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**The agro-processing industry and its potential
for structural transformation of the Ghanaian
economy**

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Abstract: The paper explores the potential of Ghana’s agro-processing industry in contributing to the development and structural transformation of the economy. Although the industry is not well advanced, a number of factors are discussed which make it a viable sector to lead the economy towards sustainable development. The paper documents the evolution of the agro-processing industry, in addition to its contribution to the economy. The importance of government policy and interventions in mitigating challenges faced by the industry is also discussed. Finally, value-chain processes and case studies are provided for key agro-processing sub-sectors of the industry.

Keywords: agro-processing industry, economic growth, value-chain, Ghana, case study

JEL classification: L52, L78, O14

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1 Introduction

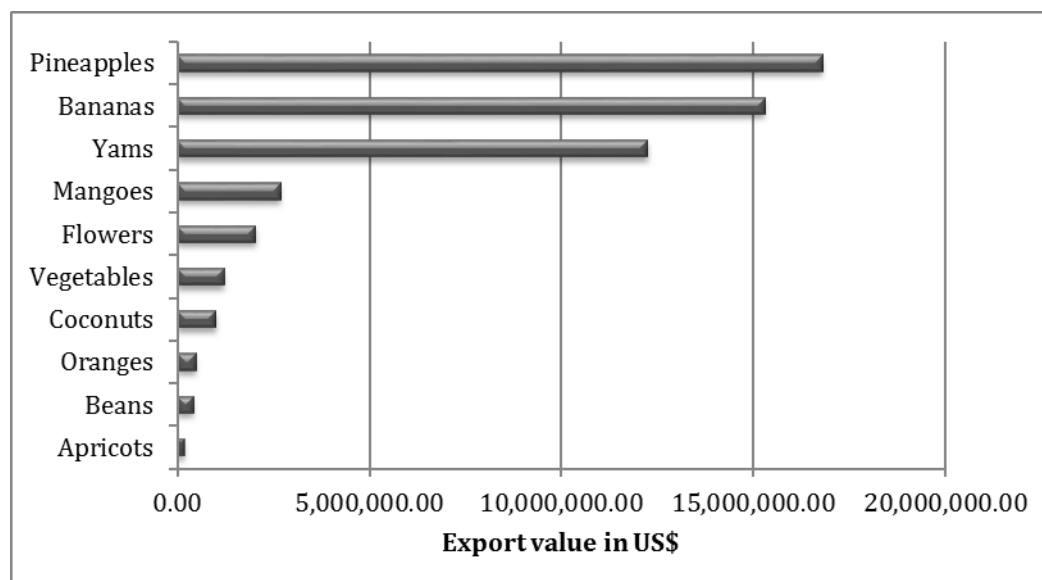
The agricultural sector plays a critical role in the overall economic growth of the Ghanaian economy. Indeed, agriculture is expected to lead to significant transformation of the economy through improvements in the sector's productivity. The sector is divided into a number of sub-sectors: crops, cocoa, livestock, forestry and fisheries. The crops sub-sector contributes about 66.2 per cent to the sector and has a large percentage of its products undergoing some form of processing (MoFA 2010). The major products include cocoa, cashew, sunflower, oil palm, groundnut, fruits, and vegetables, among others. The most common item that is processed is maize, followed by other commodities such as nuts and oils, fish, and other grains such as millet, sorghum, and guinea corn.

Food processing is an important activity related to the agricultural sector and is dominated by the predominantly small and medium-scale firms which operate in the informal sector of Ghana. Indeed, the agro-processing sector may be classified into two groups—domestic processing and factory processing (Quartey and Darkwa 2015). Domestic processing activities are dominated by female workers who are predominantly illiterate and have no formal training. Skills in food processing are acquired mostly through apprenticeship and a large amount of family labour is employed. This domestic processing often leads to processed outputs of variable quality. Nonetheless, these small-scale units are able to create employment opportunities and make use of local resources. Factory processing activities, on the other hand, are mostly foreign-owned (e.g. Nestlé and Cadbury) or state-owned (e.g. Fan Milk). These factories can process large quantities of raw materials and can contribute significantly to the nation's economy through export activities.

Agro-processing is important for a number of reasons, chief of which is a reduction in post-harvest losses. Post-harvest losses in maize, cassava, rice, and yam amounted to about 35 per cent, 34.6 per cent, 6.9 per cent and 24.4 per cent respectively in 2007 (MoFA 2007) as a result of ineffective food processing technologies, among other causes. According to the Ministry of Food and Agriculture, only 5 per cent of food products harvested in Ghana are processed. Therefore, from a health and nutrition perspective, agro-processing has the potential to increase nutritional value, and it could also increase food security in the country, through a reduction in food spoilage and wastage. Processed foods also enjoy greater price stability on the world market and may therefore increase market opportunities for exports, contributing to income securities particularly in rural communities which are mostly engaged in farming. The development of the agro-processing industry may also promote employment generation, and contribute to enterprise development, diversification of rural economies, and import substitution, among other things. According to Quartey and Darkwah (2015), agro-processing is the most important sub-sector of the manufacturing sector, with food and beverages representing the largest component of processed commodities.

In Ghana, there are a lot of opportunities to add value to agricultural commodities. Export of processed horticultural products (i.e. fruits and beverages), for instance, has become increasingly significant in the Ghanaian economy, particularly given the presence of a knowledgeable private sector. Indeed, export of produce from the agro-processing sector in Ghana is dominated by these horticultural products, in addition to vegetables, roots and tubers, and palm oil. As illustrated in Figure 1, pineapples, bananas, mangoes, and flowers were among the top non-traditional export commodities in Ghana in 2012. Notable horticultural processing firms in Ghana include Blue Skies (which processes pineapples and other fruits into fruit juice for local and international markets) and Pinora (which processes pineapples and oranges into frozen concentrates for export).

Figure 1: Top horticultural products and export values in 2012



Source: GIPC 2013.

Currently, the agro-processing industry in Ghana is not well advanced, there is a relatively low degree of value addition to agricultural commodities, and there are few linkages with marketing and financial services, partly due to the small firm sizes and under-developed processes which lead to many of these firms operating below capacity using inefficient technologies. According to Afful-Koomson et al. (2014), 85 per cent of all agro-processing firms in Ghana are micro-enterprises, 7 per cent are very small firms, 5 per cent are small firms, and only 3 per cent are medium-sized agro-processing firms. An implication of the limited scale of production of agro-processing firms in the country is that they are faced with greater bureaucratic, legal and administrative challenges, compared to larger firms. Typically, policy directives and initiatives are less tailored to the needs of small and medium-sized enterprises (SMEs) within the country, and therefore these firms are more often faced with overbearing regulations, delays, and other barriers.

The remainder of this paper is structured as follows: Section 2 discusses the role of agriculture in the Ghanaian economy. The section discusses the rise of the services sector and the contribution of this sector to a structural *shift* (versus a structural *transformation*) within the economy. It also provides some information on the evolution of agriculture in Ghana, and policies that have contributed to the growth of the sector. Section 3 focuses on agricultural processing and its definition and evolution in Ghana. The section sheds more light on the structure and performance of agro-processing firms within the country, and also discusses the constraints that this sub-sector faces, in addition to policies that have been pursued to boost the performance of agro-processing firms in the country. Section 4 discusses four key sub-sectors in Ghana's agro-processing industry— nuts and oils; grains; roots and tubers; and fruits and fruit juices—while Section 5 provides case studies on two major agro-processing firms in the country. Section 6 concludes.

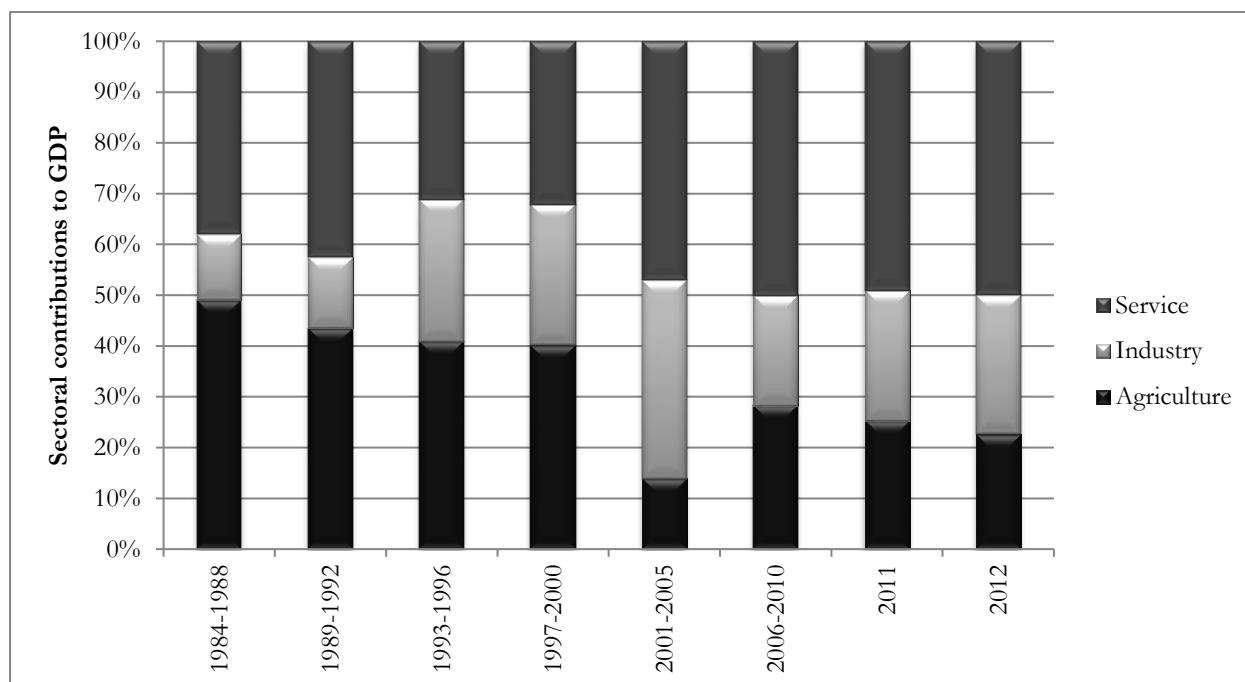
2 The role of agriculture in the Ghanaian economy

