CHAPTER 6

Transforming the Agrifood Processing Sector in Africa: The Role of Industrial Clusters

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Introduction

Agriculture and the agrifood processing sector play an important role in many African economies. Agriculture accounted for approximately 53 percent of total employment in Africa south of the Sahara in 2019 while agricultural value added as a percentage of GDP stood at 17.2 percent in 2021 (World Bank 2022). The agrifood processing sector, which forms part of the wider agro-industrial sector,[2] is also a key component in the manufacturing sector in many African economies (UNIDO 2012). For example, in Ghana, food manufacturing accounted for more than 33 percent of manufacturing value added in 2015. Moreover, food manufacturing's share of total manufacturing stood at 14 percent in Egypt in 2018, and 58 percent in Zimbabwe in 2017 (UNIDO INDSTAT 2021). This underscores the fact that although the contribution of agrifood processing to total manufacturing may vary across countries, it remains a significant contributor to many African economies, and to meeting the food security needs of the population.

In recent years, factors such as rapid urbanization and patterns of dietary changes have led to a shift beyond grains to non-grain foods (such as dairy and meat) and a rise in demand for processed foods in both rural and urban areas (Reardon et al. 2019a). This presents both a challenge and an opportunity for the agrifood processing sector in Africa. The challenge is that although the agrifood processing sector in Africa is an important one, it is relatively underdeveloped. For instance, while the continent produces approximately 70 percent of the world's raw cocoa, it only produces 16 percent of intermediate cocoa products, which are worth two to three times more per ton than the raw cocoa beans (AfDB 2016). Situations of this kind also represent a significant loss to African economies in terms of employment, lost revenue, and cost of importing processed food products. The opportunity, however, lies in the fact that the increased demand for processed food products offers a ready market for a well-developed agrifood processing sector. Therefore, the ability of the sector to develop and market innovative products will prove essential in tapping into these markets.

Industrial cluster is a general term for an agglomeration of firms that operate in a particular sector at a specific geographical location (Schmitz 1999). In the agricultural sector these clusters can be grouped into three broad categories: (1) special economic zones (SEZs); (2) agro-industrial parks; and (3) agri-clusters (Ulimwengu and Jenane 2019). These categories of clusters can be formed through a managed process often initiated by deliberate government intervention as a means of promoting economic growth, formed organically without or with limited government intervention, or formed through a combination of these measures.

Within this context, and in relation to agrifood processing firms, we can define an agrifood cluster as a concentration of producers, agribusinesses, and institutions in the same agrifood subsector that come together to build value networks while addressing common challenges and pursuing common opportunities (Nogales 2010). The development of agrifood processing clusters involves building sustainable agrifood value chains that are supported by related industries (FAO 2017). Ulimwengu and Jenane (2019) noted that clustering among agrifood processing firms has the potential to facilitate coordination among various actors along the agrifood value chain and can help reduce costs, increase profits, and facilitate market access. Therefore, creating an enabling environment for the development of clusters is crucial for enhancing value chain investment and ensuring inclusive transformation for firms in the agrifood processing sector (Reardon et al. 2019b). In the context of developing countries, clusters can help to compensate for the small size of firms by facilitating access to markets and upgrading of technology, as well as improving efficiency and productivity (McCormick 1999).

Applying the concept of industrial clustering to the agrifood processing sector therefore offers the potential to facilitate the development of agrifood processing capacity in Africa by tapping into the previously cited benefits. In addition, the development of subsidiary industries would supply various intermediate inputs, create a hub of specialized labor used by firms within the cluster, reduce the cost of employing and training labor, improve efficiency, enhance the competitiveness of firms, and drive innovation (Krugman 1991;

2 Agro-industry can be defined as manufacturing activities that involve the processing of raw materials and of intermediate agricultural, forestry, and fishery products. It provides linkages such that agriculture is the primary source of input and industry as the producer of consumer goods (UNIDO 2012).

Marshall 1920; Porter 1990; 1998; Audretsch and Feldman 1996), which is crucial for sustaining the success of such clusters. For instance, recent empirical studies on industrial clusters in Africa have emphasized that these clusters can contribute to firm growth and performance by promoting innovation and enhancing access to international markets (Oyelaran-Oyeyinka and McCormick 2007; World Bank 2011; Zeng 2008). Also, apart from facilitating knowledge spillovers, it is relatively easier and more cost effective for governments to provide fundamental infrastructure to clustered firms than to firms that are dispersed (Oyelaran-Oyeyinka and McCormick 2007). The existence of such infrastructure can enable firms to adopt the advanced technologies needed to sustain themselves and become more competitive.

Notwithstanding the aforementioned benefits of agrifood clusters, the sustainability of these benefits remains a challenge, especially for clusters in developing countries. For instance, Mayneris and colleagues (2010) stressed that although gains from clusters do exist, over-clustering of firms can lead to congestion that may offset the potential gains. Also, Zhang and Hu (2014), in their study on the evolution of potato clusters in China, noted that the ability of clusters to contribute to the economic development of developing countries will depend on how industrial policies are targeted at the local level by providing the enabling environment for these clusters to thrive. A similar argument was raised in low-income countries by Otsuka and Sonobe (2011), who emphasized the need for investment in managerial human capital and the provision of credit, among other things, to such clusters to ensure their sustainability.

