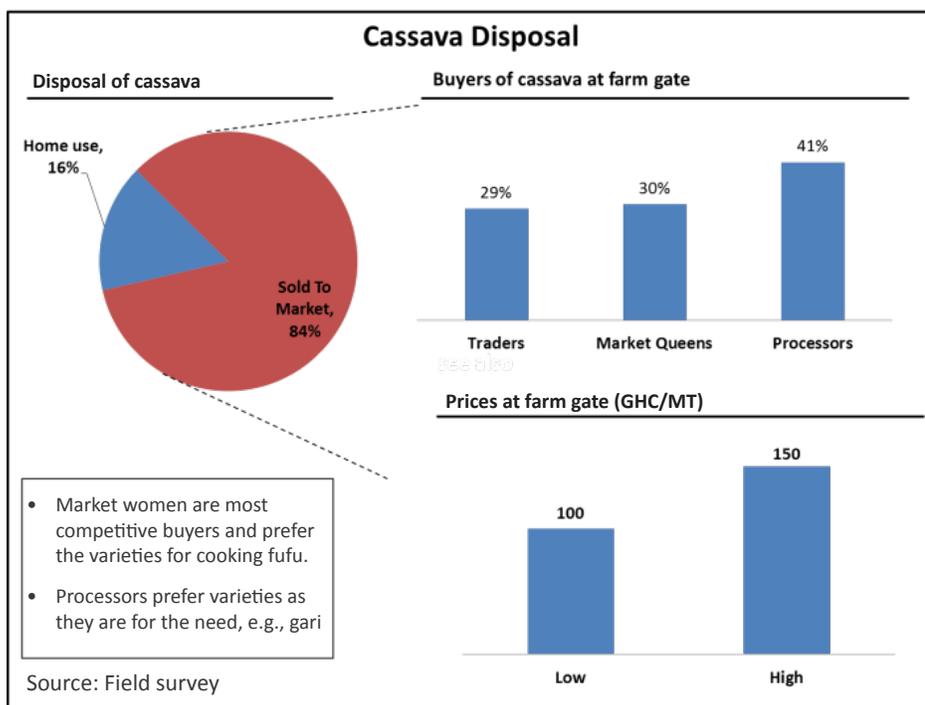
A simple regression using the survey results indicates that the key determinants of the decision to participate in the market are farm size, income, and gender of farmers. The percentage of cassava sold to the market increases with farm size, underscoring the fact that cassava is really a commercial crop. Lower household income is a strong predictor of the amount of cassava sold, which indicates that cassava is important in generating income for poor households. Being a male farmer increases the percentage of cassava sold, probably because female farmers may do more home processing.

The two primary buyers of cassava roots are traders and market women/queens, who buy fresh roots to sell to district and urban markets. The other key buyers are processors, who buy cassava directly through appointment.

²¹ Preferences differ by agro-ecological zones or regions. Local varieties are really local. Note, however, that local names for the same variety can differ, and thus some varieties can be popular in more than one region, though they are called by different names.

Pricing of raw cassava varies between regions depending on the basis of measurement. At the time of survey, the typical price range was from GH¢100 to 150 per MT, though prices could be as high as GH¢300 per MT and as low as GH¢50 per MT. Measures used to determine price create great variation, as farmers do not weigh the cassava.

Figure 4.9: Farm gate cassava disposal



Two approaches are used in pricing: (1) the price is agreed upon while the cassava is in the ground, and (2) the price is agreed upon after the cassava is harvested. Both methods pose challenges.

As indicated, labor is a major challenge for many farmers; often, they cannot afford to hire labor for harvesting, when it is most required. As a result, many farmers tend to sell cassava on land and let the buyer harvest. In one of the study areas, farmers divide an acre of cassava farm into nine sections by standard rope measure, and each rope is sold for about GH¢100, depending on the quality of the farm. A good farmer who has observed all the best farm practices gets the GH¢100 per rope (a standardized price). However, a good farmer stands to lose, as payment is based on average yields, and thus many lose incentive to be good farmers and produce lower yields.

Almost all the smallholders interviewed were reluctant to sell their raw cassava through weighing. Interviews indicate that farmers do not trust weighing scales and feel that weighing will cheat them of their fair share.²² However, by failing to insist on proper weighing, farmers are getting a very bad deal. One researcher (DONATA Project) has observed that the standard measure used in cassava—the KIA truck, which is supposedly 4.5 tons—could be much larger than that. DONATA observed that a new mode of

²² Widespread use of weighing scales is unlikely unless farmers have means of testing the scales. One innovation being proposed is to have farmers use a bag of cement, whose weight is well known (50 kg), to verify the scale's reliability.

transport, the Motorking, has a capacity of 750 kg, and it is estimated that a 10-Motorking vehicle can fill one KIA truck. If this is the case, farmers could be understating by up to 3 MT for every 7.5 MT they harvest. In terms of profit margins, Figure 4.10 shows the trend of buying and selling prices paid by retailers and wholesalers at Ashaiman market.

Figure 4.10: Trends of prices paid by traders at Accra market



Source: Field survey, 2014

Farm-gate prices rose over 50% between 2010 and 2013.²³ Wholesalers' gross margins (which are higher by about 120%) have risen even faster. However, retailing margins have been on a downward trend, falling from 60% to about 30%. It seems that the wholesalers are becoming stronger and stronger and squeezing the retailers, or the retail market is becoming more and more competitive.

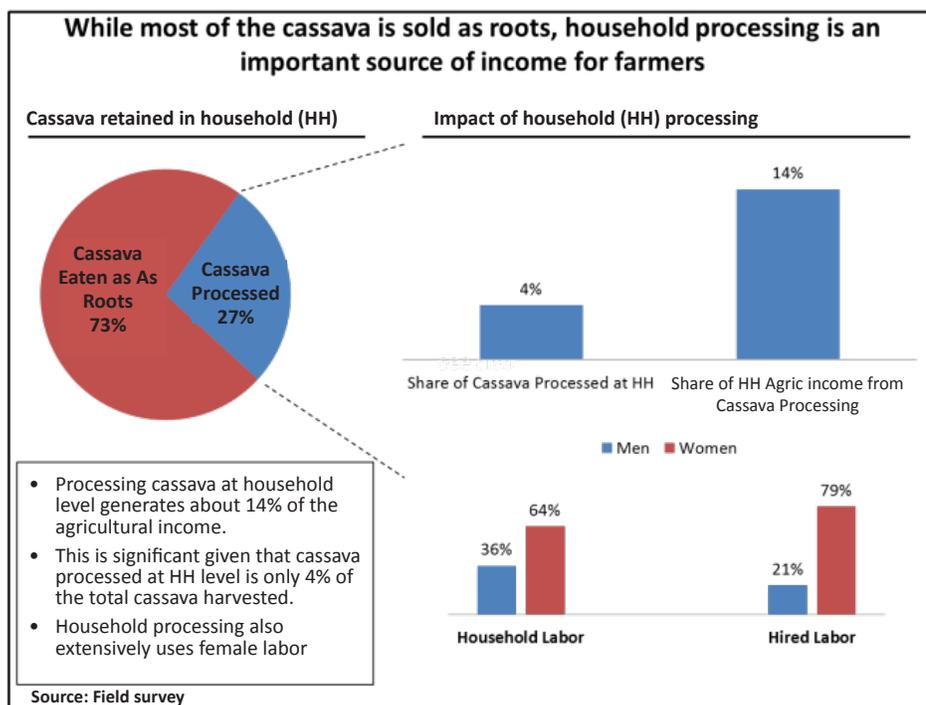
Processing

Household Processing

While only 16% of cassava is retained at household level and only 27% of the retained cassava is further processed (i.e., 4%), household (HH) processing is still an important source of household income. Our survey indicated that 14% of agricultural income of farmers surveyed came from processing cassava at household level. This is a significant value addition, since household processing uses both female and paid labor.

²³ 2014 prices are almost 50% above 2013; however, prices vary throughout the year, so the average prices for 2014 could be much lower, since the survey was conducted mid-year.

Figure 4.11: Household processing

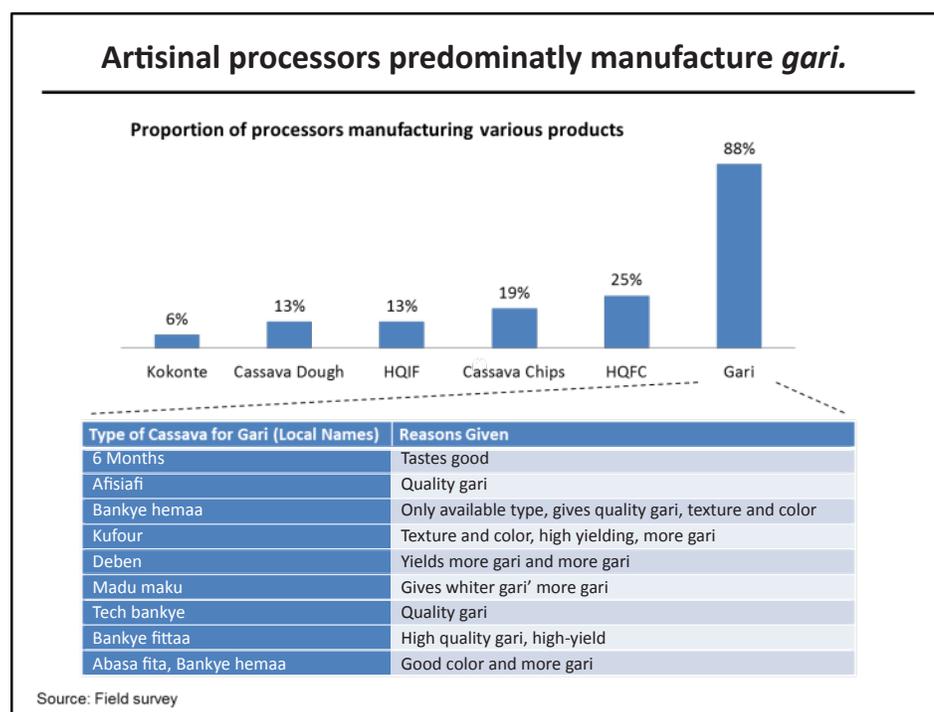


Commercial Artisanal/Traditional Processing

This is by far the most vibrant sector of cassava and is responsible for highly successful and significant cassava enterprises. Artisanal processors employ rudimentary equipment, and their premises tend to be of low standards. *Gari* is the dominant product manufactured. Eighty eight percent of the processors surveyed processed cassava to *gari*;²⁴ the next most common product, HQCF, was processed by only 25% of the processors. Other products include sun-dried chips/flour (commonly known as *konkonte*), and cassava dough (known as *agbelimor*).

²⁴ Gari averaged 76% of the output produced by processors. Sixty three percent of the processors processed only gari.

Fig 4.12: Proportion of processors processing cassava to various products



The cost structure of the various products does not vary much. Table 4.1 shows the cost structure of *gari*, HQCF, and cassava chips processing.

Table 4.1: Cost structure of cassava processing from 1 MT of cassava

	Ordinary Gari	Fortified Gari	HQCF	HQIF	Cassava Chips
Raw Material	50%	48%	64%	66%	75%
Labor	18%	17%	5%	19%	13%
Energy	7%	7%	19%	5%	2%
Transport	23%	22%	1%	2%	0%
Packaging	2%	2%	11%	8%	9%
Additives	-	4%			

HQCF-high-quality cassava flour; HGIF-high quality industrial flour

Source: Field survey

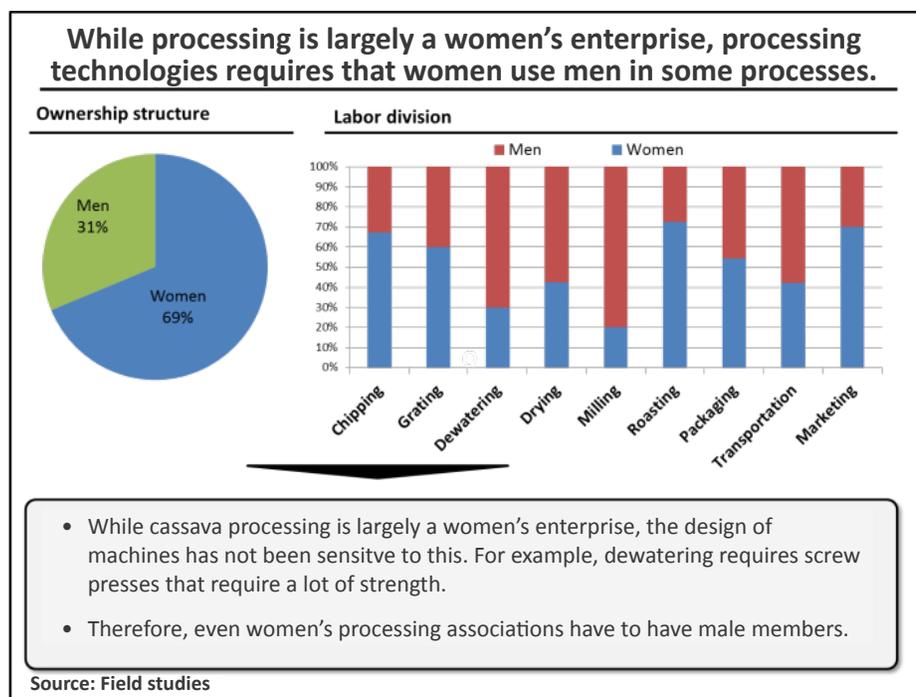
As expected, cassava roots are the biggest cost item, ranging from 50% of the total cost to about 75% of the cost. Labor and transport are the other key costs. Surprisingly, energy has a relatively small share of the cost, and this can be explained by the fact that artisanal processing uses firewood for *gari* processing and sunlight for drying chips. HQCF, which has strict standards for drying, has a relatively high share of energy cost.

Artisanal processors' gross profit margins are quite high, averaging about 53%. Considering that they do not have very high overhead (they have rudimentary processing facilities and employ low-skilled temporary labor), the business is very profitable. However, typical volumes sold are very low, so the cash flows involved are small.

Gender in Processing

Artisanal processing is mainly done by female processing groups. On average, these associations have a membership of between 30 and 50 members who also double as cassava farmers. However, since some of the processing machines require a lot of strength, they often need help from men. For example, the double screw presser requires strength to operate. As a result, ownership structure of cassava processing centers does not reflect the structure of staff.

