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DEVELOPING EFFECTIVE AND GROWTH-SUSTAINING AGRIBUSINESS MARKETS IN SUB-SAHARAN AFRICA

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1. INTRODUCTION

In Sub-Saharan Africa (SSA), agriculture accounts for 70% of full-time employment, 33% of GDP, 40% of total export earnings, and its importance is even greater in the poorest countries in the continent (Hazell, 2012). Agricultural production and agribusiness together constitute an average of around 45 percent of the economy of the sub region. The SSA sub region has enormous agricultural potential, and with well targeted investments, it should be able to double or triple its agricultural output and re-establish itself as a major agricultural exporter of agricultural products. However, over the past 30 years food production has barely kept pace with population growth. Per capita incomes remain low, and poverty, food insecurity, malnutrition and under-employment are high and persistent (Hazell, 2012, Ehui and Pender, 2005). The sub region now imports more than 15 million tons of cereals each year and many African countries found themselves vulnerable to spikes in world food prices such in 2008 and 2010. Cereal imports in SSA are projected to more than double by 2030 (Bruinsma, 2003). The region is also a net importer of processed food and shows a negative balance for trade (Jenane et al, 2008). Furthermore, agro-processing levels is extremely low in SSA. While high-income countries add nearly US$185 of value by processing one ton of agricultural products, developing countries (mostly of SSA) add approximately US$40. While 98 percent of agricultural production in high-income countries undergoes industrial processing, barely 38 percent is processed in developing countries (UNIDO, 2009). These data indicate that well developed agribusinesses can help utilizing the full potential of the agricultural sector.

With rapid population growth and urbanization, the future of agriculture in SSA rests with the development of the agribusiness sector. There is a huge potential for income and jobs growth through agribusiness and food processing in SSA that remains to be tapped. Indeed, the economic growth in Africa since the 1990s, the burgeoning urbanization, and the buoyant global commodity markets now provide unprecedented

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market opportunities for Africa to develop a competitive agribusiness sector. For example, urban food markets are set to increase fourfold to exceed US$400 billion by 2030, requiring major agribusiness investments in processing, logistics, market infrastructure, retail networks and other services (World Bank, 2013). Investment requirements for primary agriculture and its downstream industries in SSA show that the total over the 44-year period 2005/07 to 2050 could amount to almost US$ 904 billion (2009 dollars). About 66% of these needs will be required for agribusiness and agroindustry capital outlays, covering items such as cold and dry storage (US$ 78 bn), rural and wholesale market facilities (US$159 bn), first stage processing (US$207 bn), mechanization (US$59 bn) and other power sources and equipment (US$115 bn) (Schmidhuber et al., 2009). These are investments that will have to be made primarily by private sector players. The public sector will thus be challenged to create and maintain the conditions whereby investments in agribusiness and agro-industries can be forthcoming.

Our paper is organized in 5 sections: In the next section we discuss the methodology used for our analysis. Section 3 presents the potential for Agribusiness in SSA. In section 4, we discuss our findings of the estimates linkages between economic activities at the farm gate and food manufacturing. We conclude with section 5 with general policies and strategies for developing the agribusiness sector in SSA.