There is therefore an important insight we can gather from Otsuka and Sonobe's emphasis on managerial skills and capacity development. Although the external environment of clustered firms offers certain advantages, firm-level characteristics still play an important role in cluster development. Training programs that draw from successes of similar agrifood processing industries in developed and developing countries can be used to bolster the knowledge, exposure, and capacity of managers in agrifood processing clusters. Better trained managers will then be able to effectively spearhead the implementation of innovation in various aspects of the firms' operations. The goal of this chapter is to dive into the opportunities that industrial clusters offer for enhancing the contribution of the agrifood processing sector in the context of African countries.

Literature Review

UNIDO defines industrial clusters as "geographical concentrations of interconnected enterprises and associated institutions that face common challenges and opportunities" (UNIDO 2020, 18). Generally, studies that focus on industrial clusters in the agrifood processing sector are relatively scant, with studies on agrifood processing clusters[3] in Africa being even rarer. The aim of this section is therefore to draw on existing literature on industrial clusters to highlight some advantages of industrial clusters and ways in which agrifood processing clusters can thrive and contribute to the development of the agrifood sector in Africa. We further use two case studies to highlight some of the challenges and opportunities of the agrifood processing sector in Africa.

Theoretical Linkages and Empirical Evidence

The ideas that provided the framework for much of the thinking on industrial clusters were first identified by Marshall (1920). He suggested a number of reasons to explain the origins of such industrial clusters. First, he noted that physical conditions, such as climate and the nature of the soil, could set the conditions for the localization of an industry. He further noted that clusters could be initiated at the instance of some wealthy families who intentionally invite and settle certain artisans in a particular location to produce some product that they highly demand. Marshall noted that the ultimate condition for the formation of such clusters was the presence of social and political institutions that support the growth of these industries once they are initiated. In addition, he recognized the role of improved and cheaper means of communication, as well as technologies that facilitate the sharing of ideas across long distances, by noting that ease of transportation provides an incentive for firms to localize in a place conducive to

3 We consider agrifood processing clusters as geographical concentrations of interconnected agrifood processing firms and associated institutions that face common challenges and pursue common opportunities.

their production. However, the same forces can also motivate firms to locate near their customer base.

The favorable conditions that characterize industrial clusters provide a useful framework for looking at the development of agrifood processing clusters in Africa. As the African Development Bank (AfDB 2019) noted, about 65 percent of the world's remaining arable land is in Africa, where a large number of crops, from cocoa and cashew to coffee and pineapples, are already domestically cultivated in a vast number of countries. There is, however, room for private sector and government involvement to initiate and develop agrifood clusters that will further enhance the contribution of processing to the agrifood value chain. Because industrial clusters drive innovations, innovation within agrifood processing clusters is key for the contribution of the processing sector to the agrifood value chain in Africa. With increasing concerns about the climate across the globe, it is important that agrifood processing firms be able to develop and adopt innovative production technologies and processes that reduce their footprint on the environment and cut down on waste (FAO et al. 2020). Marshall's work further highlights a key role for infrastructural development, as it makes it easier for firms to localize. Whether firms cluster in an area to meet demand from customers located far away, or choose to localize close to their customers, the presence of adequate infrastructure, such as roads, electricity, and water, is an important force that shapes industrial clusters. A corollary, however, is that agrifood processing firms in Africa may not necessarily need to be located close to the raw material, unlike farms or mining companies. Rather, firms can localize in areas where they can take advantage of other key existing facilities, such as electricity, water, and storage facilities.

Building on some of the ideas of Marshall (1920), Porter (1990, 1998) shaped most modern studies on industrial clusters. According to Porter, in the modern globalized economy, input costs are largely mitigated by rapid transportation and communication channels as well as accessible markets. Consequently, a country's competitive advantage lies not necessarily in its natural endowments but rather in the productivity of factors of production as well as the innovation capabilities of these factors. To him, industrial clusters form the engine of the productivity and innovation that deliver the competitive advantage of nations (Porter 1998, 2000). Clustered firms' productivity growth and innovation capabilities provide insights for the development of agrifood processing clusters. Interestingly, Porter's theory makes it quite clear that the presence of arable land and the cultivation of a number of food crops with international demand on the continent does not guarantee that African countries will gain a competitive advantage in agrifood processing. Rather, it will take the deliberate effort of developing industrial clustering systems that leverage these natural endowments to enhance productivity and innovation in the agrifood processing sector. Agrifood processing clusters can bring together not just agrifood processing firms but also providers of specialized inputs and infrastructure as well as institutions such as research institutions and trade associations. It is these specialized factors of production that give countries a true competitive edge in international markets. Also, as Porter noted, "simply having a general work force that is high school or even college educated represents no competitive advantage"; rather, "a factor must be highly specialized to an industry's particular needs" (1998, 79). These are much rarer forms of input. In the context of Africa's agrifood processing industry, this may involve, for instance, the development of programs in universities that will promote research into innovative food products, as well as produce highly skilled labor to work in the sector. The creation of such specialized factors will no doubt demand considerable and sustained investment. However, when such inputs are made available in the cluster setting, there is the potential for much greater returns.