Figure 4.13: Gender in Cassava Processing

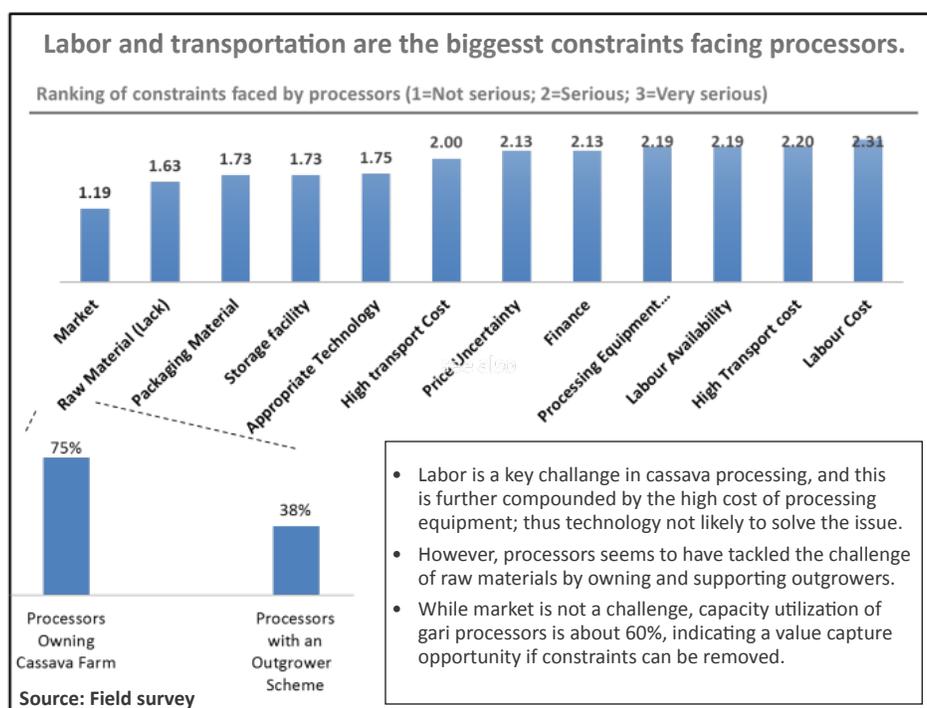


The fabrication sector is starting to acknowledge this, and efforts are being made to design female-friendly machines. For instance, the Gratis Foundation is designing a hydraulic presser to replace its double screw presser. However, most rural mechanics are not familiar with hydraulic technology, so a hydraulic presser is much harder to service in rural areas.

Artisanal Processors' Constraints

Processors rank labor availability and its high cost, high cost of transport, and high cost of processing equipment as the key constraints to their operations. Market was ranked as the least challenging, followed by lack of raw materials. These are surprising results, as lack of raw materials is usually the biggest challenge for formal processors. Artisanal processors, who are the bulk of the processors interviewed, seem to have solved the raw materials challenge. This may be explained by the fact that 75% of the processors also owned cassava farms. Also, 38% of the processors operated outgrower schemes.

Figure 4.14: Cassava processors' constraints



Processing equipment ranks high as a constraint to processing. This is despite the fact that most of the processors surveyed (88%) reported that they sourced their equipment from local fabricators. Local fabrication has therefore not made machines easily accessible. This is understandable. Local fabricators interviewed for this survey indicated that raw materials were the main cost driver for equipment fabrication.

One type of intervention that has been tried to lower costs is to make use of scrap metal; however, scrap material can only go so far. Equipment for food processing requires food-grade material, especially for surfaces that come into contact with food. Thus, expensive stainless steel, which has to be imported, is incorporated into the machines, raising their cost.

While the sector has shown great innovation, fabricators pointed out that innovation was largely driven by copying other successful machines, either local or imported. Most fabricators lack the needed resources to do research and development. Some aspects of processing—peeling and drying in particular—have not seen much development, as no successful models have been developed and diffused across the sector.

Small and Medium Enterprise (SME) Food Manufacturing

The problem with many traditional cassava food products is that they are not shelf-stable which poses a challenge for selling them in modern retailing. A nascent food-processing sector that is manufacturing shelf stable traditional products that are also properly packaged, in line with demand for modern retailing, is growing. The growth of this sector has been fueled by demand from the diaspora, who want to experience local dishes. Also, a rising middle class is creating demand for quick-to-prepare versions of traditional cassava dishes. There is a thriving SME cassava foods sector mainly serving export markets.²⁵

Industrial Cassava Processing Sector

There is a small industrial cassava processing sector that mainly produces cassava chips, starch, and HQCF for use as industrial inputs to manufacture a variety of products, including beer, plywood, and mosquito coils.

a) Cassava Chips

Cassava chips are produced mainly as feedstock to the animal feeds industry. In Ghana, it is estimated that 2,762,000 MT of cassava were used as animal feed in 2009 (FAO, 2013), which represents 22% of cassava production.²⁶ This study observed that poultry farms and piggeries in Ghana incorporate cassava chips with maize in the feeding of animals, using a 60:40 cassava-to-maize ratio. However, because no formal market for cassava chips exists, supply is very erratic, and getting consistent supply is a big problem. Farmers are not sure of quality, and due to fear of aflatoxin contamination, they do not feed the mix to young pigs (only to pigs three months and older). Demand for cassava as input to animal feeds is rising along with the price of maize.

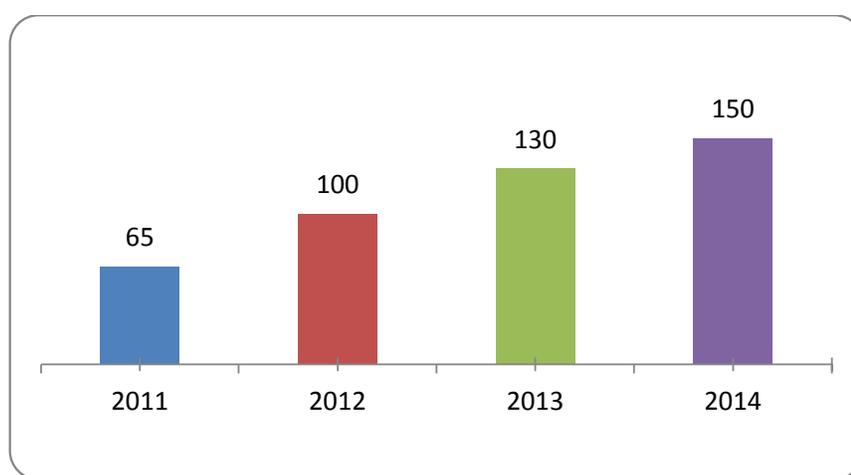
²⁵ These include Amasa Agro-Processing Co. Ltd., Accra; Cassacoxa Ltd. Sunyani; Bredi Agricultural Enterprise, Duayaw-Nkwanta; Next Door Farms; Atebubu, Afrimart Global Enterprises, Accra; Bishara Agricultural Enterprise, Damongo; Harri Farms, Bechem; Yonsu Cassava Processing Company Ltd. Yonsu; and Salaga Cassava Processing Plant, Salaga.

²⁶ The 22% figure seems very high. Cassava used for animal feed in Ghana was estimated at 4% in 2000 (Nweke, 2003).

b) Starch

Cassava starch is produced in large commercial quantities by only one company in Ghana, ASCo. ASCo is supplying cassava to Guinness Ghana for the making of cassava beer. The company has been reopened and is processing 25,000 MT of cassava roots per year, far below its installed capacity of 100,000 MT. Currently, the supply situation is difficult, and some assemblers/suppliers have to source cassava from as far as 420 km away. ASCo would like to better guarantee supply and lower costs by sourcing from within a radius of 50 km. As a result of supply challenges, ASCo has had to adjust the price it pays to its suppliers almost every year (see trend below).

Figure 4.15: Price ASCo is paying for cassava



Source: Field survey, 2014

Rising prices are becoming a challenge to sustaining ASCo. To improve supply in the medium term, ASCo is developing its own land through a block farming system of outgrowers, and in the longer term it hopes to develop outgrowers in surrounding areas.

c) HQCF

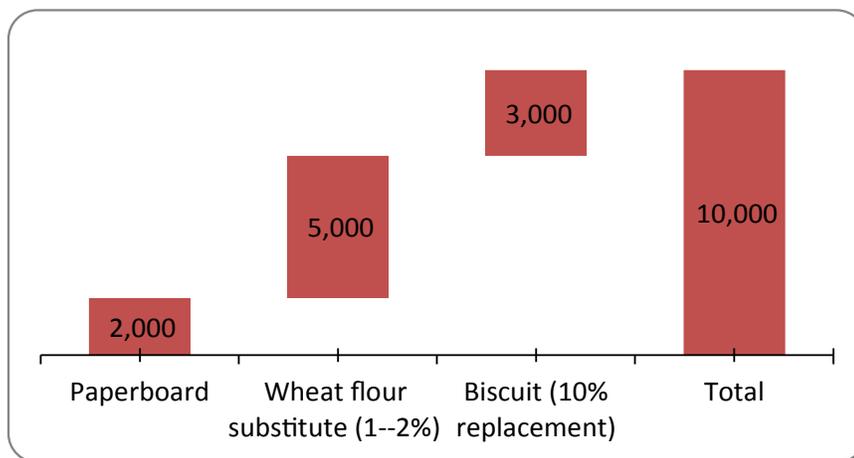
HQCF is the other major industrial product made from cassava. HQCF is being used by the plywood industry as a binding material and in bakeries as a substitute for wheat flour and to make cassava-based food products. Most HQCF is being produced by SMEs. However, they are facing significant challenges in servicing the demand. The main challenge seems to be drying, which is the most expensive part of the process. The cost of a flash dryer is about US\$100,000–US\$200,000, much too expensive for SME processors. A few large-scale processors have been established, notably Caltech ventures.

The survey found that over 80% of HQCF produced by one modern cassava processing company is sold to the plywood industry. The major advantage of HQCF over wheat flour is the fact that it is cheap; a 60 kg bag of HQCF currently sells for GH¢60, while an equivalent amount of wheat flour sells for GH¢90.

HQCF is also being used as a substitute for wheat in areas where the C:AVA program has been operating. A number of institutions—including prisons, senior high schools, and hotels in the study area—were using HQCF to make pastries and mix with wheat to make bread. HQCF is also displacing traditional cassava dough in making the traditional cassava dish, *banku*.

The C:AVA project estimates that there is a significant untapped demand for HQCF. They calculate that in the medium term (2–5 years), a total demand of 10,000 MT could be realized in the paperboard and bakery sectors, as shown in Figure 4.16.

Figure 4.16: HQCF market potential



Source: C:AVA (Ghana)

Box 4.1: DADTCO Autonomous Mobile Processing Unit (AMPU)

DADTCO is pioneering the Autonomous Mobile Processing Unit (AMPU). The AMPU can process cassava in a 50 km radius before moving to another location.

Its innovative “split” processing technology (i.e., in the field and at the factory) is dramatically changing the way cassava is perceived, grown, and processed in Africa. AMPUs provide an efficient method to reduce costs and bring the first stage of processing close to the production fields. AMPUs process cassava into a cassava cake that has about 20% moisture.

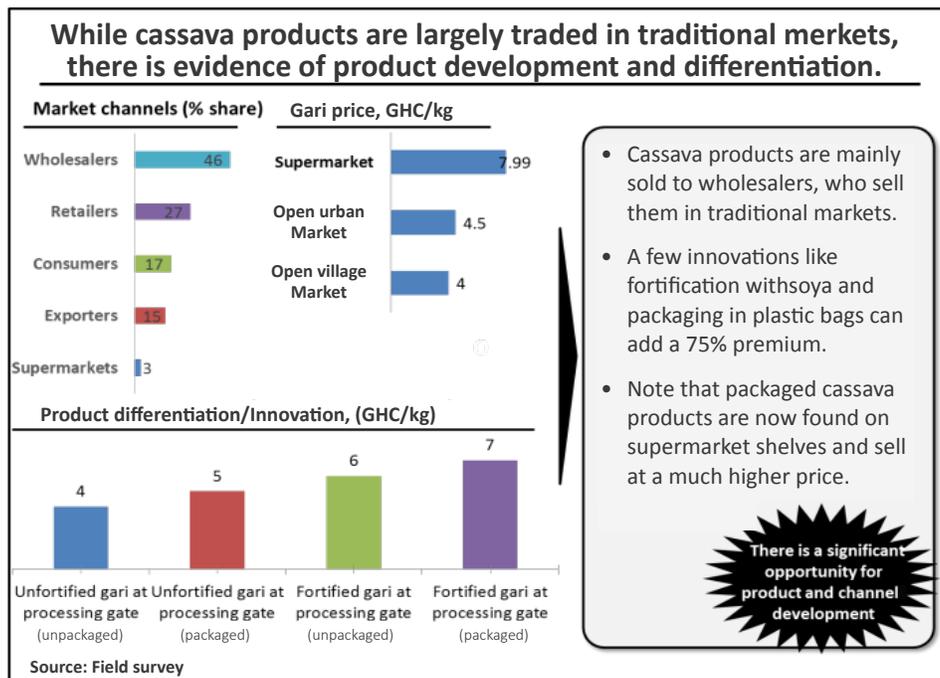
DADTCO’s AMPUs are located in cassava production areas. The AMPU stays for between three and four months in a location. When the harvest campaign is finished in one village, the AMPU will move the platform to another village.

Marketing and Distribution

Traditionally processed cassava foods—mainly *gari*, *agbelimor*, and *konkonte*—are mainly distributed by wholesalers who get them at the processing centers. Processing centers also sell to retailers and directly to consumers (14% of the product is disposed of this way), and 17% of the product is sold to exporters. Only a small portion of the product is disposed of through the supermarket channel.

It is apparent that marketing is getting sophisticated, even in the artisanal sector. The product innovation in *gari* is a good example. The main innovation has been in packaging and in fortification. Some processing associations have begun fortifying *gari* with such ingredients as nutmeg, margarine, and soybeans and supplying it to supermarkets and senior high schools in Ghana. Figure 4.17 shows that packaging *gari* adds a 20% premium, while fortifying can add another 25% premium. Note that fortifying and packaging add a 75% premium.

Figure 4.17: Product disposal channels



Exports

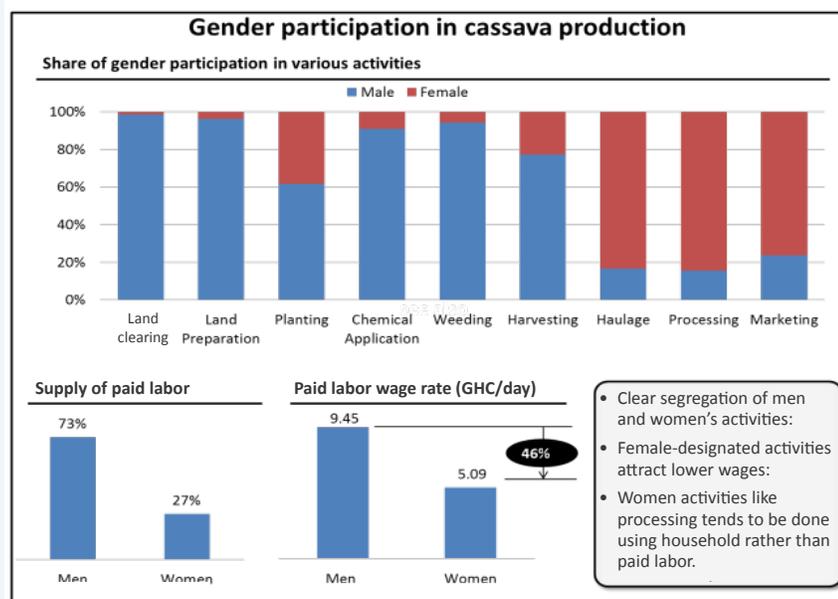
About 14% of processed cassava products²⁷ are exported, mainly by SME food manufacturers. The products are mainly exported to diaspora markets in the US, UK, and Netherlands. Exports to Burkina Faso were also observed. In the US and EU, most of the products are sold through independent shops (“African stores”) that specialize in African food products. These products are also now being stocked by mainstream supermarkets in ethnic food sections. One manufacturer reported shipping about five 40-foot containers a month through a distributor based in the Netherlands, who then distributes to various African stores in Europe.

²⁷ Products include ubankut.com/office/word/2010/wordprocessingS.

Box 4.2: Gender in the Cassava Value Chain

Cassava is considered a woman's crop in many countries. The level of gender involvement in cassava production was assessed on the basis of labor supply to various cassava production activities and the wages paid. The results are shown in Figure 4.18.

