

An Analysis of Africa's Agricultural Value Chain and Lessons from Korea's Agricultural Development Policies

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I. Introduction

Agriculture is an integral part of the African economy as it accounts for 60–70% of the continent's labor and 15% of its total GDP on average. The development of the agricultural sector is linked to Africa's economic and social development as 90% of those in absolute poverty levels reside in farming areas. Despite efforts by various governments and organizations to uplift the agricultural sector, Africa's annual food import value stands at 50 billion USD and is expected to more than double by 2025, highlighting the limits of Africa's agricultural development so far.¹

Much of Africa's policy efforts has been to increase production levels, such as through higher applications of fertilizers and pesticides, expansion of irrigation systems, application of improved seeds and so on. As a result, some African countries have been able to increase production and produce surplus food. However, the lack of attention on building a market

for trading agricultural goods has caused other problems; some farmers may have surplus production to sell, but do not have access to market price information, or may not have the room to wait till the price of crops rises because they need instant cash. They are not able to identify markets where they profit from selling the surplus production. At the same time, with the expansion of cities and the increasing demand for processed foods, opportunities to create and foster agricultural value chains are emerging. For example, the grounds for trading agricultural products are shifting from informal markets and street vendors to supermarkets and retail stores where urban consumers are able to purchase packaged and frozen products, creating a larger demand for better packaged and safety regulated products.

Such changes and challenges have created the need to understand the agricultural value chain better, such as the sources of supply and demand, the interaction between various actors and systems, the linkage between producers and final consumers and so on. An agricultural value chain, in particular, covers all activities by and between all stakeholders, the supporting services and the enabling environment from the pre-production stage to the final con-

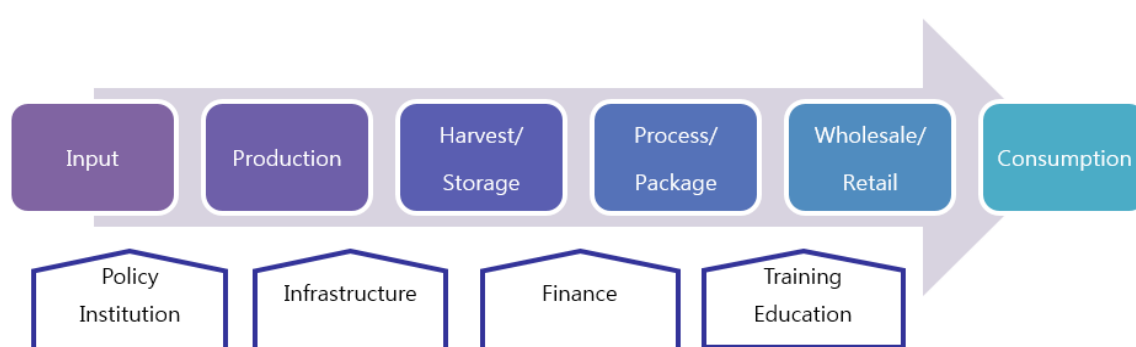
1 African Development Bank. 2016. *Feed Africa-Strategy for Agricultural Transformation in Africa 2016-2025*.

sumption stage. This includes research and development of seeds, purchase of agricultural inputs, packaging, retail and access to agricultural finance.

A value chain approach to agricultural development in Africa is important because by tak-

ing a value chain approach, actors are better able to understand the market, find potential areas of demand, and utilize such opportunities to increase income. With the development of ICT in particular, actors are also better able to access information to link one sector of activity to another (i.e. production with retail).