2.1 Sectoral performances

The agricultural sector has traditionally been the largest contributor to Ghana's GDP and has been the cornerstone of the economy since the country's independence in 1957. Between 2000 and 2008, for example, the average sectoral share in GDP for this sector was 38.7 per cent, compared to 26.1 per cent and 31.3 per cent for the industry and services sectors, respectively (GSS 2008). Additionally, the sector employed about 55 per cent of Ghana's population between 2000 and 2007 (ISSER 2008).

By 2010, however, there was a change in the landscape with regard to the economic contributions of the various sectors—the services sector became the largest contributor to the country's GDP and growth in the agricultural sector began to stagnate, as illustrated in Figure 2. The services sector continued to drive the economy, and accounted for approximately 50 per cent of total production from 2012 to 2014, while the agricultural and industry sectors contributed about 23 per cent and 27 per cent, respectively (Ministry of Finance 2015).

Figure 2: Sectoral contributions, 1984–2012



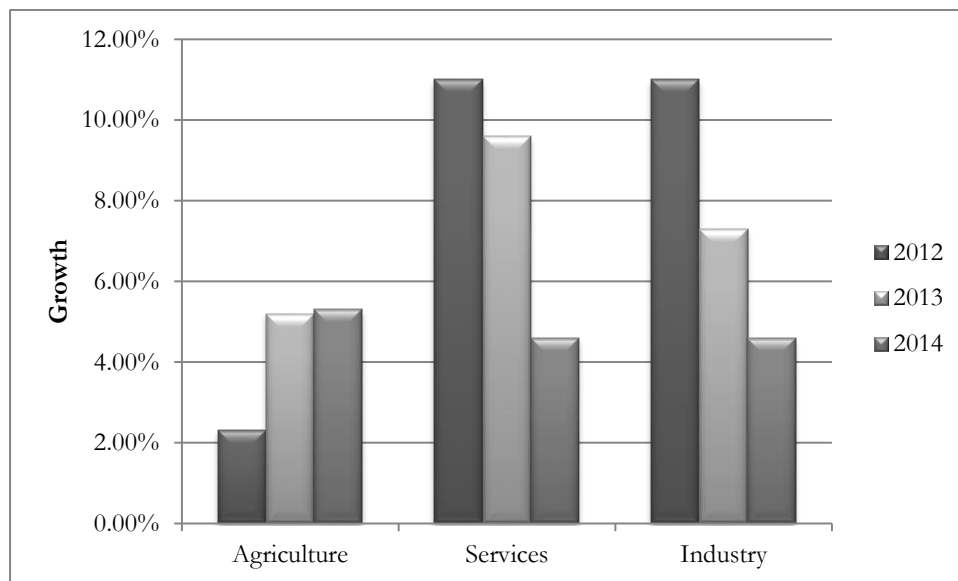
Source: Computed from national accounts (GSS 2014).

There are a number of factors that may explain the deteriorating performance of the agricultural sector over time. First, the economic reforms of 1983 which led to the removal of agricultural subsidies resulted in a slow-down in the performance of the food crop, fishing, and livestock sub-sectors. Additionally, inadequate access to markets and storage facilities and the resultant post-harvest losses may also explain reduced performance of the agricultural sector. Other factors include the rapid loss of forest cover as a result of bush-fires and logging activities, in addition to inadequate irrigation facilities and poor extension services. More recently, the declining performance of the agricultural sector has also been attributed to the discovery of oil deposits in the country, through the Dutch Disease phenomenon.

Despite the increased significance of the services sector to the country's total production, this sector may not easily be properly positioned to bring about the necessary structural transformation of the Ghanaian economy. This is because, in the strictest sense, transformation involves not only the reallocation of economic activity across the three sectors (i.e. agriculture, manufacturing, and services), but also the increase of new and more productive activities and a shift away from older, less productive, traditional activities. This increase of new and productive activities is what is expected to drive the economy forward, while the shift from older, less productive activities is expected to diffuse the gains of productivity throughout the economy (McMillan and Rodrik 2011). In Ghana, however, the dominance of informal activities in the services sector and the prevalence of low-productivity activities, in addition to the reduced significance and performance of the manufacturing sector, make recent changes in sectoral contributions more indicative of a structural *shift*, as opposed to a structural *transformation*.

Interestingly, although the services sector records the largest contribution to GDP, the agricultural sector is the only sector that maintained its rising growth trend from 2013 to 2014. As shown in Figure 3, while the industry and services sectors recorded declines in growth from 2012 to 2014, the agricultural sector was able to maintain its contribution to the economy, with the food and crops sub-sector accounting for about 75 per cent of total agricultural production within the period.

Figure 3: Growth per sector from 2012 to 2014



Source: GSS (2014).

Generally, Ghana may have a very strong competitive advantage within its agricultural sector for a number of reasons. First, over two-thirds of the total land in Ghana is fertile and requires little fertilizer to produce farm commodities in large quantities. Second, the government has demonstrated significant interest in agribusiness and a commitment to supporting increased investment in this area. Third, there is a large unemployed youth population that may provide the much-needed labour supply to the agricultural sector. There are many factors that make the agro-processing industry a viable sector to lead the economy towards sustainable development. First, due to the country's diverse agro-ecological zones, there is a diversity of commodities that may be easily processed. Second, there is a well-endowed network of water bodies which may be sourced for irrigation purposes. Third, there is access to relatively cheap agricultural products for

processing. Fourth, a number of incentives exist in Ghana to promote the agro-processing industries, such as tax-exemptions for the first five years of operations.¹

2.2 Agricultural policies and the agro-processing industry

This section discusses the evolutionary process of policies that have been enacted to promote the activities of the agricultural sector. Generally, the role of government is expected to be crucial in the formulation and enactment of economy-wide policies that provide an enabling environment for the growth of economic activities. These policies are meant to engender conducive environments for private-sector development through the provision of stable macroeconomic conditions such as low inflation, stable exchange rates, and limited budget deficits. The economic reform of the 1980s which mandated the promotion of free markets and trade liberalization has played an important role in encouraging the export of goods, in addition to growth of the agro-processing industry. Efficient financial systems, good legal and regulatory environments, and a reliable judicial system are other factors that contribute to a general economic climate favourable to the fostering of the activities of the agricultural sector.

Historically, agricultural policies in Ghana have generally favoured the production of raw materials and primary products. In the colonial era, for instance, raw materials were produced for export, while manufactured products were imported into the country for local consumption. Indeed, Guggisberg's Ten-Year Development Plan (1919), for instance, featured the promotion of cash crops such as oil palm and cocoa. The aim of this policy of focusing on export-orientation was to position the Gold Coast, as it was then known, to supply manufacturing industries in Europe.

After independence, continued emphasis was placed on primary agricultural production in an attempt to provide the requisite raw materials for the manufacturing sector, under the dominant import-substitution strategy. It is important to note that this period marks one of the earliest known attempts to promote agro-processing within the country. The seven-year development plan (1963/64 to 1969/70), which embraced a socialist approach to agricultural production, placed significant emphasis on industrialization and, therefore, numerous industries were established to process the agricultural (and mining) products that had historically been exported in their unprocessed form (Huq 1989). Indeed, the industrialization approach sought to establish significant linkages between the agricultural sector and local industries in an effort to promote backward linkages within the economy (Ackah et al. 2014). The main difference between the colonial and post-colonial eras was the focus on the modernization of agriculture in the latter era, through emphasis on large-scale state-led production. The Agricultural Development Corporation was set up in this period to oversee the modernization process but, despite large government investment in the sector, production remained at low levels.

Between 1966 and the early 1980s there were changes in government which led to alternating socialist and capitalist policies on agricultural promotion. In an attempt to reduce past excessive government expenditures, many of the local agro-processing industries that were set up at the time of independence were privatized or shut down by later governments. Around the late 1960s, there was a push for the liberalization of the economy through the elimination of import licensing and quantitative controls, and also for greater emphasis on private-sector-led growth. Small-scale farming was encouraged through the establishment of single-commodity boards for cotton and grains, for example, and through the extension of credit facilities to small-scale farmers. The

¹This policy has recently been modified, as noted in the policy section of this paper.