Figure 4.18: Cassava labor supply by gender



Source: Field survey

There is a clear segregation of duties in cassava production, with some activities designated as female and others designated as male activities. Activities such as agro-chemical application, weeding, land preparation, and harvesting are designated as male jobs. The female-designated activities attract a lower wage; the survey of wages indicated that women's average wage was 46% lower than that of men. However, there was significant variation across regions. Women's roles are said to be less laborious.

Note that women are over represented in processing and marketing of cassava (as workers and also as owners/entrepreneurs). We could not establish how income for processing is shared between men and women. However, casual observation indicates that women keep a large share of the income generated from this activity.

Some of the export arrangements are based on contract manufacturing, whereby a local firm manufactures for a foreign company (the importer). Contracting importers visit twice every year to see how much they can help the local company on issues of production and quality control.

There is potential for an export sector for HQCF, as attested by Caltech Ventures, who reported that they exported 5 MT of HQCF to Brazil in 2013.

Value Capture Opportunities

a) Farm-Level Value Capture Opportunities

At the farm level, the main opportunities are: (i) increasing yields, as cassava yields are far below potential yields; (ii) increasing efficiency through better tools and mechanization; and (iii) better planning.

Improving Yields

Yields achieved in Ghana currently range from 15 MT/ha to 25 MT/ha when farmers adopt best practices, including ridging and fertilizers. Moving farmers towards best practices can improve yield by about two-thirds. The DONATA project has managed to move yields from 12–15 MT/ha to 30–35 MT/ha in its intervention areas. DONATA interventions have included: introduction of high-yielding varieties; planting in rows; better weed management; an innovation platform that gave information to solve specific problems, rather than the generalized approach that is used in farmer field schools, where everything is taught; developing linkages to transporters and markets; and working with equipment fabricators to modify machines to make them easier for female processors to use.

Note that DONATA used an incremental approach in its interventions. Farmers are only asked to set aside a small portion of land for DONATA interventions, and the difference the farmers see between the intervention portion and the rest of the farm becomes the motivation for further adoption. One innovation that proved useful was distributing planting materials that had sprouted and packaging them in small bags. This was more female friendly and increased uptake of improved varieties by women. They also found that using processors to disseminate information on improved varieties was an effective approach.

Increasing Efficiency

Diffusing Planting and Harvesting Machinery

As discussed, labor is a key challenge to cassava production. A significant shift in efficiency can be achieved by substituting labor with technology, i.e., mechanization. The potential of mechanization has been investigated and also implemented. A study in Colombia found that seven men can plant only 1 ha/day, while a machine can plant 6.2 ha/day (Ospina et al undated). In essence, a machine is equivalent to about 43 laborers.²⁸ It was found that efficiency can be improved by 42% through a combination of improved variety and mechanization. Some recent experiences in cassava mechanization include:

- In Trinidad, a farmer who previously harvested only 1,500 lbs with six men was able to harvest 5,000 lbs in five hours with a machine (the manufacturers claim the machine can harvest 2,200 lbs per hour).²⁹
- Agro2 in Panama claims that it can now plant 5–7ha of cassava per day using harvesting equipment, instead of 0.5–1 ha per day using manual labor. Further, it found that the cassava harvester will improve efficiency by about 300%, by saving time and enhancing harvesting during the dry season, which is normally difficult due to hardened soil.³⁰

²⁸ Strictly speaking this should be 41 since the machine requires two laborers to operate.

²⁹ <http://guardian.co.tt/business/2012-04-22/ttaba-eases-farmers%E2%80%99-workload>

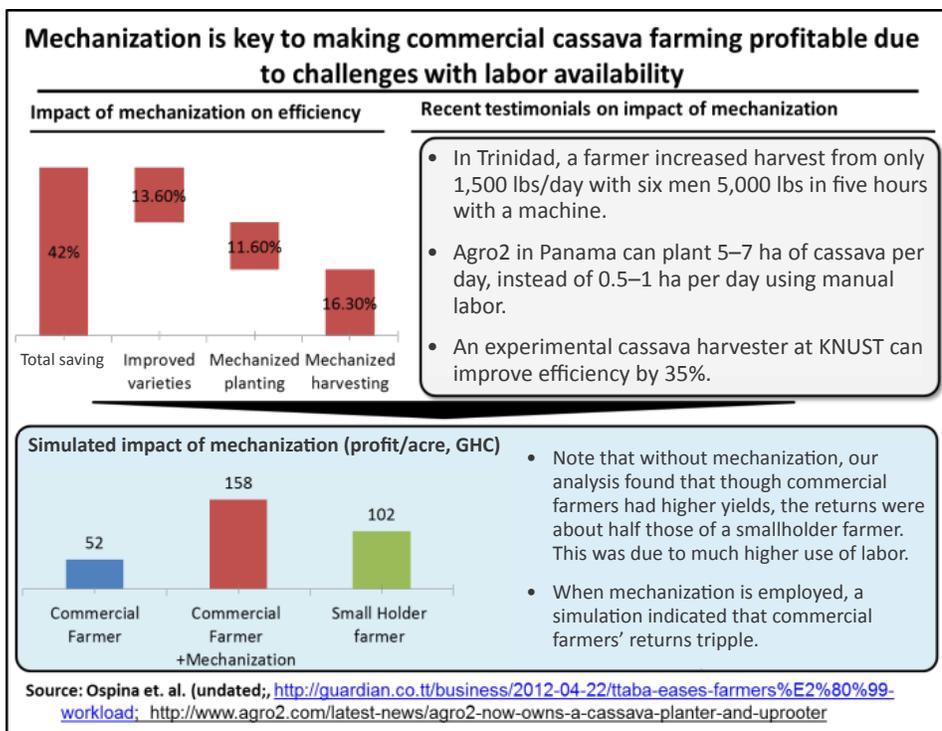
³⁰ <http://www.agro2.com/latest-news/agro2-now-owns-a-cassava-planter-and-uprooter/>

- In Ghana, a cassava harvester prototype is being tested by KNUST. Interviews with researchers indicate that the machine can harvest a hectare in two hours, compared to 53 man-hours (though the technology is semi-manual, as it only exposes the roots, which can then be picked up manually). CSIR is also testing a simple manual tool for aiding harvesting and tests indicate that it can improve efficiency by 35%.

Using Trinidad’s recent experience with the cassava harvester and Colombia’s experience with a planter and simulating the savings, we found that a Ghanaian commercial cassava farmer’s returns per hectare improved threefold and were better than the returns obtained by a smallholder, even under a low price scenario.

Beyond lowering costs of production, mechanization has the potential to have important secondary effects. Our analysis indicates that labor is one of the biggest constraints holding back processors. Processors are operating at 60% capacity despite the fact that they have no challenge with markets. Therefore, labor-saving technologies on farms can relieve labor for village processing activities.

Figure 4.19: Impact of mechanization (profit/acre under low price scenario)



Source: Team Analysis

Machines, however, require significant investment; a planter can cost about US\$30,000, while a harvester can cost about US\$70,000. However, they bring good returns on investments. Lungkapin et al (2009) estimates that for a one-year payback period, the planting area required is 80.7 ha/year.³¹ There is no guarantee that adding harvesters and planting equipment to the market will lead to uptake. A detailed study to understand a business model that will increase uptake is required.

Note also that use of mechanization will require that tree stumps be removed. This is a very costly operation and would probably require a one-time subsidy.

Better Support for the Fabrication Sector

The fabrication sector needs better support in terms of diffusing new ideas for better-performing machines and in lowering cost of inputs, especially for food grade stainless steel. Better linkages between artisanal fabricators, research institutes, and universities are needed to increase diffusion of ideas; each idea offered can benefit another. Fabricators have a better understanding of market needs, while research can help improve their designs. Part of the research and development funds that universities and research institutes access should also be made available to artisanal fabricators to improve designs.

There should be a link between the fabrication sector and the emerging mechanization centers being set up by government. Mechanization centers currently focus on tractors, but they can expand to also provide processing services. An arrangement where by they work with fabricators to be testing centers for new designs can also hasten diffusion of new equipment. Designers should be sensitive to presence of women in the industry and incentivized to make machines that are suitable for women to operate and service to reduce dependence on men.

b) Rethinking Cassava Food Manufacturing

Integrating Rural-Based Artisanal Processing to Urban-Based Modern SME Food Manufacturers

Two cassava-based food processing sectors with differing fortunes are operating in Ghana. The artisanal processing sector is doing very well, with a good supply of raw materials and good margins on products. However, the sector struggles in meeting food regulation standards and accessing modern markets. The modern SME sector, while able to negotiate the food regulatory landscape well, struggles with getting consistent supply. Thus the food sector can benefit from stronger linkages between the rural artisanal and urban-based SME processing sectors. This is the model that St. Bassa Processing Ltd. uses; it sources products from artisanal processors and then packages and markets them. Artisanal processors also participate indirectly in export markets through the company. In 2012, St. Bassa exported about 17.5 MT of *gari* to the UK. The company also exported 5 MT of *konkonte* and 5 MT of *agbelimor* to Belgium through sourcing from artisanal processors.

³¹ Based on a prototype cassava planter they tested in Thailand.

Product Development

Cassava is popular across West Africa and other parts of the world so there are a variety of ways to prepare cassava dishes. The table below shows some of the common dishes in West African countries. New recipes that combine different cassava processing traditions are also emerging. In Benin, a dish that combines methods for making *attiéké* and *gari* has been developed, and a new dish known as *attiéké-gari* is gaining popularity.

Table 4.2: Cassava dishes in West Africa

Country	Traditional cassava food variety
Ghana	<i>Fufu, Kokonte, Banku, Gari</i>
Nigeria	<i>Gari, Eba,</i>
Cote d'Ivoire	<i>Attiéké and Attoukpou</i>
Togo	<i>Tapioca</i>
Sierra Leone	<i>Garia</i>
Liberia	<i>Dumby</i>

Source: West African Trends, Issue 2 (ACET 2012)

As global food prices continue to rise with fears of a future food shortage, as attested by the 2007 food crisis, diets are beginning to shift from imported foods to local food varieties. This provides an opportunity for cassava. For instance, in Guinea, high food prices saw people switch from rice to *attiéké* (a cassava dish that can compete with rice on convenience and texture). Similarly, in Mali, *attiéké* is growing popular, especially as a breakfast cereal, due to its lower cost compared to other cereals.

The task is to take these new recipes and adapt and market them to a wider Ghanaian market. This is happening. The RTIMP program has collated recipes from the International Institute of Tropical Agriculture (IITA), the Food Agricultural Organization of the UN (FAO), and the Home Science Department of the University of Ghana. The program has conducted assessments at the CSIR-FRI on the suitability and acceptability of the recipes, so as to adapt or standardize them where necessary. The next step is to convert recipes to shelf-stable food products that can be distributed in modern retail channels.

c) Development of Cassava Industrial Feedstock

The opportunity for cassava as an industrial feedstock is largely untouched. Yet a significant opportunity exists in the production of HQCF, starch, and cassava chips for animal feeds. Ghana imports starch, sweeteners, and ethanol as ingredients for foods, pharmaceuticals, and other industries. These are products that can be produced from cassava.

Starch

Import substitution should be the focus initially, and once industrial capacity is developed, export markets have significant promise. However, competition from maize is going to limit export opportunity; current statistics indicate that maize is still supplying as much as 75% of the global starch market, with cassava starch contributing about 12%. On the other hand, the future of the EU potato starch industry hangs in the balance, as the EU is currently undertaking a wide-ranging reform of its agricultural policies. This could result in a significant decline in potato starch production and could open up the EU to greater imports of cassava starch (UNIDO).

Feeds

In the long run, animal feed remains the biggest opportunity. FAO (2013) estimates that the annual growth rate of the livestock population from 2006 to 2010 was 4.2%, with poultry achieving a growth rate of 11% annually (FAO, 2013). Further, C:AVA estimates the potential long-term market for dried cassava in animal feeds at 80,000 MT annually (75,000 MT for layers, 2,000 MT for broilers, and 3,000 MT for pigs). However, a significant number of the medium- and small-scale poultry farms have folded in the face of competition from low-priced imported poultry products. Imports stood at 72,418 MT in 2012. Government policy on imports of poultry and other livestock products is key to the development of a strong feeds sector.

There are significant export market opportunities for cassava chips. While the EU as a market has declined, there is still demand, as cassava is allowable in feeds. China is now the biggest market for cassava chips and probably a more addressable opportunity as their standards are likely to be less stringent. This is a difficult opportunity, however. Competing in global markets will require that Ghana's yields move to global benchmarks. Further, production costs will need to fall drastically for Ghana to compete with exporters like Thailand and Brazil. However, Ghana has exported cassava chips to Europe in the past, indicating that the prospect is feasible. This underscores yet again the need for mechanization.

Ethanol

Ethanol can be successfully blended with gasoline or diesel at rates of 5–10% and 3% by volume, respectively. At these ratios, no modification is required in gasoline and diesel engines; with modifications, up to 100% power alcohol can be used. This is especially important in the context of high oil prices. Globally, there is a growing demand for ethanol, mainly due to concerns about greenhouse gas emissions, which have resulted in ethanol mandates on biofuels in the US and the EU. The US has met demand through local production using maize, while the EU is increasingly looking to import to meet the renewable energy mandate that requires a 10% renewable energy component in motor vehicle fuel. Cassava is well positioned as one of the most efficient producers of ethanol. With current best technologies, some experts estimate that cassava ethanol is commercially viable when oil is above US\$38 per barrel (WAT, 2013).

Cassava Sweeteners

During World War II, as a result of a sugar shortage, sweets and sweeteners made from cassava were common, demonstrating the versatility of cassava. Nigeria, under its Agricultural Transformation Plan, is looking at using cassava to produce fructose for the food industry. Ghana currently imports 250,000MT of refined sugar, a significant amount of which goes to the food industry. This presents a big opportunity.

In the industrial feedstock sector, the key requirements are low cost and consistent and fairly large volumes. The sector also requires planting the cassava that is best for industry (high-starch) rather than for food. Smallholders are not likely to meet these specifications. By planting many varieties, they lower risk as they have better flexibility to sell to processors and to markets. They also grow cassava for their own consumption as well as for market. They are unlikely to grow cassava varieties that they cannot eat. On the other hand, a commercial farmer is focused on selling to market, and the guarantee given by an industrial buyer in terms of off-take at a given price allows for better planning. Therefore, they can make needed investments in high-yielding varieties, combined with the mechanization that is necessary to lower costs and make cassava a viable industrial feedstock. There is a need to create special incentives to support the growth of the nascent commercial sector, and this support should take a very different flavor from the current general support given to smallholder farmers. One example could be taxing sugar imports to finance development of cassava sweeteners.

Credit

Access to credit is a necessary precondition to capturing these benefits. It will not only allow higher technological input—e.g., mechanization—but will also allow better planning, as credit-constrained farmers tend to use cassava as a bank and harvest when they need money, rather than when the market provides the best returns.