Figure 1. Diagram of an agricultural value chain



II. Challenges to Africa's Agricultural Value Chain Development

1. Production and processing

Increasing agricultural production has been a major task for many years, during which expanding access to agricultural inputs, improving post-harvest management, and reforming the land system have been the core challenges. Africa's volume of fertilizer uses at 15kg/ha per year lags greatly behind that of the global average at 124kg/ha, mainly because the cost of using fertilizers is too high for the regular farmer.² Most of the African countries depend on imported inputs because they do not have the facilities to manufacture fertilizers and agricultural machines. Certain governments pro-

vide fertilizer subsidies to enhance access to agricultural inputs, but these fertilizers frequently resell at a higher price in the black market as opposed to being applied to the fields. Moreover, the rate of using improved seeds remains at an average of 10% because of institutional inefficiencies such as the cost and time required for registration, safety testing and proliferation.³ The lack of logistics infrastructure also limits access to input markets and increases the costs of obtaining improved seeds for rural farmers. Most farmers have limited access to financial support or formal banking services to be able to purchase agricultural machinery based on credit. Consequently, Africa lags far behind other regions in

2 The Economist. 2016. African Agriculture: A Green Evolution. p. 5. (March 12, 2016)

3 AGRA. 2013. The Africa Agriculture Status Report: Focus on Staple Crops. Nairobi, Kenya: Alliance for a Green Revolution in Africa. pp. 57-63.

terms of the number of tractors per area.⁴

The economic value of post-harvest loss amounts to 4 billion USD per year, equal to 15% of the farming household incomes, mainly due to the lack of infrastructure and facilities.⁵ The value of post-harvest loss accounts for as much as 67% of the loss occurring throughout the entire value chain in Kenya because a large majority of households still naturally dry their harvest outdoors.⁶ Moreover, the absence of a grading system hinders the motivation to produce better quality grains, and thus leads to a deprived post-harvest management structure. Even in the rare case where a grading system exists, it is underutilized. The AHL Commodities Exchange of Malawi, for example, has introduced its own grading structure, through which high quality grains are bought by foreign buyers, but farmers are yet uninformed about such market opportunities.

Land systems in Africa have long been a topic of reform due to its complexity; land expropriation is currently being considered in several African countries. Ownership of land is at times unclear between the state, communities and individuals, due to the lack of clarity and confusion between customary laws and statutes. Around 70% of the land in Africa is communally owned, making it difficult to use land as a collateral or to invest in improving

the land's quality and functions. Moreover, although 60% of the farming labor consists of women, women are restricted from land ownership. Such problems degrade the value of land and limit the efficient use of land to increase production.

Although rice production has increased, rice mills with modern facilities lack in number to be able to absorb and add value to the surplus production. Although many rice mills are decrepit, farmers tend to use the old rice mills because they offer a better price for the rice. In Rwanda, for example, only 10% of the total rice production is processed through middle sized mills as a result, whilst the rest is processed in small sized and deteriorated milling facilities.⁷

2. Distribution

The lack of infrastructure, financial support, market information, and quality control are also limiting the development of the distribution channel in Africa. Retail stores and wholesale markets have begun to appear in urban areas, but the majority of farmers still trade goods in traditional village markets. Many lack the means of transporting products to urban areas, where they have a greater chance of getting a higher price for the goods. Because farmers are limited access to urban markets, the middlemen often have dominance in determining the price. The number of middlemen in a traditional market is greater than in a formal distribution channel, who create several distribution layers that eventually inflate the final price. Consequently, the rate of food inflation is greater than that of the farm-

4 Sims, Brian, Martin Hilmi, and Josef Kienzle. 2016. *Agricultural Mechanization: A Key Input for Sub-Saharan African Smallholders*. Report 2016 ed. Vol. 23. Integrated Crop Management. FAO. p. 4.

5 World Bank. 2011. "Missing Food: The Case of Postharvest Grain Losses in Sub-Saharan Africa," Report No. 60371-AFR. Washington DC: World Bank. p. 18.

6 Ibid.

7 Stryker, J. D. 2010. "Developing Competitive Rice Value Chains," Second Africa Rice Congress: Innovation and Partnership to Realize Africa's Rice Potential. p. 4.

ers' income. The level of solidarity between producers in a traditional market is also weaker than that of a formal market where the act of trade and its actors are systemized and highly cohesive.