Agricultural Development Bank (ADB) was established in this period.² Additionally, rural farm production was encouraged through significant investment in rural development projects in roads, water, and electricity. The agricultural sector also received a boost in this era with the introduction of ‘Operation Feed Yourself’ and ‘Operation Feed Your Industries’ between 1972 and 1974, through which individuals were encouraged to take up agricultural activities. ‘Operation Feed Your Industries’ was particularly important as it encouraged the provision of needed raw materials for industries. Guaranteed minimum prices were also set by the reigning government for major agricultural products such as cocoa, maize, and rice, in an effort to further stimulate production.

Despite policies to promote agricultural production, however, by the early 1980s the agricultural sector had begun to decline. This may be attributed to a number of factors. Cocoa, Ghana’s main export crop, which had contributed 14 per cent of total GDP in 1970, contributed only about 2.6 per cent to GDP by 1982. Poor weather conditions also reduced food production within the country, and inflation soared from 9 per cent in 1970 to about 123 per cent by 1983 (Nyanteng and Seini 2000). The Economic Recovery Programme from 1983 to 1986 had, perhaps conflicting, implications for the agricultural sector. On the one hand, the market liberalization policy led to the devaluation of the country’s currency, which encouraged agricultural production and exports. On the other hand, the removal of guaranteed prices on agricultural products and subsidies on agricultural inputs tended to increase costs of production in the sector. Additionally, a number of agricultural enterprises collapsed due to their inability to compete on the international market.

Between 1991 and 2000, the Medium-Term Agricultural Development Programme (MTADP) aimed to provide a comprehensive framework for the recovery and accelerated growth of the agricultural sector. Although the MTADP was the main policy document for the Ministry of Food and Agriculture during the 1990s, other programmes and projects were undertaken to boost agricultural production and agro-processing within the period. These include the Agricultural Diversification Project (ADP, 1991–99), the National Agricultural Research Project (NARP, 1991–99), the National Agricultural Extension Project (NAEP, 1992–2000), Agricultural Sector Adjustment Credit (ASAC, 1992–99), the National Livestock Services Project (NLSP, 1993–99), the Agricultural Sector Investment Project (ASIP, 1994–2000), and the Fisheries Capacity Building Project (FCBP, 1995 to present). Commodity-specific programmes such as the 2001 President’s Special Initiatives (PSIs) also encouraged agro-processing, such as the PSI on cassava and its processing into starch.

The Food and Agriculture Sector Development Policy (FASDEP I) of 2002 was relevant chiefly because it adopted a sector-wide approach to guiding agricultural development and interventions. The World Bank/IMF-sponsored Interim Poverty Reduction Strategy Papers (PRSP, 2000–02) and the Growth and Poverty Reduction Strategies (GPRS I, 2003–05, and GPRS II, 2006–09) were also significant to agricultural production in the country. The first Ghana Poverty Reduction Strategy (GPRS I, 2003–2005) focused on agricultural development in order to drive rural development, while the second, GPRS II (2006–2009) and its follow-up, the Ghana Shared Growth and Development Agenda I (GSGDA 2010–2013) proposed that agriculture would lead the growth and structural transformation of the economy (MoFA 2010). It was recognized in the design of GPRS II that it would be difficult to raise the average real incomes of Ghanaians without significant improvements in the productivity of the agriculture sector, with particular focus on the agro-based/processing industry (NDPC 2007). The spike in performance of the industrial sector between 2002 and 2005 (the sector grew at 2.9 per cent in 2002 and 7.6 per cent by 2005) was

²In recent periods, the areas of financing from the ADB are agricultural production, export financing, agro-processing and marketing, and cocoa financing. However, there seems to be more focus on production and marketing and very little on agro-processing (MoFA 2007).

considered to be fundamental to the establishment of sustainable, accelerated, and job-creating agro-based industrial growth (Ackah et al. 2014).

The second phase of the Food and Agriculture Sector Development Policy (FASDEP II) aimed, among many other things, to promote agro-based industrial development in the country. The main difference between FASDEP I and FASDEP II was that the latter adopted a value-chain approach to agricultural development. FASDEP II contained the long-term policy objectives of government in relation to the development of the agriculture sector, with the means of implementation outlined in Ghana's 2011–2015 'Medium Term Agricultural Sector Investment Plan' (METASIP) document, which included several strategies and activities for the promotion of agro-processing in the country. These include the provision of at least one (private-sector-led) mechanization centre set up in each district of Ghana by 2015 to provide diversified services to farmers and agro-processors; the generation of incentive structures for agro-processing industries to implement food-grade processing technologies; and an increase in rural industrial processing of cassava (by 20 per cent), oil palm (20 per cent), shea nuts (40 per cent), cashew nuts (30 per cent), soybeans (30 per cent), and groundnut (30 per cent) by 2015 (MoFA 2010). Agro-processing is also to be promoted through the extension of:

support to individual and group initiatives aimed at adding value to major food staples. Priority will be given to maize (milling and packaging), rice (milling and packaging), cassava (gari, flour, etc), yam (flour), cowpea (grading and packaging) etc. – the support includes targeted training in value addition and linkages with relevant service providers and markets. Use of appropriate grades and standards will be emphasized to improve quality, improve market penetration and reduce post-harvest losses. In promoting agro-processing, care will be taken to ensure that the activities are carried out in an environmentally safe and sustainable manner. Thus all agro-processing interventions will be required to put in place environmental mitigation measures. Gender equity is also to be emphasized in all activities along the value chain to ensure that the disadvantaged, especially women and youth play a major role in all activities. (MoFA 2010: 25)

These goals are to be achieved through a number of activities, such as the identification of successful lead firms/agro-industries and the application of viable models of linkage with smallholders; the promotion of off-farm activities with particular focus on supporting the establishment of agro-processing micro- and small enterprises (MSEs) and on targeting women and the youth; the facilitation of credit facilities; an assessment of quality of agro-processing technologies used in food processing; the development of standards for agro-processing equipment for various types of food products; and enhancing the importation of appropriate agro-processing equipment (MoFA 2010).

The Ghana Trade Policy (GTP) also aims to turn Ghana into a major agro-industrial economy through the diversification of production in order to take advantage of export market opportunities. Other incentives for agro-processing firms include tax holidays of five years, from the commencement of commercial production, for companies engaged in the conversion of crops, fish, or livestock produced in Ghana into value-added and packaged products (i.e. agro-processing companies); location-based incentives; tariff incentives for agro-processing businesses—zero-rated for agro inputs, plant, and machinery; and exemptions from import duties on imported plant, machinery, and equipment to be used in agro-processing industries.

Although various agricultural policies over time have included sections that focus on the development of the agro-processing industry in Ghana, the country may benefit from an integrated and strategic national plan that takes into account specific characteristics and challenges faced by

small and medium-scale firms in the informal sector of the country, which includes most of those engaged in agro-processing activities. Such a national policy plan may also facilitate important linkages between the agro-processing industry and other relevant sectors.

3 The development of agro-processing in Ghana and its significance to the economy

3.1 Definition of agro-processing and linkages within the economy

The FAO (1997) describes agro-processing as the transformation of products originating from agriculture, forestry and fisheries. While agro-processing may involve global-to-local patterns (processing of imported agricultural commodities to be sold on the local market) and local-to-global patterns (processing of locally produced commodities for export), the industry in Ghana appears to be mostly concentrated on local-to-local patterns (production of locally produced commodities for domestic consumption), and dominated by informal-sector activities.

Agro-processing may vary from simple preservation operations such as drying products in the sun to more complex, capital-intensive processes. Agro-processing industries are typically comprised of upstream and downstream industries. Upstream industries are those engaged in the initial processing of agricultural commodities, such as rice and flour milling, leather tanning, cotton ginning, and fish canning, among others. Downstream industries are involved in more complex processing of intermediate products made from agricultural materials, including the making of bread, biscuits, textiles, paper, clothing, and footwear (FAO 1997). Agro-processing firms are characterized by crucial backward and forward linkages.

Backward linkages arise when local producers are able to satisfy their demand for raw materials and services from local suppliers. This may refer to the supply of credit, inputs, and other production-generating services. Backward linkages may be established by the procurement of capital goods and equipment from other industries, or by the purchase of agricultural inputs from farmers. Forward linkages, on the other hand, involve the creation of additional opportunities in other parts of the economy, from the activity of agro-processors through to the sale of processed products. This includes the marketing of these products and the generation of employment opportunities through value-addition processes. Forward linkages have positive implications for increased export earnings, employment generation, and greater food security (Babu 2000), and may be established through the sale of processed goods to final consumers, or the sale of processed goods to other firms who use them as inputs into their own production processes.

The role of agro-processing in Ghana's development could be vital, given its ability to generate increased demand for the products of other industries through backward or forward linkages. Despite the promising state of Ghana's agricultural sector, the linkage between agriculture and industry appears weak, and value additions by the manufacturing sector remain low. Agro-processing, an integrated form of agricultural development, may be expected to have the strongest effect on agricultural production, given the increased demand for primary products from this sector. Additionally, the infrastructure (e.g. roads and transport facilities, power, etc.) that is essential for promoting growth in agro-processing could also be vital to increased growth in the agriculture sector.