What It Will Take

While the government has a comprehensive policy on cassava, a number of areas should be strengthened:

- A policy is needed that gives greater attention to supporting medium-sized commercial farmers/processors, as they are the key to development of an industrial cassava sector. Further, they can be the link between industry and smallholders through development of contract farming, as demonstrated by Caltech Ventures. Support can be through subsidized financing, access to land, and routing the support—e.g., inputs—that government provides to smallholders through the medium sized farmers that have developed contract farming. Government can also deploy some of its extension officers to be on staff at the medium-sized farms in order to support contract farmers.
- A subsidy for removal of tree stumps can make more land available for cassava. This would be a one-time subsidy that is necessary due to the huge initial cost of removing tree stumps.
- The mechanization centers need to be strengthened to incorporate a greater range of machines for cassava production and processing, especially harvesters and planters. This will also require development of business models that will make the centers' services affordable and sustainable. It would be better to use existing suppliers of mechanization services (if they exist) rather than use the government to set up new centers, as is now the case. Government can support with subsidies for very poor farmers or with cheap loans to service providers. The current centers can be leased out to the private sector and operated via a Public–Private Partnership (PPP) model.

- A mechanization fund will allow greater cooperation between mechanization centers, research centers, and entrepreneurs/fabricators so that they can work more closely to develop appropriate machines and appropriate business models.
- Incentivizing new models for delivering inputs will allow input providers to also become service providers. For instance, in Nigeria, herbicide and fertilizer companies were incentivized to provide services at the farm-gate level. The certified weed control groups ensured that farmers had the benefit of unadulterated chemicals. This can also help create employment for youths.
- Export promotion policy needs to create stronger direct linkages between cassava processors and global supermarkets.
- Financing models for support of cassava production and processing are needed. Micro Finance and Small Loans Center (MASLOC) and EDAIF are facilities that could be improved through better thinking about how to subsidize risk and let commercial banks do the lending and loan administration. Agricultural financing should be expanded to include equipment fabricators.

In the longer run, there is a need for strong and consistent policies on import substitution to help grow the cassava industrial feed sector. Strong mandates will enable investments in both production and processing. Three mandates that will go far include:

- A cassava flour mandate on wheat substitution in bread, which will enable the growth of the HQCF sector. This may be, a mandate of 5% that would grow gradually to 15% over 10 years.
- An ethanol fuel mandate that stipulates a 10% ethanol component in gasoline. Again, this could rise from 5% to 10% to allow industry to build scale and needed infrastructure.
- The growth of the animal feed industry and cassava as animal feed could also benefit from policy changes on the importation of poultry and animal products. Poultry feed is the biggest feed sector, and gradually reducing importation of poultry meat (via higher taxes and, ultimately, a ban) will raise demand for locally produced feeds.



V. Ghana Cocoa Value Chain

Cocoa has historically been Ghana's main agricultural export and a mainstay of the economy overall, and the contributions of cocoa and cocoa products to total merchandise exports have been substantial. The cocoa industry contributes about 8.2% of the country's GDP, provides the second-largest source of export earnings (about 30% of the total), generates employment and income for around one-third of all Ghanaians throughout the chain, and accounts for about 50% of the agricultural labor force in Ghana.³⁴

Since 2001, the volume of cocoa produced in the country has grown at a very fast rate (about 16% per annum). Many actors involved in the sector have attributed this production growth to reform in the cocoa purchasing regimes, along with an increase in fertilizer use and the introduction of a government-sponsored mass spraying exercise beginning in 2001. Today, Ghana's production is slightly below 700,000 MT of cocoa beans per year.

However, productivity remains low, and in a bid to raise productivity, the government has put in place a number of ambitious programs. Some of the larger initiatives are:

- The National Cocoa Rehabilitation Program, an initiative by the Ghana Cocoa Board (COCOBOD) started in 2011 that aims to increase and sustain cocoa production in Ghana through rehabilitation and replacement of old and diseased cocoa trees with improved hybrid varieties. Researchers had observed that about 23% of cocoa tree stocks nationwide were more than 30 years old and less productive than they could be. Most farms were also heavily infested with mistletoes and diseases that reduced potential yields of cocoa. The 2012 budget statement allocated funds for the supply of 20 million hybrid cocoa seedlings, free of charge, to farmers in Ghana.
- The National Cocoa Disease and Pest Control (CODAPEC) or Cocoa Mass Spraying Program, which began in the 2001/2002 cocoa season aims to help all cocoa farmers in the country fight capsid/mirid and the black pod diseases. These programs have had a big impact. Cocoa production rose from 380,000 MT at the inception of the program to an all-time high of over 1,000,000 MT in the 2010/2011 cocoa season.³⁵ An important spillover impact of CODAPEC is that it has been a source of employment for youth. It has engaged over 60,000 people in rural communities as sprayers, supervisors, and mechanics.
- The Hi-Tech Fertilizer Program (HTFP), started in the 2003/2004 season, which has been promoting the increased use of fertilizers, initially through credit and now through subsidized fertilizer. In 2012, for instance, the price of Hi-Tech fertilizer was fixed at GH¢33, representing a government subsidy of 45.79%.³⁶ This program has encouraged cocoa farmers to apply fertilizers at a minimum of two bags per acre.

³⁴ Seini, 2002.

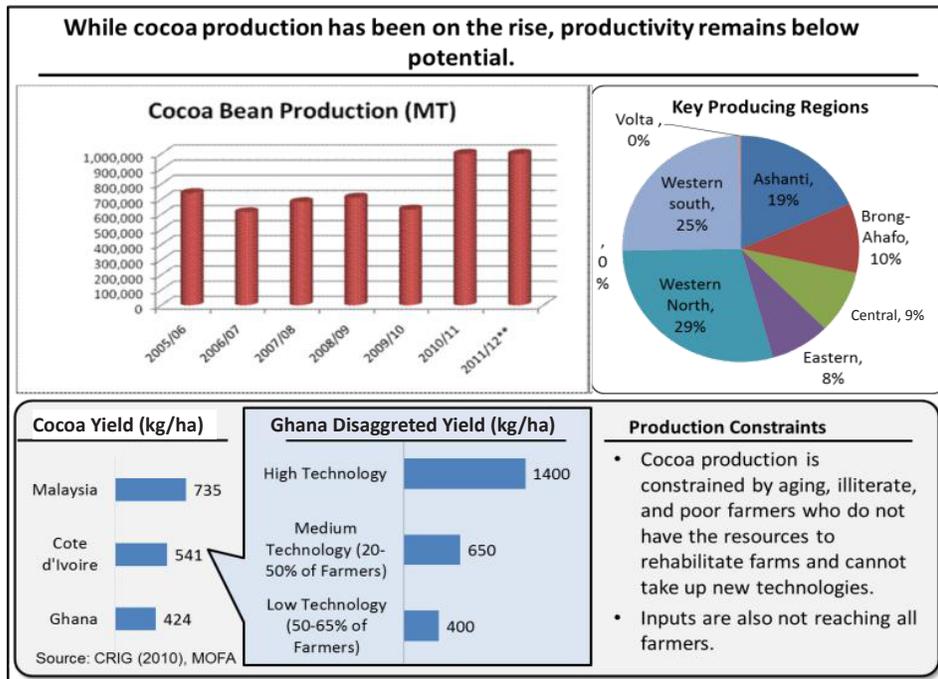
³⁵ Adjinah and Opoku, 2010.

³⁶ Dr. K. Ofori-Frimpong, Coordinator, Hi-Tech Cocoa Program.

Production

Cocoa production in Ghana reached 1,004,000 MT in the 2010/2011 growing season, then dropped to 835,410 MT during the 2012/2013 season; a total production of 830,000 MT was expected for the 2013/2014 season. Cocoa in Ghana is produced predominantly in the Western Region. That region alone accounts for over 54% of cocoa production, and, together with the Ashanti Region, produces 72% of all cocoa in Ghana.

Figure 5.1: Cocoa production trends



Source: COCOBOD data

Although Ghana has doubled its output over the last decade, productivity levels remain way below potential. Growth is explained by factors such as the product-life cycle, expansion of cocoa land, and to some extent smuggling from Côte d'Ivoire. It is not necessarily due to increased productivity. The two key challenges impacting production of cocoa are: (i) loss of cocoa land to artisanal mining, and (ii) low productivity, which is compounded by (iii) aging farmers and (iv) inputs unavailability.

i. Loss of Cocoa Lands

Gold wealth constitutes about 11% of the GDP, yet approximately 30% of Ghana's land is currently under concession to gold mining firms, and each year more arable farming land is diverted. This is especially acute for cocoa, since the Western Region's both a key gold-producing region and the main producer of cocoa. Gold mining not only takes away land for agriculture, but pollutants from mining activities also affect agricultural productivity in the vicinity of gold mines. Further, the lure of gold attracts farmers, especially young men (future farmers), away from the land, depleting farm labor. One study found that the combined losses from low yields of cocoa and maize are higher than the contribution of gold to Ghana government revenues.³⁷

37 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3357810/>

ii. Low Productivity

Cocoa productivity is low in comparison to benchmark countries. In 2011, the average cocoa yield in Ghana was 424 kg/ha. Malaysia stood at 735 kg/ha³⁸ and Côte d'Ivoire at 541 kg/ha. However, the situation is more nuanced, as there are really three classes of farmers in Ghana showing very different yields. We have:

- Low-production class or level (L): Between 50% and 65% of cocoa farmers produce about 400 kg/ha. These farmers plant at stake with unspecified sources of seeds, with irregular spacing and high density, and with little or no pruning of trees, inadequate weeding, no removal of mistletoes, no disease or pest control, irregular harvesting, and little shade management.
- Medium-production class or level (M): Between 20% and 40% of cocoa farmers produce 650 kg/ha. These farmers use good agronomic practices, but still do not produce at optimal levels.
- High-production class or level (H): A small group of farmers produce on average 1,400 kg/ha. These farmers apply the full package of recommended practices. They use improved seeds from designated seed gardens, regular spacing at 3 m, regular weed control, shade management, pest control (four times a year), disease control (5–6 times a year), frequent pruning, fertilizer application once a year, and frequent harvesting.

The problem of low yields relative to potential has been ascribed to constraints such as diseases and pests, inefficiency in the allocation of resources, and improper cultural practices.³⁹ The potential for increasing productivity is significant if farmers can shift from low-productivity to higher-productivity classes. However, increasing yields costs money, and it is unclear whether extra investments will pay off in the form of higher returns. We shall explore this below.

iii. Poor, Illiterate, and Aging Farmers

Aging farmers have no incentive to invest in new trees; illiteracy limits their ability to apply new technology; and poverty prevents them from moving from a low-productivity system to higher-productivity systems that require high levels of inputs. Indeed, cutlass and hoe remain the key technologies employed.

iv. Input Availability

The most important non-labor inputs in cocoa production are fertilizer, insecticide, and seedlings for cocoa replanting. Presently, the government of Ghana has a liberalization policy in which sales and distribution of cocoa inputs have been privatized. Even extensions have been privatized through PPP. But government still provides free or subsidized inputs through programs such as the Mass Spraying and Hi-Tech Fertilizer programs, though there are still challenges in reaching all farmers.

³⁸ FAOSTAT, 2011.

³⁹ Aneani et al, 2011.

v. Quality

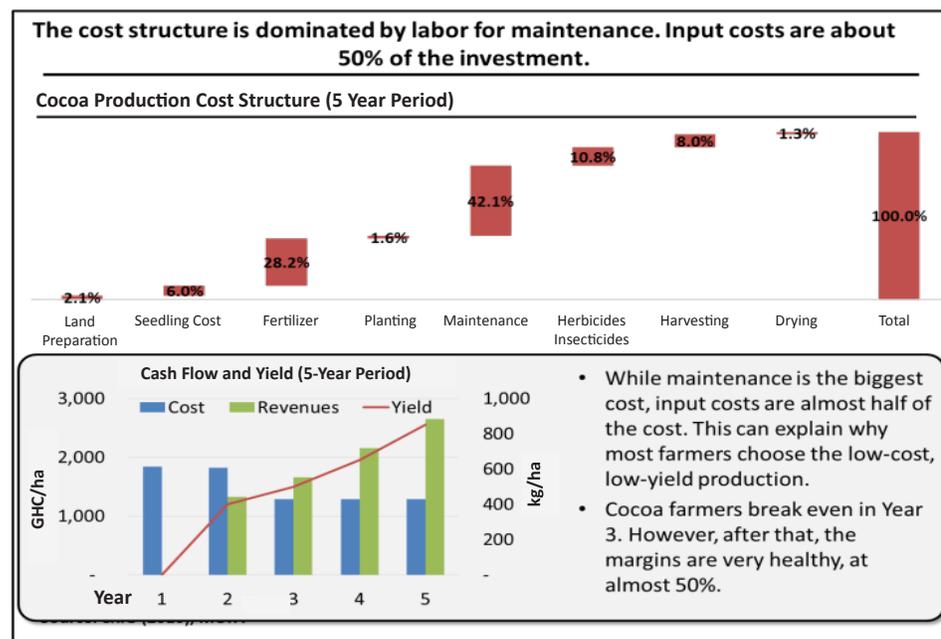
Ghana's cocoa beans have become the quality standard against which all cocoa is measured worldwide. Ghana's cocoa beans fetch a high premium on the world's commodities markets, with buyers of Ghanaian cocoa paying a premium ranging from US\$50–100 per MT.⁴⁰

To maintain product quality, COCOBOD's Quality Control Company (QCC) does three inspections: (1) at the up-country store; (2) at the take-over point; and (3) at the point of export.

Production Cost Structure

The cost structure for establishing a high-yielding cocoa farm is shown in Figure 5.2. The main cost is labor for maintaining the farm; however, input costs are about 50%, and this might be why many farmers shy away from using high levels of inputs. Family labor (including children) is the main input. It takes three years for a cocoa farmer to break even, which can explain why trees are getting old. Many resource-poor farmers are not able to make big upfront investments. However, analysis indicates that once new trees are established, the returns are very good. Thus, if farmers can be supported with initial resources to establish farms and inputs, cocoa has the potential to improve the incomes of farmers.

Figure 5.2: Cocoa production cost structure



⁴⁰ Ghana Cocoa Board (COCOBOD).

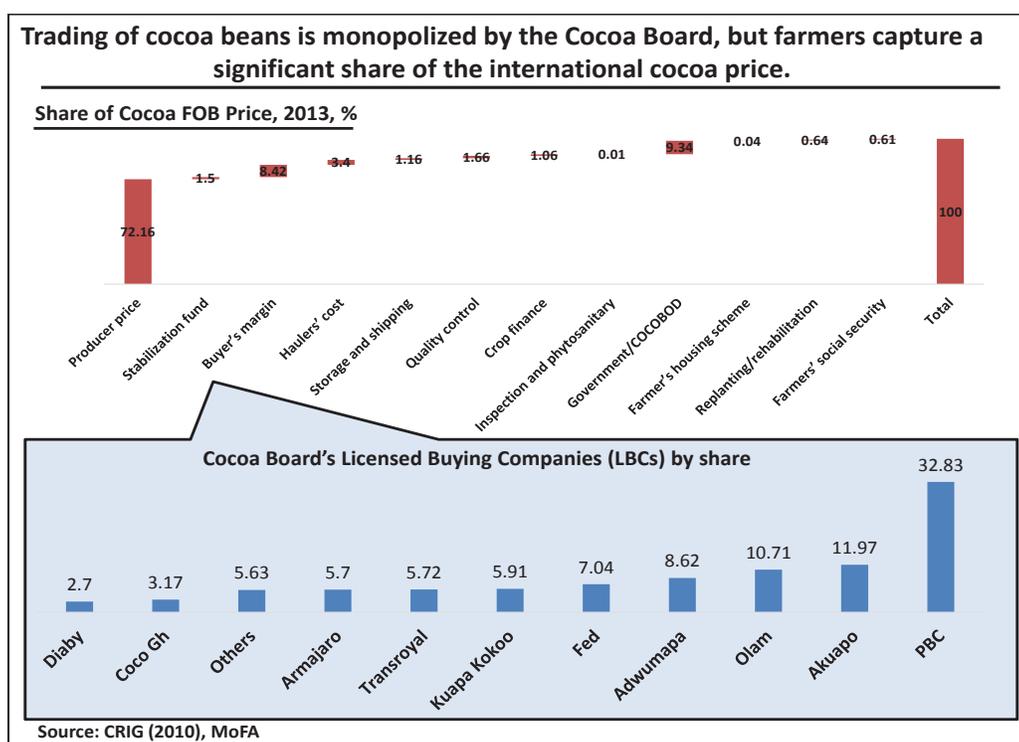
Farmers' Organizations

A majority of cocoa farmers are not formally organized. However, farm owners are automatically registered with the Ghana Cocoa Coffee Shea-nut Farmers Association (GCCSFA). In addition to GCCSFA, there are two important farmer groups that function as farmers' organizations: the Kuapa Kokoo Farmer Union (KKFU), with around 50,000 members, and the Cocoa Abrabopa Association (CAA), with over 18,000 members. There are also a number of smaller organic cocoa groups, under the supervision of the Agro Eco-Louis Bolk Institute. Informally, farmers also work together in labor exchange groups (*nnoboa*),⁴¹ and some have been part of farmer field schools.