Otsuka and Sonobe (2011) made an equally important contribution by considering industrial clusters as characterized by different growth stages that are crucial in helping to reduce market failures that increase the cost of doing business in developing countries. The authors described a cluster-based approach to industrial development in Africa by drawing on lessons from some East Asian countries. They indicated that clusters form in three phases: the initiation phase, the quantity expansion phase, and the quality improvement phase. In the initiation phase, pioneering entrepreneurs set up enterprises that mainly produce low-cost imitations of foreign products. At this stage, large domestic demand contributes to considerable levels of profit that attract more entrepreneurs, who largely imitate the pioneer without necessarily making improvements to the product. This is the quantity expansion phase, wherein firms begin to realize the agglomeration economies indicated by Marshall (1920): knowledge spillovers, development of subsidiary industries (input suppliers), and access to skilled labor. The influx of firms, however, leads to excess supply, which drives down prices and profits. Finally, at the quality

improvement phase, the declining profits spark competition to improve on product quality. This growth-stages approach to cluster development therefore proposes that government intervene to provide the needed support for entrepreneurs to build managerial human capital and also the infrastructures needed to sustain the cluster.

On the empirical side, McCormick (1999) used the collective efficiency model to study six industrial clusters from Ghana, Kenya, and South Africa. She noted that the clusters fall broadly into three categories: groundwork clusters, industrializing clusters, and complex clusters. While the groundwork cluster pioneers cluster development and helps to establish access to markets, the industrializing cluster builds on market access and engages in specialization and product differentiation. Complex clusters are more developed and are able to tap into international markets. She found groundwork clusters and industrializing clusters to be more popular in Africa, with only a few complex clusters, and concluded that clusters offer significant potential to advance industrialization in Africa. However, beyond collective efficiency, the institutional environments (economic, social, and political) are key in determining the success of clusters. Zeng (2008) conducted a study of 11 clusters across seven countries in Africa (Ghana, Kenya, Mauritius, Nigeria, South Africa, Tanzania, and Uganda). In shedding light on how these clusters form, he notes some of their common characteristics are their proximity to major cities or the capital city and a focus on meeting the needs of the local market, among others. He further notes that clustering enables small firms to overcome constraints in access to credit, technology, and markets, thus enhancing their contribution to employment and economic growth. However, they continue to face many challenges, such as low levels of innovation, low levels of skills and education, inadequate institutional support, and difficulties in meeting international quality standards. In a related study, the World Bank (2011) emphasized that industrial clusters provide a powerful tool that can be leveraged to surmount the challenges posed by the small size of domestically owned firms. Using case studies from light manufacturing clusters in five African countries (Cameroon, Ghana, Kenya, Mauritius, and Rwanda), this study revealed that firms within clusters had better performance in terms of sales and access to foreign markets. The performance gap between the clustered and nonclustered firms was explained largely by higher capital intensity (the ratio of physical capital to labor in production) within clusters.

Agrifood Processing Clusters in Africa

Much of the existing literature on industrial clusters in Africa has touted clusters as a means for small firms to overcome the challenges they face to their growth. A number of studies have indicated that clusters have the potential to ease growth constraints for small firms and thus promote industrialization in Africa (McCormick 1999; Oyelaran-Oyeyinka and McCormick 2007). Interestingly, the organization of economic activity in clusters is already a well-established phenomenon in a number of African countries. These clusters tend to form due to factors such as limited infrastructure and a culture of strong social capital (McCormick 1999; Zhang 2017). However, agriculture-related clusters form only a small percentage of the clusters studied. The agrifood processing sector has the potential to enhance the contribution of the industrial sector to many African economies.

While agrifood processing clusters are similar to clusters in other industries, they are distinct from other clusters in some key features. FAO (2017) noted that perishability, political sensitivity, and government interference, along with coordination issues related to systemic risk, are major issues affecting agrifood processing clusters. These clusters deal with raw materials that are highly perishable. Fish and other seafood, as well as fruits and vegetables, can spoil and become unsafe to consume in a relatively short period of time. Agrifood processing clusters therefore require a relatively higher level of coordination in terms of storing, transporting, and retailing products. Furthermore, the agricultural sector, due to its link with food security, is often subject to high governmental involvement. Food crises, especially those involving local staple foods, can engender social unrest. Finally, agrifood clusters deal with products whose supply is usually highly sensitive to factors such as variations in weather and the planting choices of farmers. This can present significant challenges in coordination between producers and agrifood processing firms.

The contribution of the agrifood processing industry is essential to economic survival and food security in Africa. In what follows, we look at two case studies of selected agrifood processing clusters in Africa—the fish processing cluster in Uganda and the wine cluster in South Africa—by highlighting their characteristics, successes, and challenges, and the lessons that can be drawn for the successful development of agrifood processing clusters

in Africa. These clusters were chosen based on the availability of relevant information from the literature. There are, however, other important factors that motivate the choice of these two case studies. For instance, South Africa is Africa's largest producer and exporter of wine, accounting for more than 90 percent of the US$658.1 million of wine exported from Africa in 2020. South Africa was also among the top 10 exporters of wine globally in 2020, placing 8th—above Germany and Portugal. Uganda is among eight countries accounting for more than 90 percent of aquaculture in Africa and was also the third-largest contributor to total fish production from Africa in 2019 (Chan et al. 2021). While this leaves out some agrifood processing firms whose existence and operations are not well documented, it does help to provide some idea on the nature and challenges of agrifood processing clusters in Africa.