3.2 Evolution and structure of agro-processing firms in Ghana

According to Okorley and Kwaten (2000), agro-processing in Ghana can be traced back to the colonial period, when these activities were performed on a small scale and their products consumed locally. After independence in 1957, the industrialization drive embarked upon by the new government resulted in a number of state-owned processing factories which were directly linked to the country's agricultural products. These agro-processing factories were strategically located to use the primary agricultural products produced by the various regions. For example, the sugar factories located in Komenda and Asutuare in the Western and Eastern regions respectively were meant to use the raw sugar cane produced in these regions as a raw material. Also, the Pwalugu tomato factory was located in the region to make use of the abundant supply of good quality tomatoes in Pwalugu and its surrounding areas. Other examples included the Bolgatanga meat-processing factory and the Nsawam fruit cannery. About two decades after their establishment, after the overthrow of Kwame Nkrumah, most of these state-owned processing plants experienced declines in their production performance due to administrative and managerial challenges. As a result, some of these processing plants were either sold/privatized or left to run down.

In recent times—apart from cocoa, which is processed on a large scale—the agro-processing industry in Ghana is described as being in its nascent stages, according to Sutton and Kpentey (2012). The industry in Ghana is characterized by a large number of micro-, small, and medium-scale processing enterprises that are involved in activities such as gari processing, fish smoking, flour making, nut and palm oil processing, and fruit and juice processing. These artisanal processing activities have relied mainly on very simple and locally manufactured technology. Over the years, the processing of these products has moved from completely traditional methods to semi-mechanized and then to fully mechanized methods.

3.3 Performance of agro-processing firms and contribution to the Ghanaian economy

Although the agro-processing industry in Ghana is dominated by small and medium-scale players, it continues to play a significant role in the Ghanaian economy. According to the Ghana Export Promotion Authority, the industry grew at an average rate of 14.93 per cent between 2008 and 2013. A report from the United Nations Industrial Development Organization (UNIDO 2011) shows that within the manufacturing sector in Ghana, the agro-industry represents more than half (54.6 per cent) of total manufacturing value added. Specifically, the food and beverages sub-sector of the agro-processing industry accounted for about 32.5 per cent of total manufacturing value added in 2003 (World Bank 2009).

Da Silva et al. (2009) argue that the agro-processing industry is an important source of employment and income generation globally. In addition, the FAO (1997) reports that the highest shares of employment in the agro-processing industries are found in Africa. In spite of the lack of national-level data on employment in the industry, Ampadu-Ameyaw and Omari (2015) demonstrate that in Ghana the agro-processing industry is an important source of employment for rural communities, and especially for women given that the sector is dominated by women. In a survey of 272 small and medium-scale agro-processing enterprises in Ghana, Afful-Koomson et al. (2014) found that the Brong-Ahafo, Western, and Northern regions employ the majority of the labour force in the industry. By firm size, the study also showed that micro agro-processing firms employ about 48 per cent of the total agro-processing labour force. This is therefore reflective of the importance of the industry for employment, income, and inclusive growth for the country.

The contribution of the agro-processing industry to total export earnings in Ghana cannot be underestimated. Export earnings from the agro-processing industry increased from US\$181.1 million in 2004 to about US\$902.5 million in 2011, representing a growth of 398 per cent for that period (Oduro and Offei 2014). In 2004, the industry accounted for about 7.4 per cent of total export earnings, although this dropped significantly to about 4.9 per cent in 2011. In addition, processed and semi-processed agricultural products accounted for about 86.31 per cent of the country's non-traditional exports, contributing US\$2.16 billion in export earnings in 2014 compared to US\$2.11 billion in 2013. Table 1 shows the trend in Ghana's agro-processed exports between 2004 and 2011.

Table 1: Trend in Ghana's exports (2004–2011)

Export	2004	2005	2006	2007	2008	2009	2010	2011
Agro-processed exports (\$ million)	181.1	232.3	213.5	255.2	137.0	131.9	215.1	902.5
Total exports (\$ million)	2,450.5	3,059.7	3,614.0	3,533.8	3,809.9	5,070.5	5,233.4	18,400.5
Agro-processed share in total exports (per cent)	7.4	7.6	5.9	7.2	3.6	2.6	4.1	4.9

Source: Oduro and Offei (2014) based on data from UNCOMTRADE.

With respect to sector productivity, findings from Ampadu-Ameyaw and Omari (2015) and Afful-Koomson et al. (2014) show that the indigenous technology adopted among firms in the industry has resulted in reduced efficiency and productivity, compared to multinational agro-processing firms who are able to rely on modern and more efficient technology in their operations. The labour-intensive and time-consuming features of the indigenous technology often hinder the opportunity to scale up operations, creating a scope for policy in this area.

3.4 General constraints on the growth and development of the agro-processing industry

Despite general and specific policies put in place by the government and aimed at promoting the agro-processing industry in the country, Ghana produces a little over 30 per cent of the raw materials needed by agro-based industries. Almost all the food products sold to local markets have very limited value addition. Cereals and grain legumes are often just threshed, while roots and tubers and plantains are sold predominantly in their raw form. Recent attempts to produce cassava, plantain, and yam flour are yielding results but, at present, markets for these are not fully established. Low income levels are also a source of constrained demand for the well-packaged cassava, plantain, and yam flour. It is important to note that there are hardly any statistics on the output of the agro-processing industry in the country. A critical element of the modernization of the agriculture sector is value addition to primary produce. However, the lack of reliable statistics on the supply of and demand for processed agricultural products constrains the effectiveness of this sector (MoFA 2010).

A number of reasons may be proposed to explain the low uptake in agro-processing in the country. These include the lack of agro-processing facilities and modern equipment, which often results in significant agricultural yields going to waste. The high cost of equipment is another factor. Agro-processors also often receive limited information from extension officers, in addition to low access to adequate packaging materials. There is also a lack of marketing skills on the part of agro-processors.

Attention to hygiene and basic food safety procedures is found, at times, to be limited among informal enterprises, including agro-processors (FAO 2014). Knowledge of specific regulations and legislation governing food safety and hygiene issues is only evident among those processors who market their product through formal outlets. Other reasons are the irregular supply of energy, and low youth interest in farming, agro-processing, and agribusiness, in general due to low profitability; additionally, the higher perceived gains in the mining sector attract youth away from the agricultural sector.

3.5 The policy environment of agro-processing firms in Ghana

As outlined in Section 2, Ghana's agricultural policies have aimed at the promotion of the agro-processing industry, through the creation of strong linkages between the agricultural and industrial sectors. Indeed, one of the key goals of the GSGDA is the strengthening of the agro-processing sector. The focus on agro-processing is important, given the rapidly expanding urban sector, and also due to the sector's potential to bring about a critical structural transformation of the economy.

Although Ghana's agricultural sector continues to contribute positively to the country's GDP, there remains a weak linkage between agriculture and industry. According to Nti (2015), the manufacturing sector grew by only about 2 per cent annually between 2006 and 2013, with the share of manufacturing declining over the same period from about 10 per cent of GDP to 5.8 per cent. Although agro-processing of food and beverages represents about 30 per cent of manufacturing, poor linkages to agricultural raw materials result in little value addition, a situation which limits growth and transformation of the economy.

There have been policies formulated and implemented by the government of Ghana (through the Ministry of Food and Agriculture and the Ministry of Trade and Industry) that have had positive impacts on the agro-processing sector. The fruit and juice processing sub-sector, for instance, has benefited from a number of incentives including zero input duties on inputs; zero value-added tax (VAT) and national health insurance levy (NHIL) on inputs; low-level corporate income tax; zero VAT and NHIL on imported packaging material; and zero import duties on farm machinery. The creation of the Export Development Agriculture and Investment Fund (EDAIF) in 2000 to promote non-traditional exports also plays a positive role in the agro-processing industry, through the provision of financial resources for export activities. The fertilizer subsidy programme, initiated in 2008, involves the absorption of approximately a third of the cost of certain categories of fertilizers. This policy leads to a reduction in the costs of production of raw materials for agro-processing firms.

Despite the fact that agro-processing has been encouraged in Ghana since the time of independence, with the policy of industrialization through import substitution, Ghana's current agro-processing industry may be described as having low value addition, with low technology at the cottage-industry level, and few large-scale industries (Aryeetey and Mensah 2008; Quartey and Darkwah 2015). There has not been an entire absence of technological innovation. For example, development projects such as the Village Infrastructure Project support the introduction of technologies such as shea processing equipment in the Northern region of Ghana. Development projects have also supported capacity building through knowledge transfer and training of small and medium-scale firms (Owusu-Kwarteng 2014). Nonetheless, it is doubtful that these technologies can support production at large scales, particularly by medium-scale firms. In Ghana, over 70 per cent of agro-processing occurs informally, posing challenges for technical innovations and knowledge transfer, in addition to quality control.

With respect to local technology development and adaptation, there appears to be an apparent disconnect between local product development and uptake by local agro-processing firms, which further reduces technology adoption in the agro-processing sector. Agricultural research could play a critical role in enhancing agro-industry competitiveness. However, policy makers may need to focus on better ways of facilitating the flow of agricultural technology from public discovery to private use, taking into account key barriers (cost- and non-cost-related) to technology transfer between public research institutions and private seed companies, and the role of the policy in impeding or accelerating technology development and transfer.