From Farm to Market: Cocoa Trading

The government is the sole buyer of cocoa in Ghana through the Cocoa Board. The Board grants Licensed Buying Companies (LBCs) the exclusive right to buy cocoa beans from producers at no less than announced prices and to deliver them to its subsidiary, the Cocoa Marketing Company (CMC), while adhering to quality standards stipulated by the QCC.

Figure 5.3: Cocoa trading

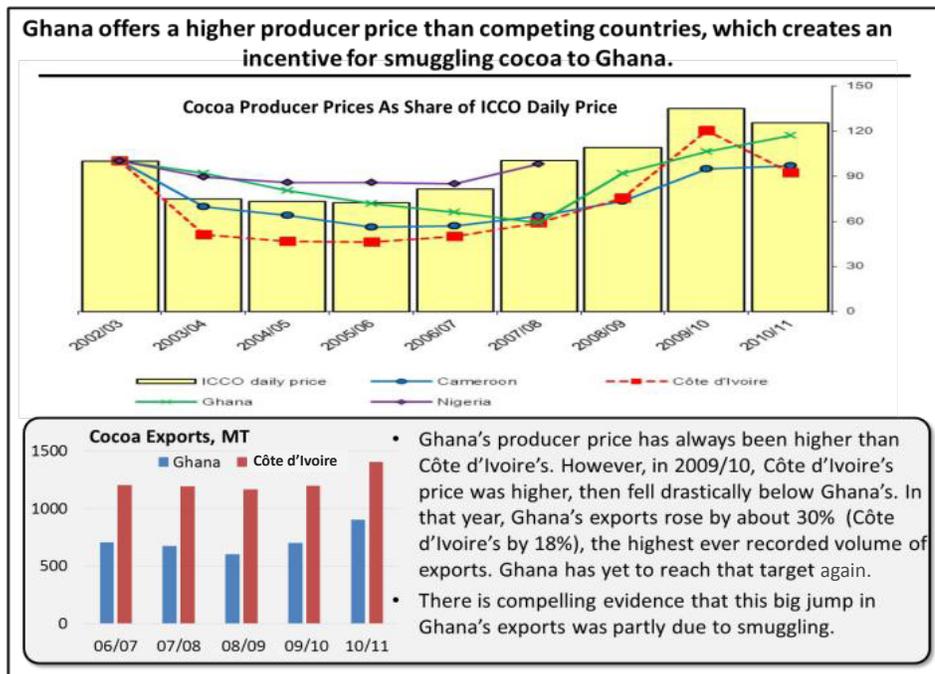


At the beginning of every season (October 1), the government announces a new producer price of cocoa beans. Currently the board targets a price for farmers of at least 70% of the international market price, with 8% of the price margin kept by the LBCs. There has been an upward shift in the share kept by farmers. For instance, the annual producer price was 56% of the freight on board (FoB) in 1998/1999, 70% in 2004/2005, and 76% in 2011/2012.

⁴¹ An Akan word meaning "farming to help one another."

Compared to other producer countries, Ghanaian farmers have been faring better under this system as Figure 5.4 shows. On average, Ghanaian farmers have been getting a higher price than their counterparts in neighboring Côte d'Ivoire, giving substance to the rumors that part of the cocoa bean production data in Ghana can be attributed to smuggling from Côte d'Ivoire. This has important implications as smuggling can lower the quality of Ghana cocoa and erode Ghana's premium cocoa earnings.

Figure 5.4: Cocoa producer price trends



Source: *The World Cocoa Economy: Past and Present*

Traditionally, LBCs are not allowed to buy cocoa below the producer price and are not encouraged to pay farmers more than the fixed price. LBCs receive a fixed buyer margin for their services.

Most LBCs have informal contracts with farmers in which they provide farmers with inputs in return for a guaranteed supply of cocoa beans at harvest. Some farmers have organized themselves as a union, and LBCs buy inputs in bulk to maximize revenue.

Since the cocoa price is controlled, some have argued that there is not much opportunity for enhancing competition or improving quality. To address these concerns, there has been a shift in policy with the introduction of (voluntary) premiums for specialty cocoa and certified cocoa. This gives both farmer groups and LBCs the opportunity to diversify their marketing channels. This premium, which is added on top of the producer price, is shared between cocoa farmers, certificate holders, and other possible business partners. It is common that farmers receive at least 50% of the premium.⁴³

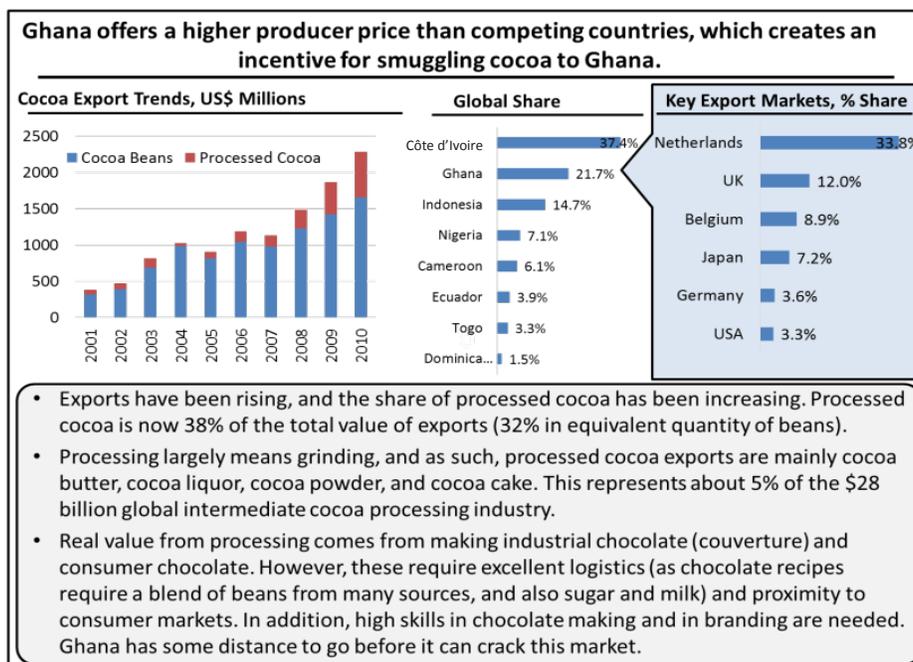
LBCs can be divided into four groups. The first category consists of the Produce Buying Company (PBC), which controls 33.8% of the market. The second category consists of other domestically owned companies, which control

⁴³ This premium is not always paid fully in cash to the farmers, but part of it may also be put in a social fund.

44.8% of the market. The third category is the farmer-based fair-trade cooperative Kuapa Kokoo, which controls 5.9% of the market. The fourth category consists of two international companies, Olam and Armajaro, which control 16.4% of the market combined.

LBCs have to contend with poor roads in many cocoa-growing areas. Delays in releasing funds due to them by CMC also constrain their operations.

Figure 5.5: Cocoa exports



Source: Essegbey and Gyamfi, based on ISSER yearly data

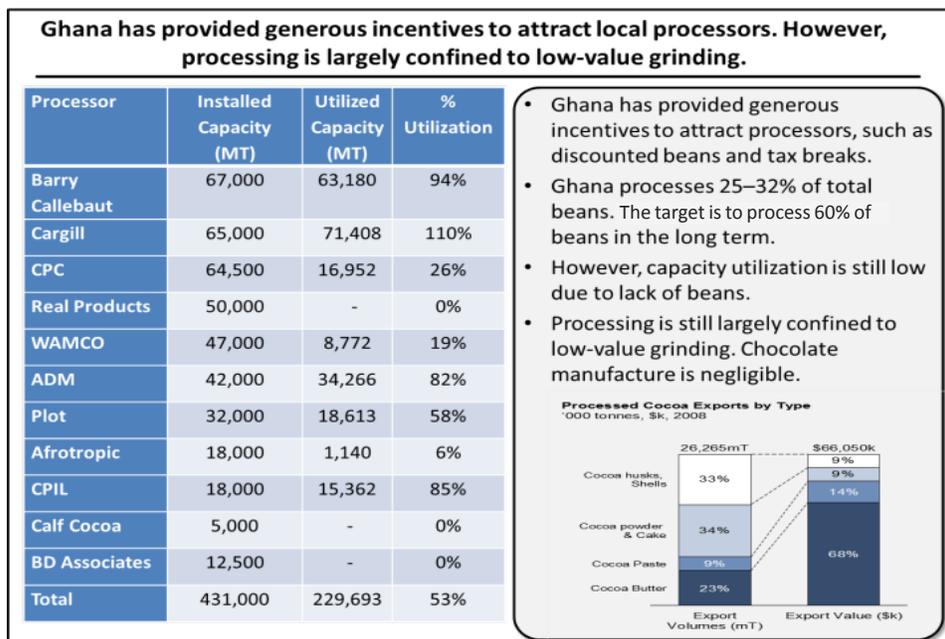
Processing

Ghana's total export earnings from cocoa have been increasing since the mid-2000s. What is significant about the trends in cocoa production and exports is the rising component of value-added cocoa. Processed cocoa now represents 38% of cocoa exports or the equivalent of 32% of cocoa beans.

The Ghanaian government has targeted an increase in origin grinding to 40% by 2012, with a long-term target of 60%. The government has provided generous incentives to attract investment in cocoa processing. Processors are sold the light crop beans at an 80% discount and get the benefits of being located in Export Processing Zones (EPZ). EPZ advantages include a 100% exemption from the payment of direct and indirect duties and levies on all imports for production and exports from free zones; a 100% exemption from the payment of income tax on profits for 10 years (after 10 years, pay no more than 8%, compared to 25% for non-EPZ companies); no value added tax (VAT) on purchases, including utilities; EPZ companies and no restriction on fund repatriation.

However, at 25–32% of cocoa beans processed, Ghana has fallen short of reaching its target. COCOBOD estimates installed processing capacity as of 2011/2012 at 431,000 MT. Beans processed during the 2010/2011 crop year, however, were at just about 230,000 MT, with the factories operating at a combined 53% capacity.

Figure 5.6: Cocoa processing



Some processors argue that the Cocoa Board's current cocoa bean pricing scheme is an impediment to local processing, despite the Cocoa Board's offered benefits to cocoa bean production.⁴⁴ Processors get the small crop at an 80% discount, but there is not enough to meet demand. Many processors must still buy main crop beans at an international market price, which they say discourages processing due to the high utility costs in Ghana.⁴⁵

Note that the European Union levies no duties on the import of raw cocoa beans, but levies 7.7% and 15% ad valorem duties on cocoa powder and cocoa cake, respectively. Intermediate processors located in Ghana tend to have higher processing costs per ton than European factories; their distance from suppliers leads to higher costs for capital investments, higher maintenance costs, and more capital tied up in inventory for spare parts. Import and export bureaucracy can create additional costs, as well as uncertainty in the supply chain. Distance from clients also necessitates solidification of cocoa liquor and butter, which raises input costs for clients that have to re-melt the products before use; it also makes just-in-time deliveries much harder to achieve and can exclude origin processors from being able to make close-proximity and very forward sales.

Finally, origin processors face a series of traditional challenges that impact industrialization in general in Ghana, such as high energy costs, relatively high interest rates, a general lack of affordable finance for local players, customs duties on machinery and parts, and higher costs for packaging, maintenance, and services.

⁴⁴ The operations manager of the Business unit of Cargill Cocoa and Chocolate, Mr. Wouter Evers, told the Daily Graphic (a prominent newspaper in Ghana) that "we have the capacity to do more than we do now, but Ghana's cocoa is expensive, and to increase the quantity we process, we will require some incentives."

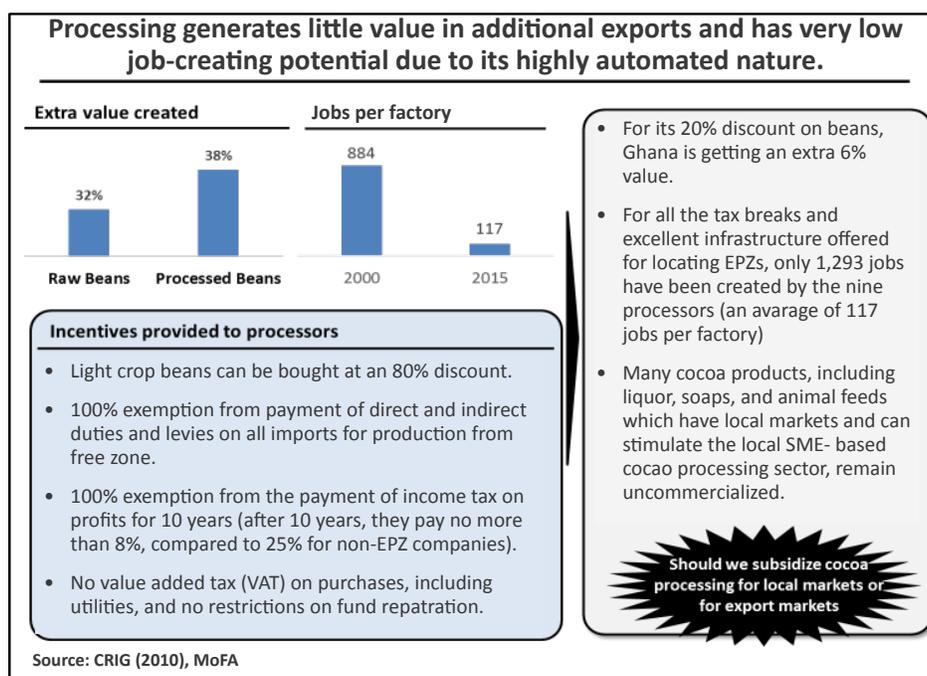
⁴⁵ We noted more than half a dozen newspaper articles in which processors advocate for more support in the form of cheaper beans from the Cocoa Board.

To Process or Not

Ghanaian cocoa processing is highly automated, employing only 1,293 workers in nine firms, which is much lower (on a per-firm basis) than in the late 2000s, when two cocoa processing companies employed 884 workers. Due to limited job creation in the cocoa processing sector, the Cocoa Board has argued against giving further discounts on the cocoa beans it sells to processors, especially those produced during the main season.