The development of the fish processing cluster in Uganda began with the British government's establishment of the Uganda Fish Marketing Corporation in 1948, which produced both frozen and salted fish products for Europeans in East Africa at the time (Kiggundu 2008; Hammerle et al. 2010). Fish processing is an important industry in Uganda, providing employment to more than 32,000 Ugandans. It contributes an average of US$116 million in export revenue, being Uganda's second-largest source of foreign exchange (UFPEA 2022). There are a total of 17 fish processing and exporting plants in Uganda, forming clusters in different subregions along Lake Victoria. Kiggundu (2007) shows that there are five each in the major cities of Kampala and Jinja. The Wakiso district has three plants, while the Masaka-Kyotera sub-region has four. Because fish is a highly perishable food, it is important for firms to be able to process their products in a cold chain in order to ensure its marketable shelf-life. As a result, although market access is important, access to infrastructure is an equally crucial locational advantage for these firms.

As already highlighted in the literature (McCormick 1999; World Bank 2011), access to a pool of skilled, industry-relevant labor is one of the key external economies that clusters provide. In the Ugandan fish processing clusters, firms have had to train their workers in factory-based handling of fish, helping to create a pool of skilled workers. However, there is still a lack of workers with highly technical skills related to the fish processing industry (Kiggundu 2008). This has been attributed to a general lack of technicians, food scientists, industrial engineers, and other highly specialized technical labor (Kiggundu 2007). According to Kiggundu (2007), firms usually rely on in-house training of plant workers with limited formal education. Complex tasks, such as product development, still have to be outsourced, due to the lack of such skills locally (Chandra 2006). Similarly, linkages between research institutes and clustered firms to promote industry upgrading and innovation is also an important benefit of clusters. In the Ugandan fish processing industry, however, this linkage is extremely weak. For instance, the National Fisheries Resources Research Institute and the Lake Victoria Fisheries Research Project are two major research institutes that are near the Jinja cluster. However, according to Kiggundu (2007), this proximity has not yielded any industry-commissioned research that would have provided solutions to problems faced by the fish processing firms within the cluster. This outcome might be due to the limited capacity of these institutes and a skills gap in their ability to provide actual market-based solutions.

The Ugandan fish processing industry underwent radical transformation when a directive from the European Union (EU) went into force in 1991 (Council Directive 91/493/EEC), which required the enforcement of strict sanitary and phytosanitary regulations (Chandra 2006). This led to extensive upgrades in various aspects of the processing value chain. Fish processing firms could be approved only if they met plant layout, operations, and hazard analysis and critical control points requirements. Despite the requirements, there was no strict monitoring from the EU on compliance until 1997, when salmonella bacteria were found in Ugandan fish exports to Spain. The upshot of this was an EU ban on fish imports from Uganda. Due to the importance of fish exports to Uganda's economy, the government, along with development agencies and the fisheries clusters themselves, moved swiftly to restore the country's reputation with its European trading partners. This involved mainly improvements in the production process. For instance, some facilities introduced computer-assisted procedures for monitoring yield and storage temperatures. Overall, the standards imposed by a demanding buyer (the EU) helped the fish processing clusters in Uganda make important upgrades in the production process.

The wine cluster in South Africa is over three centuries old, established in 1659 by Dutch settlers. Davidson and colleagues (2009) gave an excellent review of how crop varieties and associated institutions have evolved since that period. South Africa is the world's eighth largest producer of wine, and

its wine industry employs close to 270,000 people directly and indirectly (WoSA 2022). Wine exports have also grown significantly, from 177 million liters in 2002 to 319 million liters in 2020 (WoSA 2022). The cluster is located around the Western Cape, with more than 4,000 farmers cultivating about 108,000 hectares of land. The wine cluster in South Africa has four segments: established producers, new producers, cooperative producers, and wholesalers (Wood and Kaplan 2007).

The end of apartheid between 1993 and 1994 gave way to a boost in the number of small wineries due to the abolishing of the quota system (Wood and Kaplan 2005). Wood and Kaplan (2007) noted that the cluster has benefited significantly from institutional support in terms of marketing along with technical support. The latter has mainly come from the Nietvoorbij Institute for Viticulture and Oenology of the Agricultural Research Council (ARC). The ARC carries out research in a variety of areas related to wine production, including pest and disease management, soil science, postharvest practices, and technology transfer. The Wine Industry Network for Expertise and Technology coordinates the activities of researchers and technicians from the ARC and universities. It also helps in funding and disseminating research to the wine producers within the cluster. Also, the Elsenburg Agricultural College and the Department of Viticulture and Oenology at Stellenbosch University offer courses and programs in viticulture, oenology, and wine biotechnology that train the relevant labor force for the wine industry. In terms of marketing, WoSA has a mandate of promoting South African wines on international markets. As part of its mandate, WoSA is responsible for coordinating wine exports from South Africa, and it promotes the participation of South African wine companies at international trade exhibits. In 2010, WoSA introduced a seal for South African wines that traces the wine from farm to bottle—a seal that authenticates the integrity and sustainability of the wine (WoSA 2022).

These two case studies highlight the importance of institutions in the development of successful agrifood processing clusters. Both of these are exporting clusters, with their exports contributing significantly to their respective countries' economies. However, the Ugandan fish processing cluster, having benefited from strict measures imposed by a demanding buyer, has largely failed to develop institutions that will promote innovation and help improve competitiveness on the global market. The South African wine cluster, on the other hand, has well-developed institutions that provide technical and marketing support. This has contributed to South Africa's position as both a producer and an exporter of wine. Drawing on this literature, Momoh and Alutu (2017) argued that ensuring properly functioning institutions is key to fully harnessing the potential of the industrial sector in Africa. They indicated that the primary mechanism through which institutions can unlock the potential of the industrial sector is through incentives. Institutions help to provide incentives for key economic actors, influencing investments in physical capital and technology, as well as human capital (Acemoglu and Robinson 2008). In the context of developing agrifood processing clusters in Africa, this may require the development of institutions that govern the relationship between farmers and industries, institutions that facilitate the development of human capital for agrifood processing clusters, and institutions that assist in marketing the products of these clusters both on the continent and beyond. This will help to make clusters an effective tool for enhancing the agrifood sector in Africa.