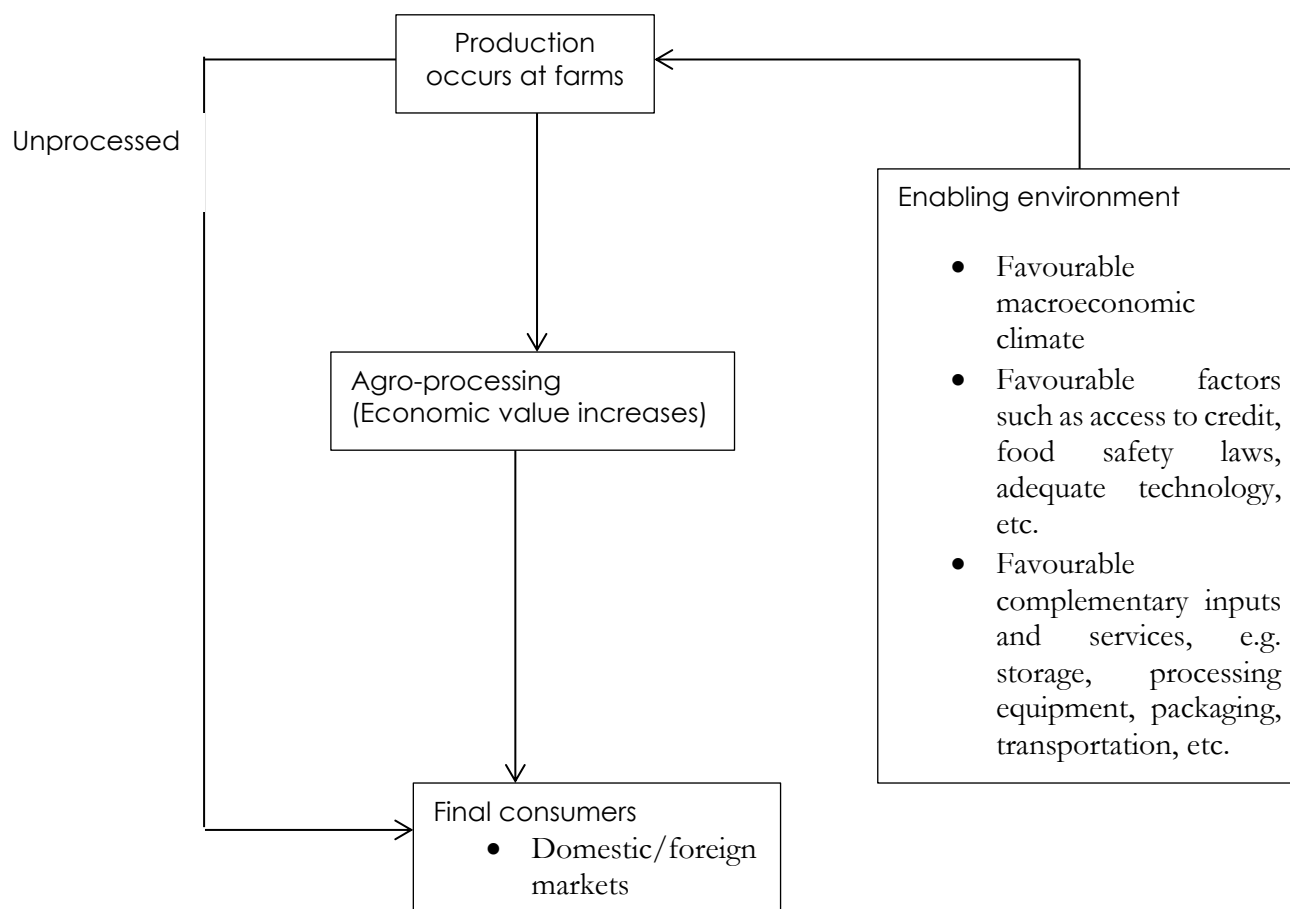
It is argued that the growth and development of small-scale food processing industries in West African countries has been limited as a result of inefficient and inappropriate technologies, poor management, inadequate working capital, limited access to financial institutions, high interest rates, and low profit margins (Büntrup et al. 2015; Aworh 2008). Indeed, in Ghana, the presence of recent utility tariff increases and a high interest rate pose a major challenge to the survival and growth of small agro-processing firms in the country. Additionally, the recent income tax regime appears to be unfavourable. In past periods, agro-processing firms enjoyed five-year tax holidays; under the new regime, businesses will be charged a 1 per cent rate during the five-year period, and subsequently, the standard corporate tax of 25 per cent.

4 Key agro-processing sub-sectors

Four major sub-sectors of the agro-processing industry are discussed in this section. These include nuts and oils; grains; roots and tubers; and fruits and fruit juices. Figure 4 models the value-chain process of these products from the farm through to handling, processing, and distribution to the final consumer.

As mentioned above, a large amount of the agricultural products harvested at farms do not undergo any processing, but are distributed and consumed directly, either locally or internationally. Some of the agricultural output, however, does go through some degree of processing before final sale and consumption. A number of factors, however, play an important role in the agricultural production stage, and also during the agro-processing stage. As discussed above, the microeconomic climate is an important determinant within the value chain, and this can be influenced by public policies aimed at improving the competitiveness of agro-processing industries. Additionally, the presence of factors such as adequate access to credit, food safety and standards boards, or access to technical knowledge, among others, is also important. In Ghana, agro-processing firms face constraints with respect to the availability of these enabling institutions. Facilitating services such as goods transportation systems, adequate storage facilities, and efficient packaging systems also contribute to the production of agricultural commodities and agro-processing activities.

Figure 4: A general agro-processing value-chain system in Ghana



Source: Authors' construction.

It is important to note, however, that the value chain may vary for different products. These will be discussed in greater detail in the sections below.

4.1 Nuts and oils

The major nuts produced and processed in Ghana include palm nut, shea nut, groundnut, cashew, and coconut. Palm oil and shea butter/oil are the predominantly processed nuts. These activities are typically carried out on small and medium scales in the country. Addaquaye (2004) classifies the processing technologies into three methods—namely, the traditional manual, semi-mechanized, and fully mechanized methods.

Palm oil and shea butter/oil processing, which is predominantly undertaken by women, involves very laborious tasks of pounding/milling, kneading, washing, and cream boiling, all carried out with very simple household equipment such as the mortar and pestle. This process, according to Addaquaye (2004), is the main method of processing oils in most West African countries, including Ghana. Hall et al. (1996) claim that this process takes about 20–30 hours in order to produce substantial amounts of oil. Mensah (2001) also documents that about 80 per cent of Ghana's shea butter is produced through traditional processing techniques.

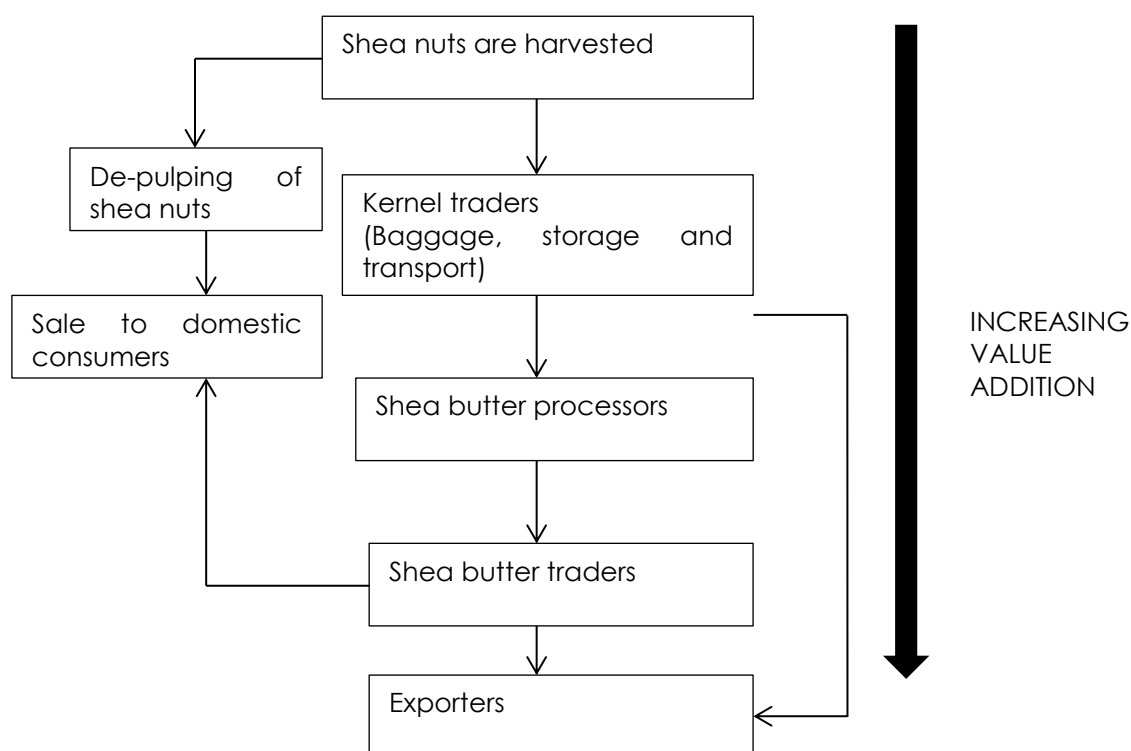
There have been attempts to reduce the long processing times and the excessive use of water and firewood in the processing of these oils. Additionally, women engaged in the process are exposed to heat and smoke for long hours. Collaborative work with the United Nations Fund for Women's Development, non-governmental organizations such as Technoserve, and development partners such as the Netherlands Development Organisation (SNV) has led to the emergence of improvements in the form of semi-mechanized technologies which are locally designed and manufactured. Examples of such equipment include the hydraulic and mechanical presses which are meant to make oil processing more efficient. These have reduced processing times and facilitated more moderate use of inputs such as water.