It is not clear whether it makes sense to grind cocoa, as it might actually be destroying value. With only 6% more in value from exports, it is not producing many jobs, and yet there is a 20% discount plus a raft of incentives. It may be better to provide incentive resources for development of other cocoa products—such as liquors, soaps, and fertilizers—that have local markets. This type of manufacturing not only adds value, but since it is likely to be produced by SMEs, it will help develop local industries.

Fig 5.7: Impact of cocoa processing



Chocolate Processing

Processing is largely low-value grinding; there is only minimal chocolate manufacturing in Ghana. CPC, a COCOBOD subsidiary involved in grinding, operates a branded chocolate production facility in Ghana making various brands of chocolate, including Portem Gold, Kingsbite, and Oranco.

Note that production of cocoa beans is not as important for the development of the sector as addressing the costs of other inputs and processing. In the manufacture of industrial chocolate (couverture), the price of cocoa beans is a relatively small share of the overall cost once sugar, dairy, stabilizers, and processing are taken into account.⁴⁶ The greatest value for chocolate is captured through branding and marketing. Thus, skill in branding and marketing are really what it takes to develop a strong for industry chocolate (and for other cocoa-based food products).

⁴⁶ ACET, 2012.

Value Capture Opportunities

In value, the global chocolate confectionery retail market has recently experienced a significant appreciation, rising from US\$52 billion in 2002 to US\$102 billion in 2011, according to data published by Euromonitor. This represents an increase of nearly 8% annually. Demand for cocoa is expected to stay high, and the worry is whether supply can keep up with demand. However, it is unlikely that Ghana can in the short run become a player in the chocolate industry.

Therefore, the key value capture opportunities for Ghana are:

- (a) increasing production to meet demand for cocoa, which is expected to stay high;
- (b) increasing efforts to develop new cocoa products to increase value capture; and
- (c) leveraging regional production monopoly power.

a) Increasing Production

Increasing Productivity

Ghana's cocoa productivity is very low compared to other countries, mainly due to aging, poor, and illiterate farmers who use low levels of inputs. However, a small group of farmers achieve very high yields, using all the recommended practices. Thus, the challenge is how to diffuse and catalyze uptake of this knowledge.

The entry of new types of farmers to replace aging, illiterate farmers must be incentivized. The current effort is focused on attracting youth to the farm, but this is probably a wrong-headed approach, since enthusiasm and resources are really what matters. The youth are children of the same farmers, and from their experience growing up, they naturally view farming as a poverty trap.

It is middle-class farmers with some resources to invest in high levels of productivity who need to be attracted. The youth can still play an important role as providers of farm services—e.g., spraying. Middle-class farmers are likely to be working already, so they must be convinced that there is potential for a better life in farming. One of the key challenges is helping them access land. It may be possible to reach deals with old farmers on a lease agreement whereby old farmers get the equivalent of what they were getting under low inputs and the cocoa farming investors get everything above that. The old farmer is thus indifferent to whether he does the farming or leases the land. Simulating this shows the following as a net income pattern over a 10-year period.

The simulation assumes the cost structure given in Figure 5.2. Under this arrangement, the farmer absorbs half the cost of land preparation, seedlings, and planting and harvesting. The investors assume the full cost of maintenance, herbicides, and fertilizer. Farmers assumes the full cost of drying. The cost uses are as follows: planting GH¢160/ha; seedlings (GH¢450/ha; maintenance, GH¢576/ha; herbicides, GH¢140/ha; fertilizer GH¢398/ha; harvesting GH¢150/ha; drying 24GH¢/ha. Harvesting starts in Year 2, though yields are only 400 MT/ha.⁴⁷ Full yield is in Year 5 when yield reaches 850MT/Ha and stays there. Cocoa is sold at GH¢3,125/MT.

⁴⁷ The costs in Year 2 are higher: maintenance GH¢864/ha; herbicides; GH¢252/ha; fertilizer GH¢230/ha.

Table 5.1: Cash flow for farmer and investor farmer

Year	Farmer	Investor Farmer
1	(733)	(1,111)
2	56	(552)
3	366	2
4	614	250
5	945	581
6	945	581
7	945	581
8	945	581
9	945	581
10	945	581

The investor farmer makes significant investments in Year 1 and Year 2 to raise yields. Note that the cost for the investor will be lower if government programs providing seedlings and subsidized fertilizers are tapped. This approach hits two birds with one stone, as it replants cocoa and increases yields.

Niche Markets

Beyond the conventional confectionery markets, new niche markets for specialty cocoa are growing even faster and provide opportunities for value creation. Although small, these niche items will attract higher premiums. This is especially notable for Ghana, given that its cocoa is already perceived to be of high quality. Two avenues available are fine flavor cocoa (FFC) and organic and fair trade cocoa.

Fine Flavor Cocoa (FFC): Demand for FFC has been growing, as dark chocolate has become increasingly popular, but its production has steadily declined in recent years due to a research focus on high-productivity and pest- and disease-resistant varieties. Manufacturers pay double or triple the bulk price for fine flavor beans due to their scarcity. If the quality is exceptional and is accompanied by a concerted marketing effort, premiums can reach as high as US\$1,000–2,000/MT above the world price for bulk cocoa.⁴⁸ This is an area in which Ghana can clearly create value for its cocoa.

Organic Cocoa: Another opportunity is in the rising demand for organic cocoa and ethical (fair trade) cocoa. These are value opportunities that are open to capture with governmental support and the right standardization and certification.⁴⁹ Kuapa Kokoo, one of the more successful farmers organizations in Ghana, has grown on its ability to deliver fair trade cocoa.

⁴⁸ Stephanie Daniels, Peter Läderach, and Melissa Paschall, 2012.

⁴⁹ Fair Trade Foundation UK reports that total sales of fair trade products for the quarter April to June 2008 had grown from an estimated retail value of £113m to £176m. The growth is significant because it is estimated that more than 7.5 million people involved in the agricultural sector (farmers, workers, and their families) in 59 developing countries will benefit from the international fair trade system.

Box 5.1: Kuapa Kokoo

Kuapa Kokoo is a cocoa-growing cooperative set up in 1993 in response to the partial liberalization of the cocoa sector in Ghana. It is the only farmer-owned organization among the private companies that has been granted a government license to trade cocoa. In this marketing role, Kuapa Kokoo purchases cocoa from members and other farmers on behalf of the state-run Cocoa Board, which controls all exports. Kuapa Kokoo now represents almost 50,000 small-scale cocoa growers, and in 2008/2009, sold 27% of production to the fair trade market.

In order for Ghana to fully capture the opportunities of addressing niche markets, certification costs need to be managed. For many smallholder farmers, certification costs are either too high to afford or are perceived to offer a poor return compared to alternative investments in areas such as agricultural inputs. When cocoa prices are high, such as in 2011, the difference in margin on fair trade cocoa versus uncertified cocoa is small in percentage terms. Compounding this is the complexity of multiple certification protocols and regimes for each major market, which are not mutually recognized. For example, certification of organic cocoa beans for the Chinese market is not recognized in the EU. The Cocoa Board can create a fund to help manage certification costs, as large-scale certification programs can lower costs for all farmers.

b) Product Development

Niche Chocolate

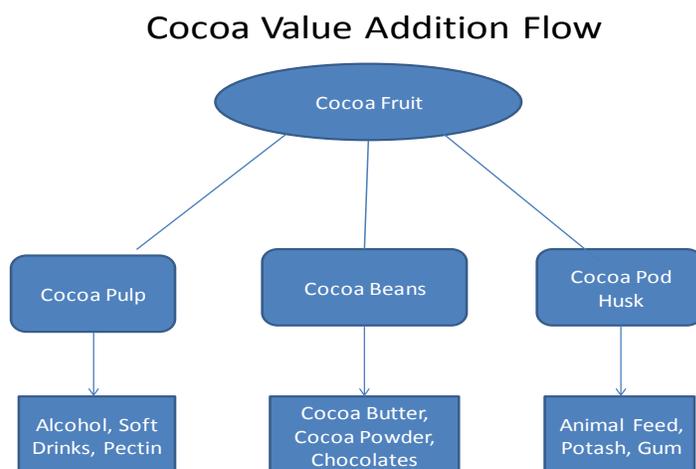
If processing capacity can be combined with development of specialized chocolates, greater value can be captured. This may require COCOBOD to seek a partnership with a craft chocolate manufacturer and use branding experts to develop a 100% Ghanaian dark chocolate brand. For instance, there is a large African American population that has a great affinity for, and identifies with, Ghana. Many African Americans wear a kente cloth during graduation ceremonies, a testimony to the desire for Ghana-branded goods. African Americans also have specialty foods manufactured under the label “soul foods.” Having a soul food-branded chocolate can create a significant market for Ghana-made chocolate. Note that there is a growing number of hip-hop stars who are developing products and marketing them. For instance, P. Diddy has the spirit Ciroc. Ghana can work with stars—e.g., Ashanti’s group⁵¹—to develop a chocolate brand. Given substantial resources, COCOBOD could actually buy one of the smaller chocolate manufacturers or soul food manufacturers located in the US and integrate forward for offshore processing and marketing. This would be a good way for Ghana to start developing skills in manufacturing internationally and, more importantly, in marketing and branding.

51 This group may no longer be as famous as it once was, but being a girl group and having the name of the region where chocolate is grown, it would have been a good start for developing brands.

New Cocoa Products

Most Ghanaian cocoa beans are used in the production of cocoa butter, cocoa powder, chocolate, and related products that use only 10% of the fresh weight of the cocoa fruit. This means that only about 10% by weight of the cocoa fruit is commercialized, while 90% by weight is generally discarded as waste, posing disposal challenges in cocoa-growing communities.⁵² However, as shown below, there are other useful products that can be derived from cocoa.

Figure 5.8: Cocoa Products



Coco Pod Husk Products

- i). **Animal feed:** Pelletized dried cocoa pod husks can be used as animal feed. The animal feed is produced by first slicing the fresh cocoa husks into small flakes and then partially drying the flakes, followed by mincing, pelleting, and drying of the pellets. In powdered form, cocoa husks can also be used as fish (tilapia) feed.
- ii). **Potash:** Cocoa pod husk ash is used mainly for soft soap manufacturing and may also be used as fertilizer. To prepare the ash, fresh husks are spread out in the open to dry for one to two weeks. The dried husks are then incinerated in an ashing kiln.
- iii). **Gum:** Cocoa pod gum is extracted from cocoa pod husks by alcohol precipitation. Cocoa pod gum can be used in the food and pharmaceutical industries for binding pet food, emulsifiers, and pharmaceutical pills, among others.
- iv). **Mulch:** Cocoa bean shells can be used as organic mulch and soil conditioner, or they can be blended with pelletized cocoa pod husks for use as animal feed.

⁵² K. Nfor Beckley, Osric T. Forton, Thomas A. Bemu, and Peter D.E.M. Verhaert, undated.

Products From Cocoa Pulp (or Sweatings)

- i). **Production of soft drinks and alcohol:** In the preparation of soft drinks, fresh cocoa pulp juice (sweatings) is collected, sterilized, and bottled. For the production of alcohol or alcoholic drinks, such as brandy, the fresh juice is boiled, cooled, and fermented with yeast. After four days of fermentation, the alcohol is distilled.
- ii). **Pectin:** Pectin for jam, jelly, and marmalade is extracted from the sweatings by precipitation with alcohol, followed by distillation and recycling of the alcohol in further extractions.

It is worth noting that Ghana has established itself as a center of excellence in the research and cultivation of cocoa. The Cocoa Research Institute of Ghana (CRIG) undertakes agronomic research related to the production of cocoa. Additionally, CRIG research includes other uses of cocoa and its byproducts in making liquor, oil, soaps, and creams. A visit to CRIG shows the variety of cocoa products it has developed. However, many of these can only be bought at the shop in the research center. There has been little commercialization. This is a call for CRIG to partner with entrepreneurs to commercialize its innovations.

c) Leveraging Regional Monopoly Production Power

In the longer run, Ghana can have more control of the cocoa industry through a coordinated regional approach. West African nations produce over 73% of the world's total cocoa output, creating an opportunity for a West African hub for cocoa bean aggregation. This power can be leveraged by creating a quota or coordinated system of sales, either to smooth market prices or to maximize revenues. In the longer run, the countries can work together to locate more cocoa processing and chocolate manufacture in West Africa.

Obviously this is a tool that must be used very judiciously, as there are many places that can grow cocoa. Latin America could step up production, and Asian countries could as well. Much as cocoa was smuggled to Ghana to kill the monopoly power of the Portuguese on its production, so can new producers of cocoa emerge. One way to pre-empt this is the development of high-quality logistics. Singapore is fast becoming a global food manufacturing center, while Dubai is establishing itself as a global sugar refining center on account of its excellent port infrastructure. If Ghana can establish world-standard port infrastructure, combined with its high-quality beans, there is an opportunity for collaboration with its neighbors to develop a global cocoa processing hub.

d) Promoting Local Chocolate Consumption

There is scope for growing the small chocolate sector through promotion of domestic demand. This can be done by promoting school meal recipes that include chocolate or cocoa, which is highly nutritious. It could also be done through energy bars or cereal fortified with chocolate. Even the quintessential *gari*, which is a must for every schoolchild, can be fortified with chocolate. Some leading chocolate manufacturers say that—regardless of local challenges of logistics, energy, and scarcity of talent—a sufficiently large base of chocolate consumers would warrant their entry into the sector.

What It Will Take

The low-hanging fruit is increasing productivity through use of inputs and replacing old trees. The government is already doing this, and the challenge for now is reaching all farmers. The program may be improved if the government encourages the emergence of medium-sized commercial farmers and farm investors.

The government can tweak its policy so that some of the support to develop cocoa production is ringfenced to go to commercial farmers who have paired up as investors in existing farms to commercialize them by raising productivity. This could include providing them with seedlings and fertilizers to supplement their targeted investments. Government may also need to bring in traditional authorities to craft contracts that will make the arrangements function. Note that this will be a variation on the traditional *abunu* and *abusa* arrangements. Rather than contributing labor, which is usually done by poor migrants under traditional systems, in this arrangement the newcomer provides resources to upgrade use of inputs. This arrangement is advantageous in that it does not eschew the poor immigrant but rather provides him or her with paid labor, which the high-productivity system requires.

Box 5.2: Share Cropping in cocoa

Under the existing land tenure system in Ghana, there is a conceptual separation between the land and what grows on it. Sharecropping contracts are common among migrant farmers, for whom tree cultivation implies acquiring what amounts to permanent tenure. Under these agreements, cultivators have a de facto ownership of the land, which only returns to the owner when land remains unused or the migrant dies.⁵⁷

There are two predominant sharecropping contracts: the *abunu* (division into two parts) and *abusa* (division into three parts); these contracts are informal. The *abusa* tenants typically manage already-established cocoa farms and perform tasks such as weeding, spraying, and harvesting. In return for these services, they are “paid” a share contribution of one-third of the total cocoa harvested. Under the *abunu* contract, tenants are responsible for all farm tasks, from clearing land to harvesting, and receive one-half of the harvest as part of the contract agreement.

Developing Agricultural Input Service Provider Youth Groups

The impact of massive spraying programs on youth employment is evident. The potential to train and equip youth in providing other services needed for cocoa production has yet to be tapped, as the focus seems to be on trying to make youth the new farmers.

Combining youth funds and part of the cocoa development funds and agricultural mechanization resources would provide room for developing young service providers. The number and scale of service providers is likely to be larger at the beginning, but it is important that, as time goes by, the weak providers are allowed to fall aside and stronger providers are encouraged to take over, so that a cluster of effective and efficient service providers will emerge.