Data Analysis

In this section, we use the World Bank Enterprise Survey (WBES) to study the behavior of agrifood processing firms in Africa. The WBES does not necessarily collect data based on geographical concentrations of firms in a particular industry but rather brings together firms in different industrial clusters (Sonobe, Suzuki, and Otsuka 2011). Nonetheless, understanding the characteristics of the firms that make up the clusters can provide us with valuable insights into key features of the clusters in Africa, as compared with other industrial clusters. The WBES is designed to ensure that the sample of firms is representative of the private sector in each economy surveyed and is therefore a useful way of establishing the position of the agrifood processing sector relative to nonfood manufacturing. This allows us to draw distinctions between agrifood processing firms and nonfood manufacturing firms in Africa in order to highlight the importance of paying more attention to the agrifood processing sector, given its contribution to African economies.

We use the most recent round of the WBES for nine African countries, selecting at least two countries each from North Africa, West Africa, East Africa, and Southern Africa. We employ descriptive statistics and histograms to highlight differences and similarities between agrifood processing firms in

Africa and firms in nonfood manufacturing. We also explore the various types of agrifood processing firms operating in the countries in our sample. Doing so helps us to provide some insight into the potential of and the challenges to the development of agrifood processing clusters in Africa.

Data

The WBES incorporates data from firms in the manufacturing and service sectors of economies around the world. The survey focuses exclusively on firms in the nonagricultural sector. It does, however, include firms that add value to agricultural products or process them into final products for sale. As part of the survey, managers are requested to specify the main product or activity of the firm. Based on the description given, a sector code is assigned to the firm using the four-digit industry classification code from the United Nations International Standard Industrial Classification (ISIC) Revision 3.1.[4] The ISIC enables us to distinguish among various types of agrifood processing firms. With the use of WBES data from nine African countries, we have a total of 8,970 firms surveyed across these countries. Table 6.1 shows the countries surveyed, the survey year, and the number of firms surveyed for each country. We acknowledge that using data from different years may affect our ability to compare different countries.

Food Processing Versus Nonfood Manufacturing

Table 6.2 shows the distribution of firms across the various industries in our sample. We see from the table that compared with nonfood manufacturing, which makes up about 40 percent of firms in the sample, agrifood processing firms form a relatively small percentage (11.81 percent). Food processing firms also form about 23 percent of total manufacturing firms in the sample. The relatively large number of firms involved in nonfood manufacturing may explain why clusters of firms in this sector tend to dominate the debate on industrial clusters in Africa.

Table 6.3 gives a breakdown of the firms that make up the food processing sector in our sample, based on the WBES. We see from the table that food processing firms in our sample are dominated by firms that produce baked products, those that produce grain mill products, and those involved in soft drink and mineral water production.

TABLE 6.1—COUNTRIES USED IN THE STUDY

Country (Survey year)	Frequency	Percentage
Egypt (2016)	1,791	19.97
Ghana (2013)	708	7.89
Kenya (2018)	985	10.98
Nigeria (2014)	2,153	24.00
Rwanda (2019)	360	4.01
South Africa (2020)	1,068	11.91
Tunisia (2020)	607	6.77
Uganda (2013)	708	7.89
Zambia (2019)	590	6.58
Total	**8,970**	**100.00**

Source: Authors' computation with data from WBES.

TABLE 6.2—DISTRIBUTION OF FIRMS ACROSS INDUSTRY

Industry	Frequency	Percentage
Food processing	1,059	11.81
Nonfood manufacturing	3,523	39.28
Construction	449	5.01
Trade (retail and wholesale)	1,898	21.16
Transport and communication	412	4.59
Hospitality (hotel, restaurants)	1,012	11.28
Other services	617	6.88
Total	**8,970**	**100.00**

Source: Authors' computation with data from WBES.

4 https://unstats.un.org/unsd/statcom/doc02/isic.pdf

It is important to note, however, that the food processing industry might play a more or less prominent role in the manufacturing sector in individual countries. Table 6A.1 in the appendix shows the value added from food and beverage firms as a percentage of total manufacturing value added in selected African countries. In the appendix, we also show the value of output of the food and beverage subsector as a percentage of the value of output of the manufacturing sector overall (Table 6A.2).

TABLE 6.3—CATEGORIES OF AGRIFOOD PROCESSING FIRMS

Category	Frequency	Percentage
Meat and meat products	39	3.67
Fish and fish products	15	1.41
Processing and preserving of fruit and vegetables	65	6.11
Vegetable and animal oils and fats	55	5.17
Dairy products	36	3.39
Grain mill products	148	13.92
Starches and starch products	3	0.28
Prepared animal feeds	46	4.33
Bakery products	254	23.89
Manufacture of sugar	7	0.66
Cocoa, chocolate, and sugar confectionery	50	4.70
Coffee processing	59	5.55
Tea processing	15	1.41
Pasta	22	2.07
Distilling, rectifying, and blending of spirits	18	1.69
Manufacture of wine	21	1.98
Malt liquors and malt	5	0.47
Manufacture of soft drinks, production of mineral waters	102	9.60
Tobacco products	8	0.75
Other food processing	95	8.94
Total	**1,063**	**100.00**

Source: Authors' computation with data from WBES.