Nonetheless, household units that produce oil at the micro- and small-scale levels continue to rely on the traditional manual methods of extracting oil due to financial constraints on purchasing the locally manufactured equipment. As a solution to the problem of financial constraint, in some instances, these rural women who are engaged in oil processing have organized themselves into groups in order to access the semi-mechanized processing technologies which allow them to increase their production.

Over the years, these semi-mechanized technologies have developed further, from equipment designed to perform particular operations such as oil digestion and oil pressing to machines that combine several operations in the process (FAO 2002). Apart from gaining access to the improved technologies, these women's groups have also been able to undertake effective marketing of their products (Mensah 2001). The finished products include oils for household cooking, oil for the cosmetics industry, and oil for the soap-making industry. In some cases, the palm nut is also processed into palm nut base (a paste with a thick consistency used in preparing soups) and packaged for export.

Figure 5 summarizes the value-addition process in the shea butter sub-sector. The shea nuts are picked and processed into kernel by young women and girls. The pulp of the shea nut may be sold to domestic consumers. Men are typically responsible for bagging large amounts of shea kernels and transporting these to processing centres. These kernels may also be transported to exporters. At the processing sites, the kernels are crushed, roasted, milled into paste, and boiled to emulsion. The oil is then collected and cooled in order to obtain the butter. This processing of kernels into butter is typically handled by women. The butter is transported to the shea butter traders, who go on to export for sales or sell in the domestic market.

Figure 5: Value chain for the processing of shea butter in Ghana



Source: authors' construction.

4.2 Grains

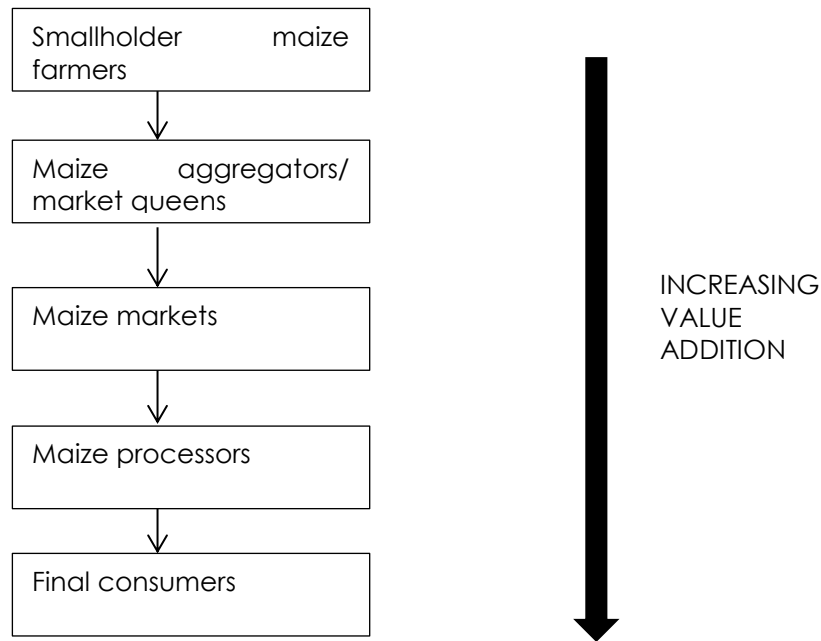
The main grains cultivated in Ghana are maize, millet, sorghum, and rice. Maize is the most important cereal crop produced in Ghana and it is also the most widely consumed staple food in the country (Morris et al. 1999). In Ghana, processing of these grains is primarily undertaken by women using simple household equipment. Processing usually involves de-husking, roasting, and milling into flour. The flour is further processed into different kinds of porridges, beverages, and other foods. Milling of the grains is usually done with mechanized locally fabricated grinders, which is an improvement on the use of the stone grinders and pestle and mortar that were employed in the past.

In fairly recent times, grains have started to be processed on medium to large scales using relatively more sophisticated technology. At the medium-scale level, grains are roasted and milled into flour, mixed with other legumes such as soybeans and groundnut, and packaged for both domestic consumption and export. On a large scale, grains are processed into grits and serve as raw materials for poultry farms, and for giant brewery companies such as Guinness Ghana Brewery Limited and Accra Brewery Limited in the production of new beer varieties and other beverages. Also, grains in Ghana are processed into high-end infant cereals such as Cerelac using state-of-the-art food-processing technology by renowned food-processing companies such as Nestlé.

Figure 6 describes the value chain for the production of maize in Ghana. Smallholder farmers produce substantial amounts of maize in Ghana. These are sold in sacks to aggregators, who repackage them into 50- and 100-kilogram bags for sale to local consumers, and also to maize processors. This weighing function may serve as a form of value addition, as the standard weight conforms to the sale requirements set out by the Ghana Standards Authority (GSA). In some

circumstances, these market aggregators pre-finance the activities of smallholder farmers, who pay back at the time of harvest, with maize yields. Smallholder farmers may also sell to market queens for sale in local markets, or to processors such as beverage breweries. Maize processing typically involves shelling and grading/sorting of maize products.

Figure 6: Value chain for the processing of maize in Ghana



Source: authors' construction.

4.3 Roots and tubers

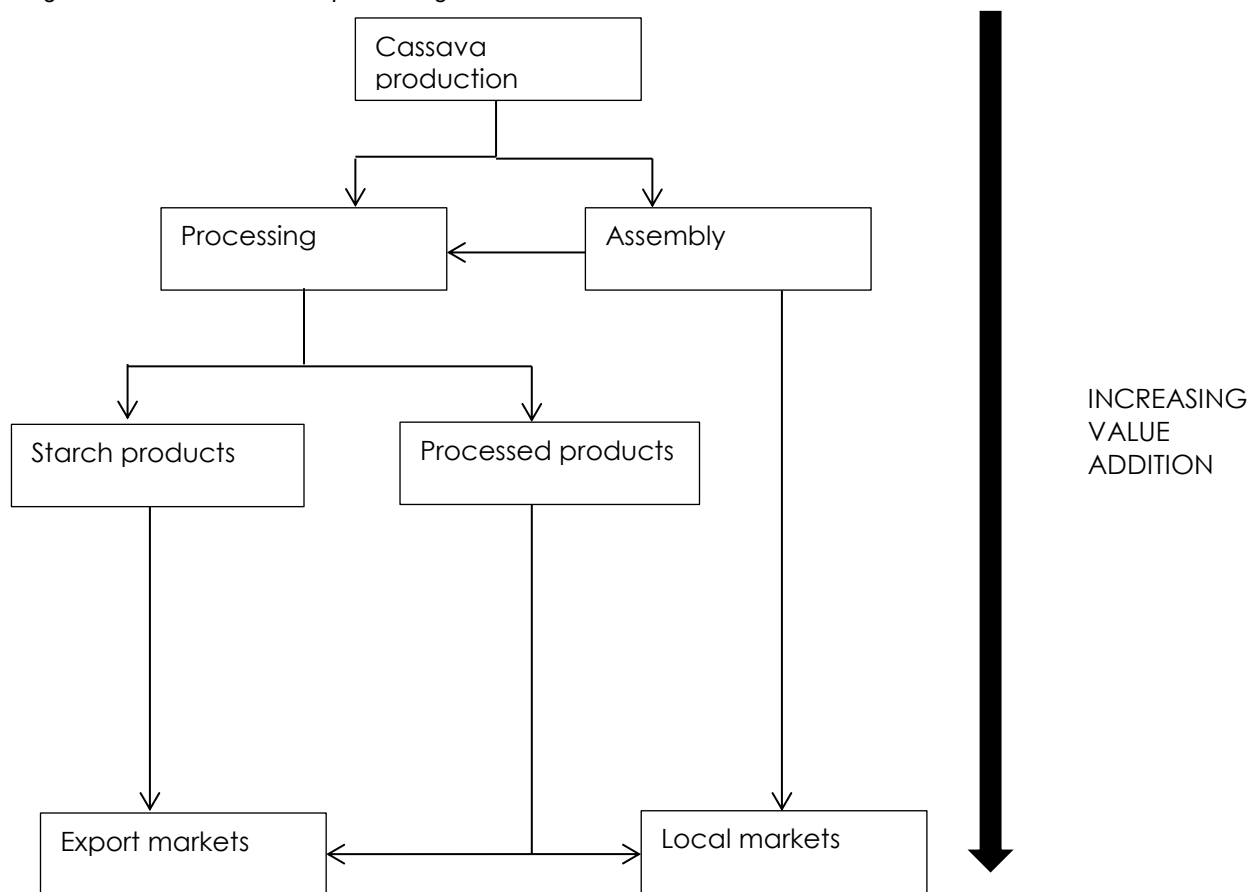
According to MoFA (2010), roots and tubers, which include cassava, yam, cocoyam, and sweet potato, contribute about 50 per cent of Ghana's agricultural GDP. Of these four, cassava is the most processed due to the fact that it is the most perishable among the root and tubers, deteriorating within a period of two to three days after harvest (FAO 1998). Processing of cassava in earlier years was predominantly carried out by individual micro- and small processors. These processors relied on very rudimentary technology made from local materials. Some of the finished products include *gari*, *kokonte* (sun-dried cassava chips/flour), cassava dough (*agbelima*), tapioca, and starch, usually for local and domestic consumption.