2. METHODOLOGY

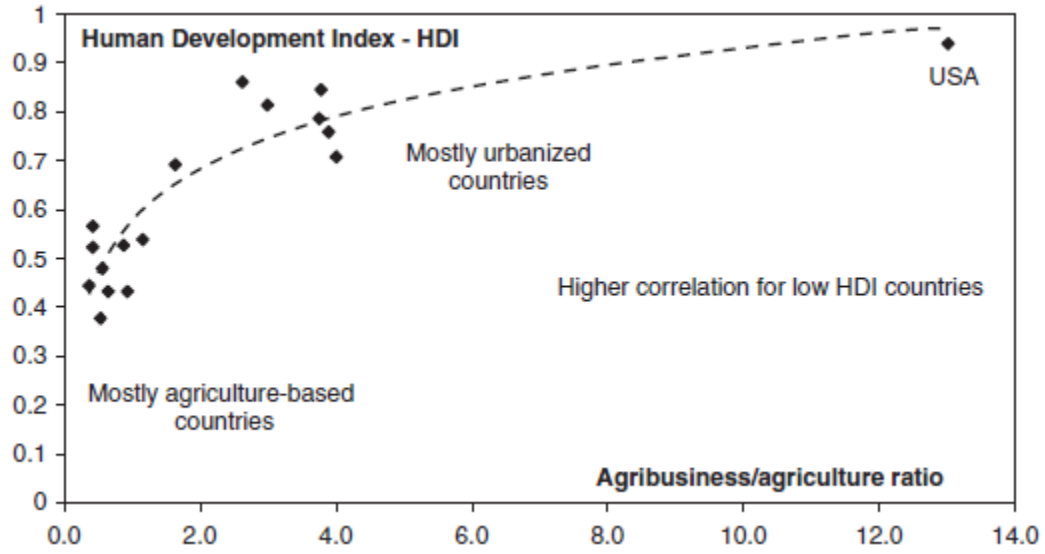
In this paper we examine the potential impact of key policy actions in the agribusiness sector in selected countries in SSA. We focus on the significance of costs between the farm gate and the factory gate and investment costs for food manufacturing. We also estimate the impact on food manufacturing on the reduction of postharvest losses in selected countries in SSA. We estimate the importance of these costs by running simulations with the GTAP computable general equilibrium (CGE) model and data for the year 2011 from version 9 of the GTAP database. In the simulations the farming sector is able to expand without incurring additional costs. The GTAP model is based on assumptions that are common in the literature: perfect competition, constant returns to scale, and no change in the economy-wide employment of resources. Each regional economy consists of several economic agents: on the final demand side of the model, a utility-maximizing household purchases commodities (for private and government use) and it saves part of its income, which consists of returns to primary factors and net tax collections. On the production side of the model, cost-minimizing producers employ primary factor services and intermediate inputs to supply commodities. Land, labor, and capital are mobile within a region but not internationally. International trade in commodities and services clears world markets under the assumption of product differentiation by

country of origin. This analysis is based on data consisting of 22 regions and 57 sectors/commodities. We have identified 13 economies in SSA to model economic links between these economies.

3. THE AGRIBUSINESS POTENTIAL IN SUB-SAHARAN AFRICA

Following the typology of the World Development Report (WDR) 2008 Agriculture for Development (World Bank, 2008), the ratio of value added in agribusiness to that in farming is only 0.6 in agriculture-based countries (mostly SSA) compared to a ratio of 2 for transforming countries (mostly Asia) and 3.3 in urbanized countries (mostly Latin America), and 13 in the United States. More importantly, this ratio is highly correlated with basic parameters of socioeconomic development. Low indices of human development are directly associated to low ratios of agribusiness-to-agriculture development (Figure 1). On the other hand, socio-economic progress, can be highly and positively correlated with levels of economic growth passed on from agriculture to agro-related manufacturing and service activities (Wilkinson J. & R. Rocha, 2009). Overall the agribusiness sector in SSA faces constraints including but not limited to (i) inadequate policies in agricultural output and input markets and trade; (ii) prevailing land tenure systems fail to provide sufficient security to farm and agribusiness operators; (iii) poor infrastructure, especially power storage, and transport; and (iv) difficulties for the small holder to have access to working capital, technologies, fertilizers and improved seeds.

Figure 1. Correlation between human development and the agribusiness/ agriculture ratio. Source: Wilkinson J. & R. Rocha (2009)



There are several reasons why the focus should be on the development of the agribusiness sector in SSA: First, the development of agro-food processing industries can lead to capturing forward and backward production linkages with other sectors of the economy in SSA[2]. The WDR (2008, *op. cit*) called attention to the fact that the share of agribusiness and agro-industries in GDP tends to grow as countries move from lower to higher levels of income. Through their forward and backward linkages, investments in these sectors produce significant multiplier effects, generating demand for agricultural products and associated inputs and services, creating on- and off-farm employment, enhancing incomes and contributing to value addition and increased public sector revenues. Through the development of agro-industries and agribusiness, access to markets, finance and technical assistance can be facilitated for smallholder farmers, promoting their inclusion into more modern and efficient value chains. In addition, agro-processing of food commodities increases food security in four major ways; (i) by reducing post-harvest losses; (ii) by extending the shelf-life of food, making it easier to reach urban areas where most of the population is concentrated; (iii) by adding value to commodities and therefore increasing incomes and creating employment along the food chain from production to marketing; and (iv) by improving the quality and safety of foods through establishing appropriate certification, traceability systems and harmonization of standards, thus increasing access to markets. In sum, the combined effects of employment gains, income enhancement, inclusiveness