⁵⁷ Berry; 1993. Quisumbing et al, 2001.



VI. Role of Market Structure

Productivity levels for agriculture in Ghana and most other African countries are low. Part of the problem lies in market structures and poor institutions and policies. Agricultural output occurs along a value chain in which intermediaries, exporters, and downstream producers interact with farmers. Farmers may therefore suffer from non-competitive behavior of other agents along the chain, or be unable to sell in markets because transport and other services are unavailable or too costly.

The value chain studies discussed above focused on constraints and value capture opportunities along each value chain. It is equally important to understand how the market structures work and the potential for further value capture opportunity through competition policy.

To explore the role of the structure of domestic competition in agricultural supply chains, a simulation was completed using a model developed by Depetris Chauvin and Porto (2013). The model combines theory, household surveys, and in-depth knowledge of local context to isolate and quantify the effect on household income of changes in competition levels in domestic markets. It also examines the role played by household constraints and agricultural institutions that hinder productivity and market access, and shows some poverty results stemming from these simulations by combining the model's prediction with information from household surveys. In particular, it analyzes the changes in real income of different households caused by the hypothetical price changes of cash and food crops predicted by the model's simulations.

Importance of Markets

How food markets work is particularly important given the share of income spent on food. At the national level, 58.6% of the average Ghanaian household budget is spent on food. However, the story is more complicated. At the bottom of the distribution of income, more than 70% of the budget is allocated to food, while at the top, only about 40% is allocated to food. This share is larger for rural households (65.1%) than for urban households (46.5%). This observation fits with the idea that urban people are richer and thus spend more on other goods and services than on food. Among food items, the most significant crops in consumption are maize, yam, cassava, and rice. On average, maize represents 6% of Ghanaian household expenditure (7.5% of rural expenditure and 3.3% of urban expenditure). Yam and cassava account for 4% of the budget, with a larger incidence in rural than in urban areas. Rice (3.5%) and livestock (3.1%) are also important food staples in Ghana, in particular in urban areas, where they account for 3.9% and 4.3% of the average household expenditure, respectively.

The similarity of the level and the relationship with the level of livelihood for budget and income shares of cassava suggests a strong auto-consumption component for this crop. For poorer households the budget and income shares of cassava are larger for urban than for rural households. However, while these shares smoothly decline with the level of income for urban households, they increase significantly for rural households. In rural areas, the richest households on average spend (earn) up to 20% of their budget (income), while the poorest only spend around 2% on cassava.

Simulation Model Results

The simulation studies the effect of changes in the level of competition among processors or importers on farm constraints and on farm-gate prices, incorporating the supply and demand effects following a specific shock. We consider two sets of exercises. The first exercise is to shock the market structure of the supply chain. To this end, we consider (arbitrary) changes in the number of firms and in their market shares to capture both increases and decreases in the extent of competition in the supply chain. We also consider comparative static results from changes in key parameters affecting the production decisions of the farmers. We explore (arbitrary) changes in international prices, costs of production, endowments, risk, and food security aversion. The simulation results are discussed below.

Cocoa

The simulation results are displayed in Table 6.0. As expected, increases in competition would increase the price paid to the farmers, and a reduction in competition would decrease it (row 1). However, the effect is only large when we consider the limit cases of equal market shares (farm-gate prices would increase 17.91%) and perfect competition (prices would increase 27.34%). We find that the pass-through of the international price to the farmers is more than 100%. An increase of 10% in either the marginal or fixed cost of producing cocoa would contract the supply of cocoa, but the price received by farmers would only increase 0.38% and 0.36%, respectively, in the baseline scenario. An increase of 10% in the endowment of the farmers (row 6) would increase the resources available for both food and cash crops, and the increase in the supply of cocoa would reduce the price paid to the farmer by slightly more than 1%.

The marginal cost of producing food can also affect cocoa production choices. Increases in the prices of competing food crop prices marginally increases, the price paid to cocoa farmers (row 8). Alternatively, an increase in the cost of producing those goods would lead to no change in cocoa prices (row 9). On the other hand, a 10% increase in the transaction costs associated with the production of cocoa beans would result in a 5% increase in its farm-gate price (row 10).

There is also evidence of substitution and complementarity effects, though they are small. An increase in the international price of cocoa of 10%, and an increase in competition whereby all the processing cocoa firms have the same market share, would lead to a price increase of 29.95% while the sum of the individual effects would amount to 29.65%. On the other hand, if we consider the combination of an increase of the food crop price and equal market shares, the joint effect on the price of cocoa (17.94%) is lower than the sum of the individual effects (18.09%). In this case, the two policies are substitutes.

Table 6.1: Simulation Results for Cocoa

% Change in Price						
	Baseline	Leader Split	Leaders Merge	Exit of Largest	Equal Market Shares	Perfect Competition
Competition Policy	0,00	2,04	-0,83	-2,38	17,91	27,34
Increase of 10% in:						
International Price	11,74	13,90	10,70	9,12	29,95	40,32
Marginal Cost of Producing Cash Crop	0,38	2,40	-0,48	-1,99	18,11	27,34
Fixed Cost of Producing Cash Crop	0,36	2,43	-0,48	-2,00	18,23	27,34
Endowment	-1,17	0,94	-2,15	-3,63	16,48	27,34
Preference Parameter	1,35	3,48	0,59	-0,96	19,27	27,34
Food Crop Price	0,18	2,20	-0,66	-2,17	17,94	27,34
Marginal Cost of Producing Food Crop	0,00	2,03	-0,85	-2,39	17,91	27,34
Transaction Costs on Crop Production	5,05	5,98	4,60	3,92	12,88	17,34
Transaction Costs on Inputs	0,11	0,70	-0,14	-0,58	5,25	27,34
Non-Farmer Demand	0,00	2,04	-0,83	-2,38	17,91	27,34

Cassava

There is already a lot of competition in this market, so the effects of competition policy shocks are very small. Only the extreme case of perfect competition among cassava importers would reduce cassava farm-gate prices by 6.75%. On the other hand, changes in the constraints affecting farmers have relatively important effects on the price of cassava. For instance, increases in the production costs of the cash crop generate a reduction in the price of cassava because some cash crop farmers would switch to cassava and increase its supply. The magnitudes are not irrelevant. The impact of changes in marginal costs is -3.22% (row 4), and the impact of changes in fixed costs is -1.17% (row 5). An increase of 10% in the price of the cash crop in turn raises cassava prices by 4.37% (row 8) because it induces farms to produce more cash crop and supply less cassava.

Factors that affect cassava production directly have relatively small impacts on the cassava farm-gate price. In row 9, for instance, a 10% increase in the marginal cost of producing cassava raises cassava equilibrium prices by only 1%. Similarly, changes in household risks that raise auto-consumption have a positive effect on cassava prices but the effect is small (0.65%). An increase of 10% in transaction costs of cassava would increase its farm gate price by almost 3% because of its negative effect on supply (row 10). An interesting result is that an increase in the endowment does not reduce the price of cassava, but increases it. A higher endowment allows households to produce more of all crops, including cassava. *Ceteris paribus*, this should lead to price declines because of a larger supply. However, the price of cassava increases 1.35%. This could happen if the increase in household resources is such that cash crop production becomes, at the margin, profitable to a larger number of farmers, which creates incentives to move some resources out of cassava and into the export cash crop.

Table 6.2: Simulation Results for Cassava

% Change in Price						
	Baseline	Leader Split	Leaders Merge	Exit of Largest	Equal Market Shares	Perfect Competition
Competition Policy	0,00	-0,20	0,28	0,28	0,00	-6,75
Increase of 10% in:						
International Price	6,80	6,64	6,95	6,95	6,80	2,34
Marginal Cost of Producing Cash Crop	-3,22	-3,36	-3,09	-3,09	-3,22	-6,75
Fixed Cost of Producing Cash Crop	-1,17	-1,36	-0,95	-0,95	-1,17	-6,75
Endowment	1,35	1,03	1,68	1,68	1,35	-6,75
Preference Parameter	0,65	0,40	0,93	0,93	0,65	-6,75
Cash Crop Price	4,37	3,97	4,84	4,84	4,37	-6,75
Marginal Cost of Producing Food Crop	1,00	0,70	1,30	1,30	1,00	-6,75
Transaction Costs on Crop Production	2,92	2,85	2,99	2,99	2,92	1,00
Transaction Costs on Inputs	0,29	0,20	0,38	0,38	0,29	-6,75
Non-Farmer Demand	0,49	0,22	0,77	0,77	0,49	-6,75

Poultry and rice are also modeled as food-importing sectors. Poultry meat and rice imports are often larger than domestic production. The markets for poultry and rice are relatively competitive, and therefore the price impacts of changes in the level of competition are rather modest. For instance, in the case of leader split, the price of poultry and rice would decrease by 0.42% and 0.50%, respectively. As with cassava, the international-to-domestic price pass-through is incomplete. A 10% increase in the international price of the food crop would increase the domestic farm-gate price of poultry meat and rice by 4.48% and 1.85%, respectively. An increase of 10% in the marginal cost of the competing export cash crop sector would only reduce the price of poultry meat by less than 1%, but it would reduce the price of rice by 3.62%. The rice price is also more sensitive to changes in the price of the export cash crop. An increase of 10% in the cash crop price would move resources away from rice, which would lead to an increase in its price of around 4.5%. Changes in the endowment have positive but small price effects on the two food staples. Variations in transaction costs, both for the final product and for production inputs, seem to have a minor farm-gate price effect.

Table 6.3: Simulation results for rice

% Change in Price						
	Baseline	Leader Split	Leaders Merge	Exit of Largest	Equal Market Shares	Perfect Competition
Competition Policy	0,00	-0,50	0,40	0,56	-3,22	-6,14
Increase of 10% in:						
International Price	1,85	1,40	2,21	2,37	-1,36	-3,71
Marginal Cost of Producing Cash Crop	-3,62	-3,79	-3,54	-3,39	-6,66	-6,14
Fixed Cost of Producing Cash Crop	-0,64	-1,10	-0,29	-0,14	-3,88	-6,14
Endowment	0,40	-0,10	0,84	1,01	-2,78	-6,14
Preference Parameter	1,98	1,29	2,60	2,78	-1,48	-6,14
Cash Crop Price	4,51	3,61	5,40	5,56	1,11	-6,14
Marginal Cost of Producing Food Crop	0,67	0,12	1,17	1,33	-2,59	-6,14
Transaction Costs on Crop Production	0,80	0,60	0,95	1,02	-0,58	-1,59
Transaction Costs on Inputs	0,19	0,03	0,34	0,39	-0,75	-6,14
Non-Farmer Demand	0,27	-0,24	0,69	0,82	-2,97	-6,14

Table 6.4: Simulation Results for Poultry

% Change in Price						
	Baseline	Leader Split	Leaders Merge	Exit of Largest	Equal Market Shares	Perfect Competition
Competition Policy	0,00	-0,42	0,46	0,60	-0,89	-3,30
Increase of 10% in:						
International Price	4,48	4,29	4,60	4,73	3,59	2,95
Marginal Cost of Producing Cash Crop	-0,70	-1,02	-0,39	-0,31	-1,59	-3,30
Fixed Cost of Producing Cash Crop	-0,53	-0,88	-0,19	-0,08	-1,43	-3,30
Endowment	0,59	0,11	1,14	1,26	-0,32	-3,30
Preference Parameter	1,15	0,58	1,73	1,85	0,23	-3,30
Cash Crop Price	2,96	2,16	4,02	4,13	2,05	-3,30
Marginal Cost of Producing Food Crop	0,70	0,14	1,24	1,36	-0,28	-3,30
Transaction Costs on Crop Production	1,93	1,85	1,98	2,03	1,54	1,27
Transaction Costs on Inputs	0,20	0,04	0,36	0,40	-0,08	-3,30
Non-Farmer Demand	0,20	-0,24	0,73	0,87	-0,71	-3,30

Welfare Impacts

Some regularities can be detected in the simulation results. Increased competition and complementary policies in cocoa show positive welfare impacts across households. The impacts are obviously larger for cocoa producers, but are modest overall, except for extreme cases such as moving to perfect competition. Competition among exporters in a cash export crop implies higher farm-gate prices and, consequently, higher farm income from cocoa production. Since cocoa is only produced and not consumed directly by the households, real farm income is in the end higher. For the food crops, the overall welfare effects are very small because the net benefit ratios are very small (income shares are compensated by expenditure shares of the same order of magnitude). The overall effect of more competition is not clear, as households (in particular in rural areas) tend to be both producers and consumers of food staples.

Policy Imperatives Arising

These simulation results indicate that policy is not a very effective tool in these four sectors, with the exception of cocoa.

Cocoa, as expected, shows large impact from various simulations, indicating that it can benefit from more regulation. Increasing competition in the sector can increase the margins farmers receive, and there is thus a case for COCOBOD to further liberalize the buying of cocoa. Even a middle-of-the-road liberalization, where all existing LBCs are given equal shares of the market, could raise farmers' income by 18%.

The area in which policy matters is international markets. In all crops studied, farm-gate prices respond positively to a rise in international prices, more so for cocoa. The impact for rice and poultry is modest, which has important implications for import policy. Since increasing duty is equivalent to increasing the international price, a policy to stimulate local production through levies and tariffs will require fairly heavy import duties.



VII. Synthesis of Emerging Issues and Policy Options for Rural Transformation

The foregoing discussion of the four value chains identifies much value to be captured with the right support and policies. The approach should look at whole value chains, and markets in particular, in order to organize them to respond to emerging markets and challenges. Some general issues arising from the studies are discussed below.

Opportunities to Improve Farm-Level Production

What to Subsidize—Mechanization vs. Inputs

Traditionally, the production aspect of the value chain has received the most support, mainly through research to develop better seeds and extension, and expanded recently to include the supply of free seeds and subsidized fertilizers. However, the need for farm mechanization cannot be understated:

- Labor scarcity is an important constraint to production, and more mechanization technologies are needed. We have seen that quality is closely tied to level of mechanization. Mechanized harvesting and threshing of rice can help address the biggest challenge for Ghana rice producers, which is markets. Subsidies on mechanization may be more beneficial than subsidies on inputs.
- A one-time subsidy to remove tree stumps from farms would probably be more effective than regular input subsidies, as this allows for application of mechanization that can greatly lower the cost of production. Land free of tree stumps will also attract commercial farmers to invest, as the huge cost of removing tree stumps deters most medium-scale commercial farmers.

While machinery can be imported, what is needed is careful attention to the business model that will facilitate uptake of the technology. Ghana has already mechanization centers (AMSECs) where tractor services can be hired, but this has not increased uptake of tractor services by cassava farmers. This model is plagued with challenges. A visit to the center revealed:

- Much of the equipment at these centers is in a state of disrepair, as government is slow in ordering spare parts. Political economy issues mean that the tractors stocked are of poor quality. The decisions on which equipment to acquire are made elsewhere, rather than through consulting experts at the centers.
- The determination of the location of the centers is highly influenced by politics as opposed to optimal location for servicing demand. Powerful party officials have been known to locate them in their villages.
- A further complication is the perception that, since they are government-owned, their services should be free. Operators of the centers pointed out that many farmers fail to pay once the service is provided, and they now insist on farmers paying upfront. However, since many farmers can only pay after selling the produce, as few have savings or access to credit facilities, utilization of tractors and other equipment is low.