The introduction of starch—high quality cassava flour (HQCF)—glucose syrups, and industrial alcohol (which served as potential cassava-based industrial raw materials for the bakery, plywood, paperboard, pharmaceutical, confectionery, and beverages industries in the mid-1990s) has seen the emergence of several medium- and large-scale processing enterprises in the country (Dziedzoave 2008). The technology used in the processing of cassava has also evolved from the traditional manual technique, which involves the use of heavy knives for peeling and heavy reliance on the sun for drying the cassava chips. The traditional processing method also includes sifting, fermentation, and roasting.

Medium- and large-scale processing of cassava benefited from the introduction of motorized cassava graters in the late 1960s. Since this period, stakeholders in the industry, such as research institutes, university departments, small-scale artisanal shops, and blacksmiths, have designed and developed different kinds of cassava-processing equipment, with the support of various non-governmental organizations. Some of the locally manufactured equipment used in processing cassava in recent times includes graters, cassava chippers, screw presses, hydraulic presses, cassava dough disintegrators, sieving machines, grading machines, plate mills, hammer mills, and mechanical dryers. These new technologies have been adopted especially at the micro- and small-scale levels by groups of women who have formed cooperatives in order to be able to purchase the equipment. Currently, the export of cassava chips for industrial use has been made possible through the efforts of private initiatives, supported by the government. The renewed demand for wet cassava chips, especially in the brewery industry, which makes use of more sophisticated technology, has made cassava processing an even more profitable venture in Ghana.

Figure 7 describes the value chain for the production of cassava in Ghana. Production of cassava is carried out predominantly by small-scale farmers. There are also a few medium- and large-scale producers of cassava in the country. After harvest, small-scale farmers typically sell their fresh cassava root produce to assembly traders and other intermediaries for sale in local markets. In some instances, assembly traders supply fresh cassava roots as a raw material to some processing plants. Medium- and large-scale producers of cassava, however, sell their produce predominantly to processors, who make cassava products such as *gari*, *agbelima*, and *kokonte*, which are sold in local markets or exported. Processors also make starch, which may be exported or consumed in the local market.

Figure 7: Value chain for the processing of cassava in Ghana



Source: authors' construction.

4.4 Fruits and fruit juice processing³

Between the mid-1990s and 2002, Ghana depended on about four large fruit-processing companies that employed very expensive, capital-intensive, and imported technology for fruit juice processing in the country. The huge capital outlay required for fruit juice processing therefore served as an entry barrier. During the same period, there was a proliferation of flavoured drinks through the use of syrups; these types of drinks required substantially less start-up capital. Due to the large number of producers of flavoured drinks, the Soft Drinks Manufacturers Association of Ghana was formed. The viability and the perceived shortage of players in the fruit juice industry propelled the leadership of this association to engage local engineers in the manufacture of simple machines and equipment to overcome the huge capital outlay of fruit processing. This initiative was largely successful and the subsequent locally manufactured technology adequately handled processing steps that ranged from extraction of juices to bottling on a small scale. The washing and cutting up of fruits, however, remained a manual process. A main factor that increased the adoption of these technologies was its affordability. Also, the local equipment facilitates juice processing at relatively small scales. Over time, these local technologies have been further advanced with the introduction of hydraulic presses for juice extraction, a semi-automated process that further increases efficiency.

A major challenge in the juice-processing industry in Ghana is the issue of limited supply of fruits, which serve as the main raw material for the industry. Farmers are often unable to provide a constant supply of fruits to the processors' factories due to relatively high input prices and unexpected weather conditions. Also, fruit farmers in peri-urban areas are gradually losing their farmlands to very large estate developers. With regard to packaging, the industry is challenged over access to clean and sanitary bottles. The heavy reliance on recycled bottles for packaging is unsustainable, as processors are not guaranteed a continuous supply of these bottles. To get around this challenge, the Association has begun to explore the option of using plastic bottles. These, however, entail additional costs.

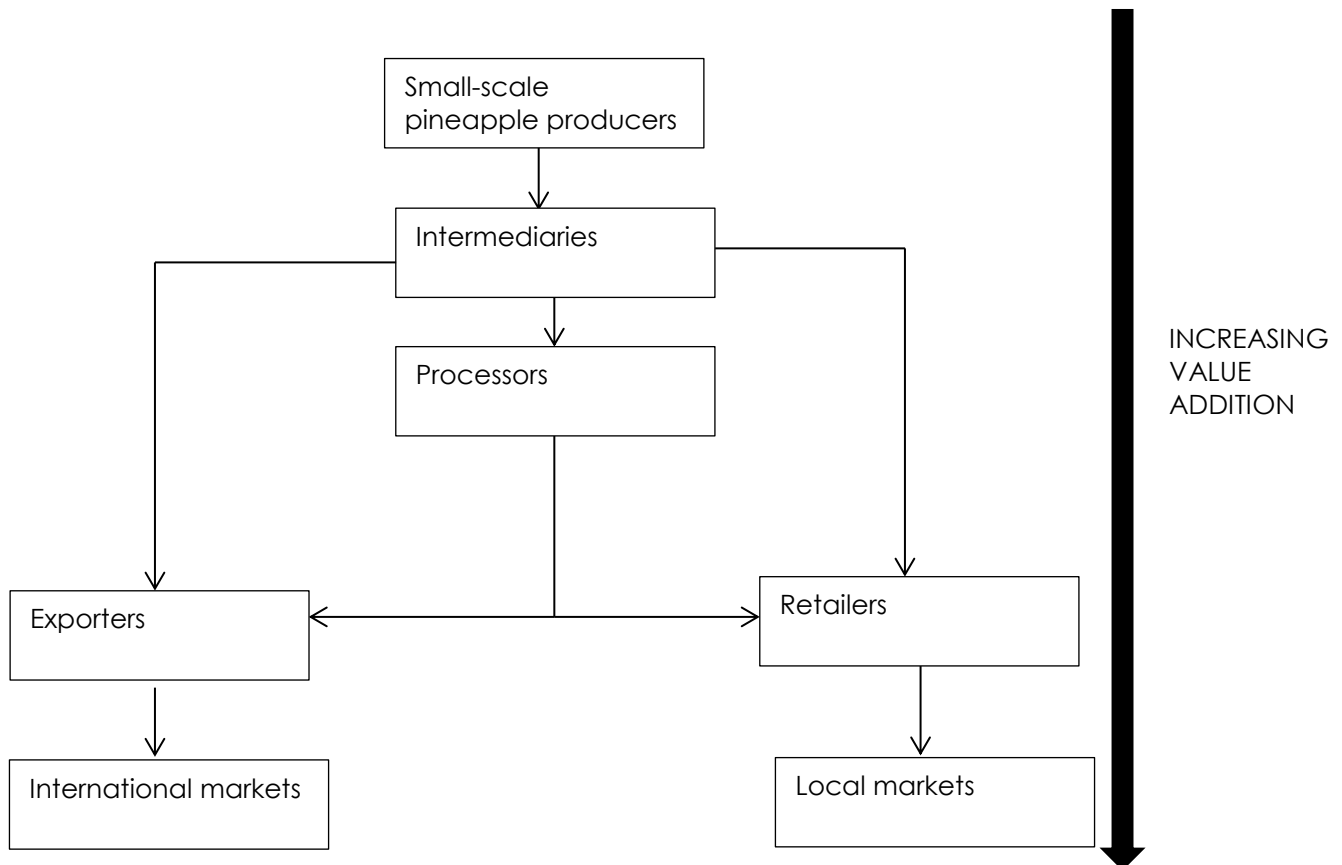
Although the practice is not currently widespread, some players in the fruit-processing industry have begun to export cut fruits to European markets. Fruit export to the European market was precipitated by the high demand for Ghana's sweet pineapple variety, accompanied by the proximity of the country to its target market, which ensures constant supply to Europe via cargo planes. This mode of transportation is costly, however, and therefore an association formed by pineapple exporters has explored cheaper options for transporting fresh produce to Europe. Sea freight appears to be a cheaper option and, combined with the availability of cold storage facilities at the ports, has facilitated more efficient transportation of processed goods to European markets.