[2] *Examples of backward linkages are more related to farm inputs supply industries (fertilizers, seeds, machinery, etc.). Forward linkages include for example in the area of the livestock industry manufacturing industries for meat conservation, tanning operations, manufacture of footwear and other leather goods based on hides and skins*

and food security promoted through an agribusiness and agro-industries development strategy can effectively contribute to reducing overall poverty in SSA.

Second, investment in agro-processing plays a special double role in the small, commercializing, economies of SSA, where industrial production linkages involving agriculture on the whole are very weak. Processing not only adds value to agricultural commodities, but often makes them more tradable than they would be otherwise. Commercialization requires investment in processing of commodities to turn Africa's largely non-tradable rural economies into market-based economies (Goletti and Wolff, 1999). In addition improved processing of food in particular can help improve the elasticity of supply of those items that workers most want, and which are otherwise not always available, or are in limited supply, as wages increase. More formally, investment in processing in the African context can help improve the elasticity of supply of wages goods and, thus of non-tradable generally (Ehui and Delgado, 2000). Such improvements allow growth gains from increased exports to be converted more fully into further new employment and production, as opposed to inflation in food prices. It has been estimated that in SSA, these "consumption growth linkages" are, in a quantitative sense, at least nine times more important to growth than technical backwards production linkages (Delgado et al., 1998).

Finally, the structure of global production continues to change, as it has done during the last two decades, business people and policy makers in SSA will need to find ways of integrating their activities in global value chains for food and agricultural products. During the last two decades international trade has evolved from trading in goods destined for final consumption, to trading in intermediate goods destined for further processing at least one time before final consumption. In a search for lower costs, companies have segmented a production process into several stages in several locations. Improvements in the flow of information and communications have made possible the coordination of production in several locations and the flow of inputs and products. Lower import tariffs and reforms of regulations and investment policies have facilitated the flow of products and financial capital. These developments provide new opportunities for agricultural and food producers in SSA. It might be more profitable for a food company to position itself in a particular segment of a global value chain instead of striving to a consumer product from raw agricultural commodities. Policy makers could facilitate participation in global value chains by reforming import tariffs and investment regulations, streamlining administrative procedures, reducing waiting times at the border, etc.

4. ESTIMATES LINKAGES BETWEEN ECONOMIC ACTIVITIES AT THE FARM GATE AND FOOD MANUFACTURING

The following parameters were analyzed by running simulations with the GTAP computable general equilibrium (CGE) model and data for the year 2011 from version 9 of the GTAP database: (i) facilitating investments in food manufacturing; (ii) strengthening the links between farming and food processing; and (iii) reducing post-harvest losses for grains and vegetables and fruits. Below are obtained results:

a) Facilitating investments in food manufacturing: Figure 2 suggests that most SSA food manufacturing sectors are fairly responsive to lowering the costs of investment. Kenya's food manufacturing sector could expand the most, by about 0.65% for a 1% reduction in investment cost. With the same reduction, Cote d'Ivoire's, Namibia's, and Senegal's food manufacturing sectors could expand by about 0.3-0.4%. Kenya's food manufacturing sectors are in general more capital intensive that other SSA sectors.

b) Strengthening the links between farming and food processing: Next we consider lowering the costs between the farm gate and the food factory door. These costs include not only transportation costs, storage costs, etc., but also the costs that farmers incur to stay connected to the rest of the economy. We have simulated the effects of potentially reducing food manufacturing's costs for farm products by 1%. Figure 3 suggests that Cote d'Ivoire's food manufacturing sector is the most responsive sector to reductions to post farm gate costs. A 1% reduction in the effective price paid by food manufacturing for farm products could lead to a 0.71% increase in Cote d'Ivoire's food manufacturing.