A sustainable business model is required to make AMSECs work. The significant capital needed means that entrepreneurs willing to get involved need significant support. On the other hand, established dealers of motor vehicles and machinery can be incentivized to go into this business. Innovative PPP models, like Build Operate Transfer (BOT), can be explored, whereby investors can build and run centers for a time and transfer to local entrepreneurs over time

Which Farming Model?

The current policy focus is on smallholder farmers, but an ecosystem that supports both smallholder and commercial farmers might be more helpful. Commercial farmers can help smallholders specialize, and thus increase efficiency, by taking on some of the more technical and resource-intensive activities. Commercial cassava farmers are developing novel contracting models that allow subsistence farmers to separate subsistence from commercial farming and thus have a dual orientation, whereby they farm food crops on their plots and commercial crops on the commercial farmer's land.

No Farmer Left Behind—From Inputs As Product to Inputs As a Service

Lowering the cost of inputs for subsistence farmers should be a priority, and government has been helping through subsidies. However, limited capacity has meant that support does not reach many farmers. New models may help to lower input cost and increase reach.

There are now successful models that focus more on providing inputs as a service rather than furnishing products—e.g., seedlings and fertilizer. There is already a good model for this in Ghana through mass cocoa spraying programs, whereby contracts are given to youth groups. This can be expanded to create groups that offer generalized services, including farm mechanization. Indeed, the success of cassava enterprises in West Africa, in which processing machine fabricators offer grating services to farmers rather than trying to sell them equipment, has shown the power of proper business models to make technology available.

In the context of the current desire to engage youth in agriculture as a way to solve unemployment, it may be more cost-effective to make them service providers rather than trying to make them farmers. In this way, they can improve the productivity of the current generation of aging farmers and halt further fragmentation of already-small pieces of land.

Opportunities for Improving Post-Harvest Logistics

From Middlemen to Logistics Providers to Industrialists

The middleman or broker is the single most important person examined in the value chain studies. Our studies show that the middleman coordinates, finances, and finds markets. He or she is the most entrepreneurial person in the chain and is key to making it work. However, middlemen are plagued with many challenges. Many post-harvest losses occur because of the many small middlemen/women who can only buy small quantities and lack resources to invest in improved transportation and storage systems. The 30% losses in eggs due to transport issues can be avoided if aggregators have the right means of transport. Helping aggregators upgrade to become logistics providers is thus key to upgrading value chains.

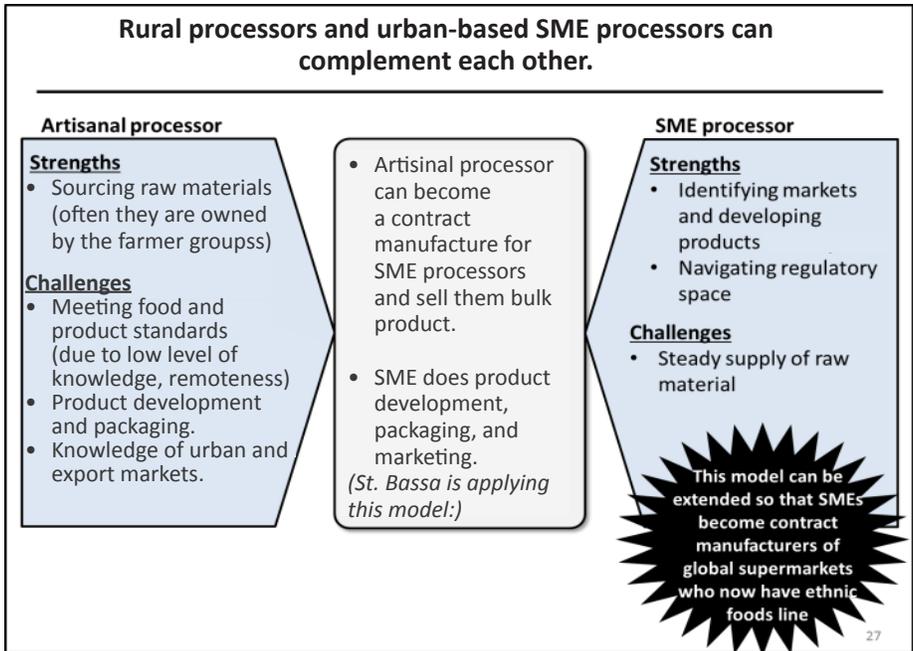
Further, in many industries, powerful traders become processors once they have gathered enough resources. They tend to be very successful at it, as they understand the business and have built the needed logistics chains. The organic growth of traders should be deliberately promoted so they can scale up and transition into processing, input supply, or farming—they may even become diversified entities that deal in all three, taking over the governance of production. The ultimate aim should be to develop them into commodity trading houses. Therefore, concerted efforts to strengthen and upgrade the much-demonized middlemen may improve the functioning of the value chain and create value for all players.

Opportunities for Strengthening the Processing Sector and Improving Linkages to Smallholders and Markets

Processing is probably one of the most heavily challenging parts of the value chains studied. It both suffers from unreliable and low-quality supplies and lacks the resources to develop new products and acquire the needed equipment to bring these products to market. This tends to confine food manufacturing largely to artisanal and SME sectors and thus to a narrow product range.

However, a model that is proving versatile in resolving the challenge is tighter integration between rural artisanal processors and urban SME processors. Rural processors have solved the problem of supply (as they are also farmers), but lack skills in product development and navigating food marketing regulations. SME food manufacturers have the skills in market and product development and in managing regulations, but have difficulties in sourcing consistent supply. A model whereby an artisanal processor is able to supply a product in bulk to an SME, which then packages and markets, is mutually beneficial.

Figure 7.1: Linkages between rural processors and SMEs



There is a need to rethink policy on industrialization and provide incentives to strengthen these types of linkages. Tax breaks and subsidies on equipment should be extended to firms that have developed contracting models with rural processors. Going hand in hand with this should be support for marketing and branding, directing part of the agriculture budget to advertising firms to help promote products from the more innovative companies.

Opportunities for Product Development and Market Channel Development

Markets

Markets are probably the most important determinants of the productivity and profitability of the value chain. Value capture through better markets may be more efficient than efforts at increasing farm-level productivity. Studies in Senegal have shown that local rice could fetch a 30% premium through branding and promotion, which is probably more efficient than trying to increase productivity by 30%. Therefore, building the image of local foods should be a key part of efforts to increase their value, and agricultural policy should generally focus more on the marketing end of the value chain.

The role of modern marketing channels, especially supermarkets, should be carefully thought out, as they will become increasingly important in shaping diets. Supermarkets can have considerable influence on what consumers purchase and can thus shape both the agricultural and the processing landscapes. Due to their stringent requirements, smallholder farmers and artisanal/informal processors may not be able to participate in this process. Supermarkets are also influencing processing by producing supermarket brands through contract manufacturing. Further, supermarket chains have a regional reach and can thus easily help firms access export markets.

Therefore, both agricultural policy and industrial policies need to start making specific reference to supermarkets and direct resource, so that the growth of this sector carries along smallholder farmers and helps to upgrade the vibrant artisanal and SME food processing sector.

Towards End-to-End Agricultural Value Chain Financing

Our field survey found finance to be a critical challenge across the value chains that were studied. Lending for agricultural production is low. Though there has been an improvement (albeit very marginal) in commercial banks' share of the total agricultural loan portfolio, from 4.3% in 2008 to 6.1% in 2010,⁵⁸ the share remains very low. The difficulty in accessing credit is not confined to producers and rural households. Access to credit is also severely limited for aggregators, traders, and processors. The cost of credit is also quite high, ranging between 25% and 40%, according to the Bank of Ghana. The lower interest rates are reserved for large importers, while medium-sized firms are charged approximately 30% to 35%. Meanwhile, smallholders, including FBOs and smaller agro-enterprises, are offered the highest interest rates (in the range of 35–40%) with short repayment periods, which make them very unattractive.⁵⁹ Another limiting factor is collateral requirements, which smallholder farmers do not have.

⁵⁸ World Bank Agribusiness Indicators, 2012.

⁵⁹ <http://www.agrifinfacility.org/access-agriculture-finance-ghana>

Microfinance institutions have emerged to fill the void left by banks. However, though it is easier to get loans from these institutions, interest rates can also be very high and payment terms do not reflect cash flows from agriculture. The government has created a number of institutions with the mandate to lend to agriculture, including:

- Rural banks and the Agricultural Development Bank
- MASLOC
- EDAIF

However, interviews indicated that accessing the funds is difficult due to political economy issues (one needs to know someone!) and the structure of the funds. For example, EDAIF provides the funds to commercial banks to disburse, but the banks take the risk. The banks are reluctant to lend the funds, as they can lend their own funds at higher interest rates. Banks do not lack liquidity, and thus providing funds will not increase lending.

Box 7.1: Export Development and Agriculture Investment Fund (EDAIF)

The Export Development and Agriculture Investment Fund (EDAIF) has been set up with the objective of promoting the agroprocessing industry in Ghana. The fund was established by Act 823 to provide financial resources for the development and promotion of agriculture relating to the agroprocessing industry. There are three accounts of the fund: (i) the Export Development and Promotion Facility (EDPF), (ii) the Credit Facility, and (iii) the Credit Account (the "Agriculture Grant Facility").

- The EDPF supports the development and promotion of export products and provision of services to the export sector. Activities supported include product development and promotion, capacity building, market research, and development of infrastructure and export trade.
- The Credit Facility extends loans through Designated Financial Institutions. Individuals, corporate exporters, and producers of export goods are eligible to access the Credit Facility.
- The Agricultural Grant Facility supports persons, groups, and institutions in the development and promotion of agriculture and agroprocessing products, and provision of services to the agriculture and agroprocessing sector. Activities supported include: product development and promotion; capacity building and research; and the development of infrastructure and common user facilities for agriculture relating to agroprocessing.

Although much as microfinance has been able to close some of the rural farmers' financing gaps, the rise of impact investing or social enterprises is starting to change the agricultural lending landscape. New models that are more tailored to farming cycles are now being pioneered with success. One such model is One Acre Fund, which is providing value chain financing to smallholder farmers in Ghana. It provides a complete set of services within walking distance of the farmers. The service bundle includes:

- Financing for farm inputs
- Distribution of seed and fertilizer
- Training on agricultural techniques
- Market facilitation to maximize profits from harvest sales

These interventions guarantee that farmers reap high yields and good prices and thus good income to pay back loans.

There is an urgent need to start thinking more creatively about financing agriculture. As we found, aggregators/market women are key sources of finance for many farmers. However, they are limited, as they also need working capital. The advantage these types of financiers have is intimate knowledge of farmers, trust relationships, and informal enforcement mechanisms. They thus face a much lower risk than formal financial institutions. The potential of using them as intermediaries to lend to farmers is huge.

But the entry of a financier/bank into operations has the advantage of free working capital and lets value chain actors focus on their core businesses. Farmers also obtain financing without having to produce collateral, as financing gets channeled through the stronger value chain actors. The bank gets new business and is less exposed to lending risk, as the established relationships mitigate it. This is the rationale for the establishment of Root Capital, which is financing agricultural value chains in a number of countries across Africa. Root Capital provides financing to medium-sized enterprises working in agricultural value chains to enable them to transact with farmers and invest in equipment and infrastructure for operations. In Ghana, it is financing Savannah Fruits to purchase shea from its network of farmers. The long-term objective is to demonstrate good lending opportunities for local banks, which will then take over and start lending to this neglected sector.

Box 7.2: Subsidizing credit risk

The main concern for traditional banks in lending to agriculture is the perceived high risk. To encourage the participation of banks in lending to the sector, interventions to subsidize risk are being introduced to the agricultural sector. One such intervention is USAID's Development Credit Authority (DCA). DCA guarantees lending to the agricultural sector by providing a 50% credit risk for loans going to rural farming communities.

DCA loan or bond guarantees are often complemented by USAID-assisted training that develops a bank's ability to perform cash-flow analysis, due diligence, and risk management on loans to underserved sectors. The combination of training and partial guarantees has introduced local financial institutions to new lending opportunities in microfinance, infrastructure, energy, housing, and agribusiness.

In addition to mobilizing financing for specific projects, DCA partial guarantees help demonstrate to local banks that loans to underserved sectors can be profitable. This fosters self-sustained financing because lenders become willing to finance projects on a continuous basis without the support of guarantees from USAID or other donors. DCA aims to be a powerful catalyst for unlocking the resources of private credit markets to spur economic growth while advancing development objectives.

While financing will continue to be a challenge, there are innovations out there to catalyze lending to the value chain. These innovations can provide new ways of thinking for governments to incorporate. The traditional way of lending, through agricultural banks and industrial development banks, has been challenged by governance problems (stemming from the political economy) and the perception that farmers and other value chain actors do not feel obliged to repay money that has come from public banks. However, using the approaches above, government can join hands with social entrepreneurs/impact investors and development partners to channel funds to support value chain actors through programs that are already working on the ground. This is probably more efficient than government-run programs, which are prone to the inefficiencies that come with a political economy that is highly patrimonial.



IX. Conclusion and the Way Forward: Aligning Agricultural and Industrial Policies

Agriculture's potential for rural transformation and poverty reduction in Ghana has yet to be unlocked. The foregoing value chain studies and simulation exercises have identified opportunities and potential pathways, with an emphasis on strengthening and upgrading the value chain. A strong value chain requires a market that works, a processing sector that delivers the right products, and a production sector that can respond to demand. Logistics is the link that makes the chain work as a single entity, and finance provides the grease to make it function. Agricultural, industrial, and budget policies must be aligned if strong and responsive value chains that deliver a fair value to all value chain actors are to emerge. The suite of policy options given in the last section can further strengthen the policy framework already laid down by the government and help focus resources and activities.

True rural transformation will come from rethinking and enhancing the role of various actors in the value chains so that they can govern and guide the chains' growth. Four potential pathways are possible:

- **Integrated FBOs pathway:** Strengthening farmers through the development of strong FBOs that can integrate backwards to supply inputs and extension, and also forward to processing and marketing. Cassava processing groups have already blazed this trail. Strong FBOs should be identified and encouraged to integrate forward to processing.
- **Processors-led contracting model pathway:** The modest success of contract farming in cassava shows that with innovation the model can be made to work. The model can be further improved if processors focus on diversifying livelihoods of its farmers. For instance, cassava processors can help farmers develop the poultry industry and use cassava to make feeds. This creates a much deeper relationships as both farmers and processors are buyers and sellers to each other. Diversified livelihoods also mean that farmers have less pressure for cash and need not side-sell to address family emergencies.
- **Emergence of strong middlemen pathway:** As shown, middlemen have the capacity to organically grow from buying to providing inputs and support to becoming processors that can upgrade the value chain. Support to help the more enterprising middlemen/traders to become strong actors should be sought.
- **Enhanced medium-sized commercial farmer pathway:** An emerging sector of medium-sized commercial farmers could lead transformation of the agricultural sector. Beyond the emergence of strong actors, two developments that can be particularly transformative are the development of rural cottage industries and the emergence of clusters that integrate a number of value chains.

The pathways identified here straddle agriculture and trade and industry policy domains. Currently, Ghana's industrial policy sees agroprocessing as the key sector to be developed, and the agricultural policy has prioritized a value-chain approach. While this is a good starting point, there is no forum for explicit coordination of the two, nor budget to support this. The critical role of agriculture in industrialization requires a more explicit platform to help coordinate efforts, and developing such a policy advocacy forum will be crucial to drive the agriculture-led transformation proposed. This will require buy-in from key stakeholders, necessitating a process that will bring them together and sell them on the vision. This report has laid the ground for that and provides a good platform on which to mobilize these stakeholders to action.

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