Size and Age of Agrifood Processing Firms

Several studies have emphasized the dominance of small and medium enterprises (SMEs) in the private sector in Africa and other developing regions (Dinh and Clarke 2012; Ndiaye et al. 2018). Based on this outcome, we further our analysis by examining the difference between the agrifood processing and the nonfood manufacturing sectors in terms of firm size. In Table 6.4, we show the distribution of firms by size in agrifood processing and nonfood manufacturing as well as other industries in our sample. We see from the table that about 80 percent of firms in the sample are SMEs. Also, the agrifood processing sector is similar, in terms of firm size, to the nonfood manufacturing industry, with about 75 percent

TABLE 6.4—AVERAGE FIRM SIZE ACROSS INDUSTRIES

Industry	Micro (fewer than 5 employees)	Small (5–19 employees)	Medium (20–99 employees)	Large (100+ employees)
Food processing	1.32	40.23	35.88	22.57
Nonfood manufacturing	1.05	46.01	30.66	22.28
Construction	0.22	38.75	35.63	25.39
Trade (retail and wholesale)	2.27	59.01	28.50	10.22
Transport and communication	1.21	37.86	38.11	22.82
Hospitality (hotel, restaurants)	1.28	49.31	37.55	11.86
Other services	1.13	50.08	34.68	14.10
Percentage of firms in each category	**1.34**	**47.99**	**32.46**	**18.21**

Source: Authors' computation with data from WBES.

of firms in both industries being SMEs. Again, it is likely that one would find significant differences among the nine selected countries.

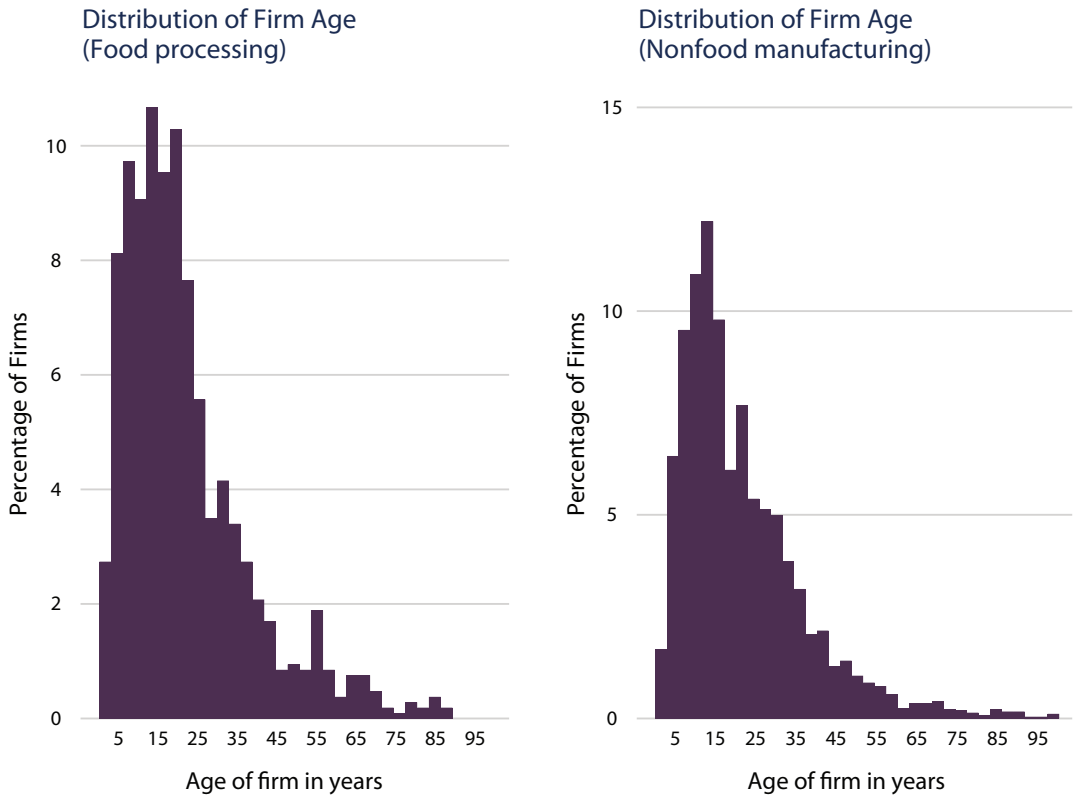
We further distinguish between agrifood processing and other firms by age. In Figure 6.1, we see the distribution of firm age for food processing and nonfood manufacturing firms. The figure shows a generally similar distribution. About 90 percent of firms in both sectors are less than 40 years old. This shows another important similarity. Even though nonfood manufacturing firms far outnumber food processing firms, we see from the current section and the previous one that they are largely similar in terms of both size and age.

Discussion

Our analysis in this section highlights a number of important points. First, the contribution of the agrifood processing sector to the overall output of the manufacturing sector varies significantly across African countries. Generally, however, the nonfood manufacturing industry dominates in most African countries. This offers at least some tentative evidence to explain why several studies on industrial clusters in Africa have focused on firms in the light manufacturing area of the nonfood sector. Furthermore, examining age and size for agrifood processing versus nonfood manufacturing firms shows striking similarities. Thus, the large number of nonfood manufacturing firms is not due to the advantage of age. Moreover, it does not seem to be the case that the agrifood processing sector is dominated by a small number of large firms while small firms dominate the nonfood manufacturing sector. What, then, is the advantage of the nonfood manufacturing sector?