3. Finance

The need to provide agricultural insurance is growing with the high fluctuation of crop prices as global warming intensifies, causing extreme damages due to the weather. Moreover, farmers need access to credit to be able to purchase agricultural inputs and to invest in production in advance to harvesting. However, African smallholder farmers have limited access to financial services not only because the agricultural sector is perceived as a high-risk sector due to the fluctuation of crop prices but also due to difficulties in mobilizing land as credit. The African Rural and Agricultural Credit Association, a financial association that includes central banks, development banks, commercial banks, and microfinance institutions as its members, was established in the late 2000s to provide for such needs. The Grameen Bank likewise provides microfinance to smallholder farmers without the requirement of collaterals. However, the deficiency in understanding the diverse needs and usages of agricultural finance, as well as high interest rates and the small size of loans, has led to the failure of popularization of such financial systems. Consequently, of Africa's entire bank loan portfolio, less than 4% is provided to the agricultural sector.⁸ On the other hand, although the level of access differs according to the level of participation in the value chain, much of the credit accessed by smallholders is obtained through other actors and participants in the value chain.

8 CABRI. 2014. *Alternative and Innovative Financing in Agriculture in Africa*. Keynote Paper. p. 6.

4. Community organization

Cooperatives play an important role in strengthening the members' bargaining powers, cutting costs, and increasing the efficient use of limited assets. Agricultural cooperatives in Africa are fragmented into different scopes of activities such as finance, production, and distribution. They are limited in their capacity to actively participate in the value chain due to various reasons: low residential density, weak communal governance structures, the predominance of subsistence farming, weak legal status, and political repression. Although the majority of cooperatives across the staple grain value chain have weak functions, cooperatives on the cash crops value chain are relatively well established. Such differences highlight the importance of a product's economic feasibility, such as market demand and access, in strengthening the role of community organizations.

5. The case of the rice value chain in Podor, Senegal

The Senegal River basin is home to 70% of Senegal's rice production and is expected to produce even more through the expansion of irrigation facilities and land rearrangement. Rice farmers in this area produce more than subsistence levels. However, much of the rice produced in this area is consumed by residents in the nearby areas while 90% of the rice consumed in Dakar is imported from abroad, at more than double the price of the local rice. Senegal is in fact amongst the 10 largest importing countries of Asian rice. In the case of Podor, the demand for rice is high but the poor quality of local rice prevents its marketability. This is partially due to the government's priority on increasing production rather than enhancing the quality and also because customers in urban areas are willing to buy specific

brands, even at a higher cost.

Other reasons are similar to those listed earlier. Distribution channels are long and complex for the smallholders while equipment at the rice mills is outdated. As for agricultural co-operatives, they are relatively active in the upstream activities of managing irrigation facilities or intermediating in the collection of harvests for the repayment of loans. However, they do not take part in the joint collection, processing or marketing stages, which restricts individual farmers' participation and bargaining power in the value chain. This also restricts the individual farmers' access to credit services as agricultural loans, handled mostly by 'Caisse Nationale de Crédit Agricole du Sénégal (CNCAS),' is given only to community organizations. The process of applying for the loan is also quite complex and composed of several layers. It also lacks merit compared to the market rate of interest in terms of the costs of borrowing as applying for a CNCAS loan comes with various transaction costs.

An interesting case is that of Durabilis, a social investment company that started off with retailing agricultural products. They have been able to procure the capital and ensure quality by engaging in all activities of the value chain including production, processing, distribution, and sales. They introduced the concept of paying in advance for the purchasing of rice and for its processing. Contract rice mills were able to invest in modernizing their facilities and farmers were able to purchase inputs in advance. As a result, contract farmers were able to earn 3 times more than selling rice in local markets. Total earnings were 360,000 USD in 2012, but in 2018 they doubled the number of contract farmers to 1,000 while yields are also expected to triple. The Durabilis case accentuates the importance of strengthening the value chain link.

III. Korea's Agricultural Value Chain Development Policy Experience

Korea also struggled with achieving food security and fighting hunger until it achieved self-sufficiency in rice, its staple crop. The Korean government prioritized the development of the agricultural sector as it contributed to more than 40% of its GDP in the 1960s. Dependency on imported food and food aid was high; food imports were at \$126 million whilst merchandise exports were at \$87 million in 1961, depleting the government's finances.⁹ Like in Africa's case, farmers were mostly smallholder farmers who barely produced at subsistence levels. It must be noted that because of its economic size relative to the national GDP and the large proportion of labor engaged in agriculture, the Korean government directly led and fostered the agricultural sector.