The process of learning in the fruit juice-processing sub-sector of the industry can be described as top-to-bottom transfer of knowledge. The leadership of the Association is periodically engaged in various capacity-building and training activities at the national or international level. Knowledge and skills gained on new technologies, as well as best practices in the industry, which are likely to improve the production process, are then cascaded down to members through locally organized training workshops. Additionally, the availability of juice-processing manuals, through funding from the Ministry of Agriculture and development partners like GTZ (the German Technical Cooperation Agency), opens up the industry to more entrepreneurs.

³ Information for this section was obtained from a one-on-one interview with the President of the Fruit Processing and Marketing Association of Ghana (FPMAG).

Figure 8 describes the value chain for the production of pineapples in Ghana. The supply of pineapples is dominated by small-scale farmers who operate on approximately 1–5 acres of land. Market women often play the role of intermediaries, who take on the risks of storage, transport, and associated finance between farm and final consumer. Intermediaries may supply harvested pineapples to small grocery stores or large-scale multinational corporations' stores. Alternatively, they may also supply pineapples to various processing plants. Once processed into juice or pulp, products may be sold in the local markets through retailers, or in the international market through the services of exporters, which may include large commercial farms. It is important to note that in addition to processed pineapples, large international supermarkets also buy whole pineapples.

Figure 8: Value chain for the processing of pineapples in Ghana



Source: authors' construction.

5 Case studies

This section provides case studies of two major firms involved in agro-processing in Ghana. The firms are Blue Skies Ghana Ltd, for the production and processing of pineapples and other fruits for domestic and foreign consumption, and SeKaf Ghana Ltd, which processes shea butter for local and international markets. Blue Skies Ghana Ltd is a foreign-owned company that has been in operation in Ghana since 1998, while SeKaf Ghana Ltd is a locally owned company that was established in 2003.

Case study 1

Blue Skies Ghana Ltd: pineapples

Blue Skies Ghana Ltd is one of the largest agro-processors in Ghana, and employs over 1,500 workers in its operations. The company was founded by a UK-based entrepreneur and has its head office in the UK. Blue Skies Ghana Ltd began producing fresh cut fruit in 1998, and in 2004 expanded its operations to include fresh fruit juice for both local and international markets, which include the UK, France, Italy, and South Africa. In addition to various pineapple varieties such as the Smooth Cayenne, MD2, and Organic Sugarloaf, Blue Skies also processes other fruits such as mangoes, papaya, coconut, passion fruit, and banana. The company sources pineapples, mangoes, passion fruit, papaya, and coconuts from eastern and central regions in Ghana; melons and pomegranates from Egypt; melons from South Africa; and mangoes from Brazil. Although initially established in Ghana, Blue Skies Ltd has since expanded to include branches in Egypt, South Africa, Brazil, and the UK.

Fresh cut fruit was the first product of Blue Skies Ghana Ltd, and initial quantities were prepared for supermarkets in Europe. Smallholder farms provide the majority of the supply of pineapples to Blue Skies, although some pineapples are also sourced from a few commercial farms in Ghana. The company deals with individual farmers and not with cooperatives, and purchases over 1,750 tonnes of raw fruit products from these fruit growers on a monthly basis to use in its production of fresh cut fruit and fruit juices. This linkage between the small-scale fruit cultivators and the processing company is beneficial, as the farmers benefit from greater local and international market access to their products. Additionally, the company is known to pay farmers promptly and at a higher rate per kilogram of produce, compared to other competing pineapple buyers in the area, which ensures continued supply of raw materials to its factories. Blue Skies Ltd also provides technical advice and regular training on agricultural methods to its currently over 150 small-scale fruit growers, and has been known to pre-finance the production activities of these farmers. The company also provides inputs and equipment to pineapple growers for purchase, and takes on the technical and financial responsibility for certifying its suppliers. This, however, further obliges suppliers to remain loyal in their supply of produce to the company. The close proximity of the Blue Skies factory to these farmers allows it to obtain a regular supply of raw materials for its processing plant, which facilitates delivery of freshly harvested fruit to local consumers within 24 hours, and to UK consumers within 48 hours.

The products of Blue Skies Ghana Ltd undergo a significant amount of value addition at its local processing plants. The fresh fruit is bought and transported from local farmers to factories, cleaned, cut, and packaged for sale. Fresh cut fruit and juices are produced under strict local and international food safety and quality management systems. Additionally, the products are labeled and branded by the company, an important step in the value-chain process. They are then transported by air-freight using commercial airlines, to international market locations. The company's access to primarily UK-based supermarkets is often attributed to the founder's origin and networks within the EU supermarket industry (Webber and Labaste 2009).

From a policy perspective, the continued expansion of Ghana's pineapple industry may be attributed to regulatory reform, tax incentives, market linkages, investments in new pineapple varieties, and public-private partnerships.

Case study 2

SeKaf Ghana Ltd: shea butter

Sekaf Ghana Ltd is a Ghanaian-registered company that is based in the town of Tamale, in the middle of the savannah zone, in Northern Ghana. The company was founded in 2003 and was originally engaged in the distribution of a varied array of nut products. In 2004, it began to specialize in shea, given the opportunities for growth and expansion in this area. The company relies primarily on women for the production and processing of both raw and refined shea butter.

An important activity of the company was the establishment of the SeKaf Shea Butter Village in 2008, which serves as a convergence point for the processing of shea butter by women from neighbouring villages. Here, shea fields are developed and managed in collaboration with women's cooperatives. Approximately 2,500 women are currently employed as shea nut pickers and processors for SeKaf Ghana Ltd.

In addition to raw/unrefined shea butter, the company also purchases shea nuts from women in the local villages. It ensures the high quality of these products and provides storage/warehousing facilities as well. The unrefined shea butter is used to produce high-quality cosmetic products for sale in local and international markets, and the company assumes responsibility for the labeling and packaging of final products. These products are then distributed to buyers in both local and international markets. Products from SeKaf Ghana Ltd include shea nuts, shea oil, shea stearin, cold press shea butter, traditionally hand-crafted shea butter, and cashew nuts.

Noted challenges in the production and processing of shea butter include poor and inconsistent shea butter quality, leading to low market competitiveness, low bargaining power, and absence of guaranteed buyers. SeKaf Ghana Ltd has addressed these challenges in a number of ways. First, the quality of shea butter was upgraded through the establishment of the SeKaf Shea Butter Village, where shea butter could be processed in a controlled environment and under better supervision, as opposed to the former method of home-based processing. Second, to deal with the problem of low bargaining power, the company encouraged the formation of cooperatives and also provided training in simple cost calculations in order to ensure that women did not trade at a loss. Third, to overcome the problem of steady demand, SeKaf pledges to be a guaranteed buyer for the women, with a guaranteed price that is 15 per cent higher than the calculated market price. While this ensures a steady supply for SeKaf's processing plants, it also guarantees income for women engaged in shea butter processing and trade. SeKaf Ghana Ltd also provides interest-free loans to women and receives shea nuts in exchange for these loans in some instances, indicating the presence of some pre-financing schemes.

6 Conclusion

Although agricultural production in the country is generally rainfall-dependent, there are a number of factors that make this sector a viable area in which to focus more attention and investment. These factors include the presence of a well-endowed drainage basin with networks of water bodies that can be tapped for irrigation; a well-established agricultural research system which has been successful in the improvement of the production of crops such as cassava, maize, and cowpea; a large youth population which can provide a ready supply of labour for increased crop production; and relative nearness to the European market for export facilitation, compared to other countries in southern Africa (GIPC 2013). A major strength of the agricultural sector is the diversity of commodities being produced in each of the three major agriculture zones within the country. The northern savannah zone, the largest agricultural zone, is well-known for its production of rice, millet, sorghum, yam, tomatoes, cattle, sheep, goat, and cotton. More recently, mango plantations

and ostrich farms have also begun to gain agricultural prominence in the zone. The coastal savannah zone is another important agricultural zone in the country. The lower portion of this zone drains into the Volta River and therefore provides a conducive environment for fish farming and aquaculture. Other commodities produced in this zone include sweet potato and soybean crops under irrigation, in addition to rice, maize, cassava, vegetables, sugar cane, mangoes, coconut, and various livestock. The forest zone, with its more abundant supply of rainfall, is more noted for the production of cocoa. Other crops cultivated in this area include coffee, oil palm, cashew, rubber, plantain, banana, and citrus crops.

Although the services sector currently contributes the majority share to total GDP within the Ghanaian economy, it is unlikely to sustain growth and long-term development due to a recognized lack of competitiveness in this sector. Although education levels within Ghana are relatively high, the high quality of education that is needed to foster innovation and increased productivity is lacking. On the other hand, these average levels of education may be sufficient to spur production in light manufacturing sectors such as agro-processing, which typically relies on relatively lower-skilled labour. Additionally, while services sectors thrive on well-developed infrastructure and technology such as good transportation systems, storage facilities, and financial systems, the current access to only basic infrastructure (e.g. electricity, road networks from farming communities to urban and peri-urban markets, irrigation facilities) in Ghana may be more conducive to activities of the agricultural and agro-processing sector. The experience gathered by the labour force in the blue-collar jobs in the agro-processing industries may also likely propel the establishment and growth of heavy manufacturing industries, which will ultimately spur overall economic growth and development in the country.

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