Otsuka and Sonobe (2011) noted that nonfood manufacturing clusters are usually initiated by the production of low-cost imitations of foreign products. The relatively crude technologies used in such production tend to spread quickly, enabling the development of a large number of producers within a relatively short period. Clusters, therefore, form easily and naturally among firms in the nonfood manufacturing sector. With respect to food products, however, it is possible that an initial focus on subsistence agriculture and the export of raw food products has left the domestic agrifood processing sector in many African countries relatively underdeveloped. This may have contributed to the limited investment in agrifood processing in many African countries.

FIGURE 6.1—FIRM AGE DISTRIBUTION FOR AGRIFOOD AND NONFOOD FIRMS



Source: Authors' computation with data from WBES.

We have seen in this section the position of the agrifood processing sector relative to the nonfood manufacturing sector in Africa. Agrifood processing firms tend to be outnumbered by nonfood manufacturing firms, even though the distribution of firms by age and size is roughly similar in both sectors. In order to promote industrial clusters in the agrifood industry, it may therefore be important to consider ways to ensure a large and consistent supply of agricultural raw materials for agrifood processing firms. This could be achieved by developing a system for aggregating output from smallholder farmers. Furthermore, governments could partner with the private sector to expedite the shift from subsistence agriculture to large-scale production, including fruits and vegetables, fish, and meat products. The private sector is already showing great potential in helping to develop the agrifood processing industry in Africa, with the proliferation of SMEs in the various subsectors (AGRA 2019). As emphasized by Otsuka and Sonobe (2011, 6), an "entrepreneur-led and government-backed" approach may be very useful in helping to encourage the formation of successful, dynamic, and globally competitive agrifood processing clusters.

Conclusion and Policy Recommendations

This chapter has relied on the available literature and firm-level data to stress the importance of industrial clusters in the agrifood processing sectors from an African perspective. Although limitations exist, the theoretical literature is explicit on the potential gains of such clusters, especially for the African countries, if they are to reap the full benefits of the African Continental Free Trade Area (AfCFTA) initiative. Nevertheless, and as several authors have revealed especially in the context of African countries (see Abdelaziz, Ellis, and Zhang 2021; Abdelaziz et al. 2021), bottlenecks are often associated with industrial clusters that experience a decline in external demand due to a loss of international competitiveness and supply-side constraints, including limited infrastructure, labor supply shortages, limited innovation, and value addition, among others. These constraints require the collective effort of both public and private sector stakeholders, such as the local government and business associations. We therefore provide the following recommendations.

The Role of Government

The work of Marshall (1920), Porter (1998), and Otsuka and Sonobe (2011) highlights the importance of government intervention in the development of clusters. However, it is important to understand that although some of the most successful industrial clusters, such as the garment industry in Bangladesh, were government-initiated, government can play a significant role in cluster development by facilitating and providing an enabling environment for the organic development of clusters, as the literature suggests. The provision of infrastructure such as roads and electricity is a major area where the government can contribute to providing an enabling environment for cluster growth and development. As noted earlier, agrifood processing firms have to deal with perishable goods. It is therefore important that a transportation infrastructure be developed to link farms to storage facilities and processing firms. Reliable electricity supply is also essential for the production and storage of both plant and animal products. In the area of policy, it is also important to have sound and clear guidelines for the operation of agro-industrial firms. The case studies also underscore the importance of institutions. Government plays a particularly key role in this respect. By providing the appropriate institutional frameworks, such as legal structures and policies, government can provide the right signals and incentives to encourage the participation of private sector actors, thus helping to grow and strengthen agrifood processing clusters. As noted by Oyelaran-Oyeyinka and McCormick (2007), it is relatively easier and more cost-effective for government to provide a conducive institutional environment and fundamental infrastructure to clustered firms than to dispersed ones. Also, as suggested by McArthur and Sacks (2019) concerning agricultural development and economic growth in Uganda, similar arguments can be made for targeted overseas development assistance in the agriculture sector that can bring about the needed structural transformation by providing the infrastructure required to sustain the industrial clusters.

The Role of Research and Training Institutions

As emphasized in Porter's (1998) model of industrial clusters, innovation and input productivity are the main drivers of cluster development. Public and private research institutions have a part to play in helping to develop new products and

production processes. Innovation helps to enhance product quality and improve efficiency in production, thus helping to make products more competitive on the global market. The creation of specialized inputs can also improve output. As shown in our case studies, having university departments and institutions dedicated to the development of human capital for the wine industry has contributed to the success of the South African wine cluster, while the lack of such human capital in the fish processing industry in Uganda has stifled the potential of the cluster.