In 1962, the government set 1968 as the year of rice self-sufficiency, a goal which it achieved with the development of the Tong-il rice variety. The research and development efforts by the government resulting in the Tong-il variety enabled yield to increase by 30%. The government established the Rural Development Administration (RDA) to oversee the distribution of the Tong-il rice, which

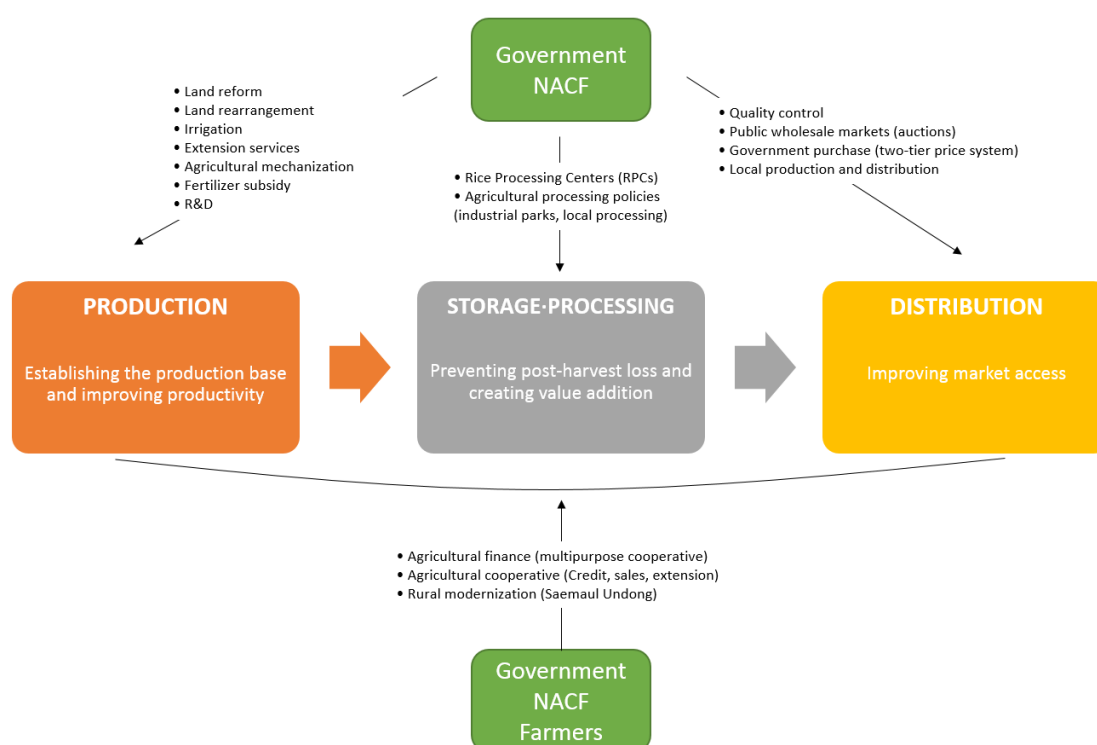
9 World Bank Development Indicators; Rural Development Administration of Korea. 2014. "The Path of the Development of Agro-management and Agro-technologies and Prospects: Rice" in Korean, Nongsaro. Available at http://www.nongsaro.go.kr/portal/ps/psb/psbk/kidofcomdtyDtl.ps?jsessionid=xvqImZX7b1TT10UjddiBP9nSfYOxJ74EtM1uSgL1C8RyBQAhMsvDjZ5ZKs71412K.nongsaro-web_servlet_engine1?menuId=PS00067&kidofcomdtyNo=31691. (access October 15, 2018)

was quickly accommodated across the country. The government was also adamant in manufacturing fertilizers domestically because they were critical to improving production as the Tong-il varieties required a heavier usage of fertilizers and also because the scale of fertilizer imports posed a burden on the government's foreign reserves. Beginning in 1961, the government established a number of fertilizer production facilities by mobilizing the finances through foreign loans, domestic and foreign investment as well as commercial loans.

Not only did the government authorize the purchase of fertilizers through cash and credit,

or promissory notes stating the repayment in cereals after harvest, it also subsidized fertilizers so that they could be widely accommodated through a two-tier price system where the National Agricultural Cooperative Federation (NACF) would sell at a lower cost to the farmers than that of its purchasing price from the manufacturers. The price at which the government purchased the Tong-il rice from farmers was also higher than the inflation price, which was resold in urban areas at a lower than purchasing price. This led to the stabilization of food prices in urban areas whilst rural income levels improved. This system, however, was not as sustainable as it pressured the government's fiscal deficit.

Figure 2. Korea's policy experiences across the agricultural value chain



After the attainment of self-sufficiency in rice and fertilizer production, the government turned its focus on developing the post-production val-

ue chain stages and strengthening the supporting environment. Consequent policies increased the cost efficiency and quality of rice and

supported development of physical and institutional agricultural infrastructure. This change came with the increase in income for both urban and rural consumers, partly through the growth of the industrial sector, which was willing to pay more for better quality. Policies included the domestic production, and distribution of agro-machines, rearranging land for the adoption of agro-machines, as well as long-term, low-interest loans for the purchase of agro-machinery.

In the 1990s, the government introduced rice processing centers (RPCs) and drying and storage complexes (DSCs) as one-stop post-harvest processing units. In order to ensure high quality and food safety, the government instituted schemes such as the Good Agricultural Practices (GAP), agricultural product origin verification, and the agro-product standardization. These schemes disclosed product information to the customers and set high standards of hygiene and grading.

To dissolve the complicated informal distribution channel originally dominated by middlemen and to encourage the participation of smallholder farmers, the government established 33 public wholesale markets in several urban areas, which adopted an auction system for transparency. This resulted in the decrease of trade through informal markets from 51% in 1982 to 19% in 2010.

From the 1990s and onward, the impact of globalization and urbanization changed food consumption and purchasing habits. Urban

consumers sought faster and more convenient ways to consume, which led to the development of greenhouses in the urban peripheries for the fast delivery of fresh products. Greenhouse horticulture was designated as a strategic sector by the government, becoming a growing source of income for farmers. The adoption of new agricultural technologies controlling the climate and preventing infections added value to the final products. The expansion of 1–4 person households has led to an increase in convenience stores and smaller packaging. The advent of mobile and internet platforms has led to the development of online retails. The government has supported the development and expansion of 'local food markets' where local farmers organize the production, processing, and sales of local products.

IV. Lessons and Implications

Considering that a large portion of Korea's agricultural value chain development was led and supported by the government, certain areas of the policy experience are less relevant to the African picture. With modern logistics, communication technologies, and a more integrated trading system, Africa faces a different environment from that of Korea. Yet, there are common challenges that were critical to strengthening the agricultural value chain in Korea, and which are applicable to Africa.

Table 1. Summary of Africa's challenges and Korea's experience in the relevant policy areas

Level	Challenges	Policy
Production	<ul style="list-style-type: none"> Limited access to inputs Improved seeds 27% of all seeds planted Fertilizer use per hectare at 1/8 of the global average 	<ul style="list-style-type: none"> Construction of and financial support for fertilizer manufacturing facilities Distribution of fertilizers through subsidies Green revolution through the development of the Tong-il variety Provision of long-term loans for the purchase of agro-machines and communal use Establishment of repair centers for the agro-machines
Storage-Processing	<ul style="list-style-type: none"> High loss in value post-harvest due to the lack of storage and processing facilities Sales immediately after harvesting due to lack of facilities hindering an increase of rural income 	<ul style="list-style-type: none"> Improvement of quality control by establishing RPCs that provided one-stop services for drying, storing, and processing crops after harvest Establishment of small scale working stations to make use of idle labor to create value during the off-season Creation of agro-processing zones to reduce logistical costs and to enhance economies of scale
Distribution	<ul style="list-style-type: none"> Consumer preference for imported rice due to the poor quality of domestic rice Lack of standards and grading systems 	<ul style="list-style-type: none"> Mandatory notification of the product's origin Development of the Good Agricultural Practices (GAP) scheme
Cross-cutting issues	<ul style="list-style-type: none"> Limited functions of existing cooperatives in one sector (i.e. finance, production, marketing) Limited access to finance Lack of good governance and capacity 	<ul style="list-style-type: none"> The formation of a multi-purpose agricultural cooperative that includes financial, distribution, procurement and extension functions Provision of mid- to long-term loans at low interest rates through the creation of an agricultural development fund mobilized through loans by international organizations Development of institutional capacity through the Saemaul Undong and training for government officials and village leaders