Export-Oriented Clusters

It is important that the development of agrifood processing clusters have an export-oriented focus. For instance, the fish processing cluster in Uganda mainly exports to the EU, while the wine cluster in South Africa has Germany, the Netherlands, and the United Kingdom among its biggest export destinations in recent years (WoSA 2022). FAO (2017) noted that while domestic industries can develop successful clusters, those that are export-oriented tend to be more profitable. This is due to less sophisticated demand in domestic markets as well as a lack of intra-cluster cooperation in dealing with common challenges (Nogales 2010). It is equally important to note that export-oriented agro-processing seems rather easy for African economies. For example, the Everything But Arms initiative of the EU allows duty-free and quota-free imports from all least developed countries. In practice, however, nontariff measures such as hygiene standards, among other red tape, present high barriers to market entry for most firms from Africa. Also, apart from exporting to Europe or other developed regions, the ratification of the AfCFTA presents the prospect of a single market with more than a billion consumers and more than US$2 trillion in GDP (AGRA 2021). This attractive prospect highlights the importance of developing agrifood processing clusters both as a means of achieving the Feed Africa initiative of the African Development Bank (AfDB 2019), as well as boosting economic growth and development by promoting intra-African trade. This is not a call to shift focus entirely to existing sectors, such as coffee, cocoa, or fish. Rather, it emphasizes the need in the medium to long term to also develop and market new and improved products that can compete on global markets.

Focus on SME Development

Generally, the business environment in Africa suffers from such challenges as limited access to credit, weak institutions, and a lack of infrastructure. This partly explains why SMEs dominate in the private sector. The collective efficiency framework of Schmitz (1999) showed that the externalities generated by clustering enable small firms to enjoy large-firm benefits through the pooling of resources and collaboration with other firms. These include, among others, access to market information, technological spillovers, and skilled labor. Developing successful agrifood processing clusters in Africa will therefore benefit from encouraging the development of small firms. Thus, instead of spending on large state-owned factories, which may collapse due to the lack of managerial ability and other inefficiencies, government initiatives facilitating the training of SME entrepreneurs in the agrifood processing sector should be supported. These entrepreneurs can form the nucleus for the development of a thriving agrifood sector, as they gather experience and expertise in the sector over time. This is consistent with Otsuka and Sonobe's (2011, 6) "entrepreneur-led and government-backed" approach to cluster development in Africa. As noted by Schmitz and Nadvi (1999), eventually, successful clusters will not be dominated exclusively by small firms. However, it is important to leverage the limitations of the environment in order to build successful agrifood processing clusters by taking advantage of the existence of small firms.

Appendix

TABLE 6A.1—NUMBER OF FOOD AND BEVERAGE INDUSTRIAL ESTABLISHMENTS AS A PERCENTAGE OF TOTAL MANUFACTURING ESTABLISHMENTS

Country	2013	2014	2015	2016	2017	2018
Algeria	25.31	25.13	24.66	NA	NA	NA
Angola	NA	56.40	51.24	NA	NA	NA
Cabo Verde	32.28	33.16	33.33	32.74	31.59	NA
Egypt	55.63	56.29	58.80	58.85	NA	NA
Eritrea	33.33	26.01	29.87	33.77	37.25	34.80
Eswatini	19.49	19.28	18.64	18.91	19.44	18.18
Ethiopia	25.88	NA	NA	NA	NA	NA
Ghana	18.56	NA	NA	NA	NA	NA
Mauritius	19.97	20.26	20.13	20.37	20.74	21.80
Morocco	NA	NA	NA	27.12	NA	NA
Niger	29.20	29.24	29.28	30.08	NA	NA
Rwanda	NA	29.24	NA	NA	32.31	NA
South Africa	10.46	10.51	NA	NA	NA	NA
Tunisia	16.69	16.75	16.81	17.02	17.23	17.58
Tanzania	43.09	42.99	43.17	43.03	NA	NA
Zimbabwe	17.40	18.42	18.70	18.38	18.34	NA

Source: Authors' computation with data from UNIDO INDSTAT Database (2021).
Note: NA=data not available.

TABLE 6A.2—OUTPUT OF FOOD AND BEVERAGE SUBSECTOR AS A PERCENTAGE OF TOTAL MANUFACTURING OUTPUT

Country	2013	2014	2015	2016	2017	2018	2019
Algeria	13.21	14.45	18.71	18.71	18.71	NA	NA
Angola	NA	21.83	16.65	16.65	16.65	NA	NA
Botswana	20.11	18.26	18.67	18.35	17.90	17.84	19.07
Burundi	89.20	89.20	89.20	NA	NA	NA	NA
Cabo Verde	NA	NA	NA	71.78	66.74	NA	NA
Egypt	18.36	18.59	22.72	20.79	20.79	20.79	NA
Eritrea	46.84	45.25	54.85	55.45	63.58	64.13	NA
Ethiopia	33.71	33.68	33.68	NA	NA	NA	NA
Ghana	35.34	35.34	35.34	NA	NA	NA	NA
Kenya	47.84	48.07	49.17	50.19	51.84	51.70	49.80
Mauritius	47.46	47.13	43.02	42.68	43.92	43.92	43.92
Morocco	31.12	29.87	25.45	27.30	27.87	18.75	18.75
Namibia	50.57	50.57	50.57	NA	NA	NA	NA
Niger	21.45	35.77	41.14	43.29	43.29	43.29	NA
Rwanda	NA	69.76	66.58	66.88	69.84	66.30	NA
Senegal	34.68	34.68	NA	NA	NA	NA	NA
South Africa	NA	18.29	18.29	21.26	24.29	21.68	21.68
Tunisia	27.90	27.10	31.53	32.28	32.28	32.28	32.28
Tanzania	55.20	55.20	55.20	55.20	55.20	55.20	NA
Zambia	31.66	36.40	34.66	NA	NA	NA	NA
Zimbabwe	28.79	52.39	53.68	52.64	61.16	NA	NA

Source: Authors' computation with data from UNIDO INDSTAT Database (2021).
Note: NA=data not available.