1. A multi-purpose agricultural cooperative

The establishment of the NACF was critical in driving out informal lending and effectively managing the distribution, procurement, and sales of agricultural inputs and outputs. This was because NACF was a multi-purpose agricultural cooperative system that took on marketing, purchasing, financing, and insurance activities on behalf of the agro-community. By taking on financial functions, it was able to cut down high interest-rate informal lending practices. The NACF acquired capital through its

monopolistic authority over the government's agricultural finance, and also through its functions as a commercial bank which provided necessary funds to farmers at low-interest rates. NACF's case shows that by combining financial tasks with production and retail, it becomes possible to create a virtuous cycle for all actors in the value chain.

2. Production of agricultural inputs

The need for increased use of fertilizers to increase production in Africa has been well noted. The regional manufacture of fertilizers would reduce government expenditure on sub-

sidizing imported fertilizers. Africa is home to the raw materials that are used for the manufacturing of fertilizers and therefore, has the advantage of producing fertilizers locally which would drive down costs. One of the greatest barriers to reducing the cost of fertilizers in Africa is the under-development of the logistics infrastructure, an issue which needs to be improved simultaneously with the development of fertilizer manufacturing facilities. Efforts towards building regional fertilizer manufacturing facilities have been taken by the World Bank, which has announced a 1 billion USD loan for a fertilizer factory production line in Nigeria. It has also provided loans for construction in Gabon with the AfDB. Korea's experience in developing the Tong-il variety that resulted in a historic turnaround of rice production level shows the importance and need for an emphasis on research and development of improved varieties.

3. One-stop post-harvest management systems

The final value of an agricultural product is determined not only by its variety but also by its quality, which is greatly determined during the stages of storage and processing. Developing modern one-stop processing centers and storage sites such as RPCs and DRCs would encourage the development of quality standards and grading regulations. It would also encourage smallholder farmers to form community organizations where crops can be processed in bulk, which would cut down the costs of storage and processing.

Considering the limited size of production on a village level, creating small scale working units that use idle manpower during the off-season for simple packaging or the use of by-products in making folk craft or fabrics would lead to an increase in rural income. In the case

of Korea, the government provided loans, tax exemptions, training and supported market access to working units composed of more than 10 households.

4. Strengthening the role of the government and creating institutions

There are many factors hindering the development of Africa's agricultural value chain, which spans across economic, social, and institutional segments. There are also many actors, fragmented into the various stages of the agricultural value chain whose individual activities sever the linkage across the value chain. An integrated approach is needed to understand and foster the entire “forest,” a role which was undertaken by the government in Korea. The government's role is important especially in the agricultural sector as it is perceived as a high-risk sector by the private sector. The African agricultural sector has faced various market failures that require the government to regulate and foster vulnerable areas.

5. Saemaul Undong

Failure of the agricultural sector comes not only from policy failures or market neglect. Various policies that have been well-structured and efficiently managed have failed because of the lack of willingness from the target groups. Many policymakers have acknowledged the need for social change in addition to improving production. The Saemaul Undong, otherwise known as the New Village Movement, played an extensive role in changing the social attitude towards diligence, self-help, and cooperation. By providing material incentives and compensation for the voluntary mobilization of villagers, it encouraged institutional capacity building, participatory development and also the empowerment of villagers including women and

youth. Unlike in Korea, where the government had much influence in the implementation of the Saemaul Undong, methods of utilization in Africa should consider implementation through tribe leaders or customary practices which are at times more trusted than the government. **KIEP**