Figure 2. Gains in outputs of food manufacturing and farming from reducing food manufacturing investment costs by 1 percent

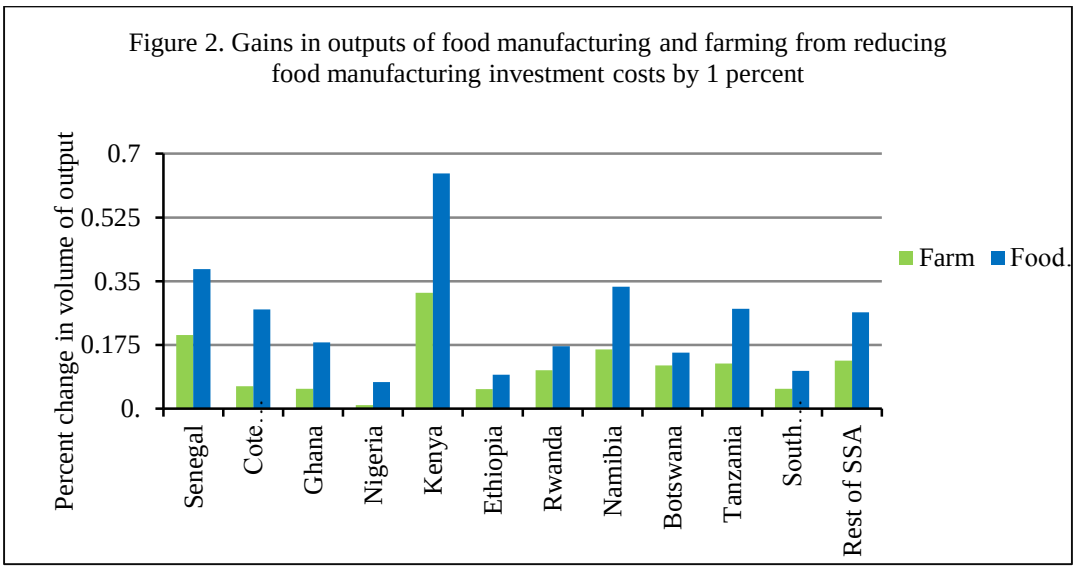
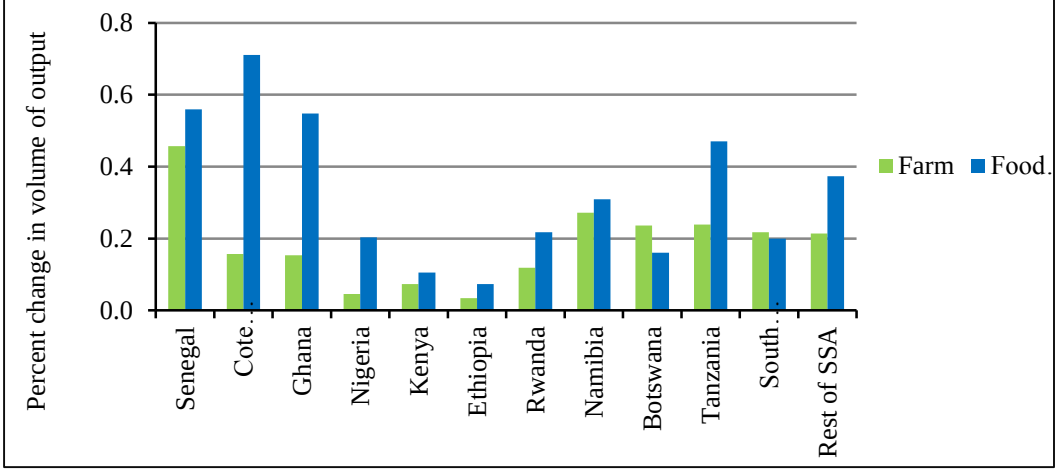
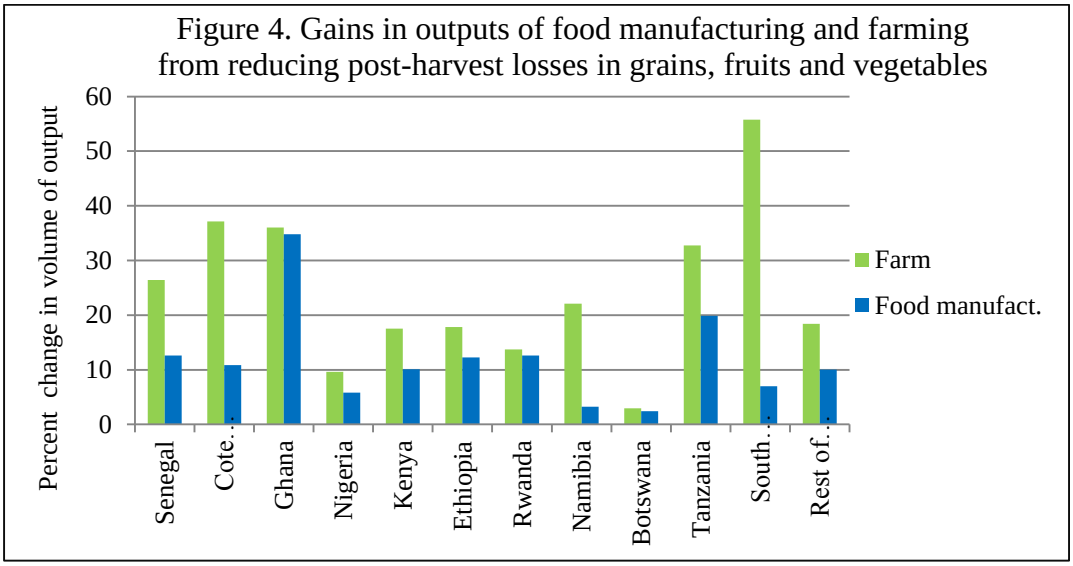
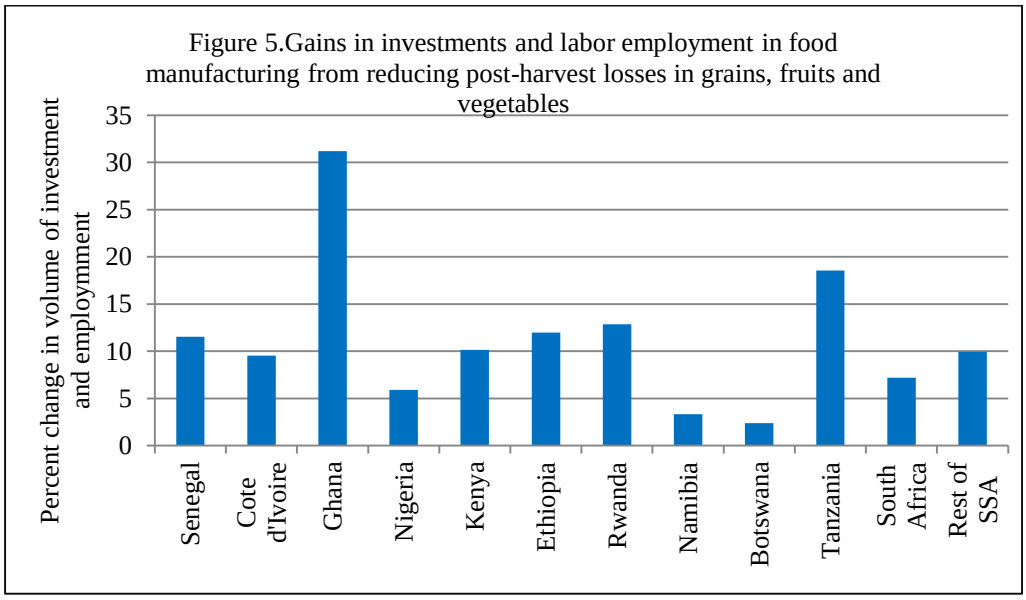


Figure 3. Gains in outputs of food manufacturing and farming from reducing post farm gate costs



c) Reducing post-harvest losses for grains and vegetables and fruits: These are currently estimated by several Organizations (FAO, CIRAD, NRI and UNIDO) to be as high as 20% in cereals, 30% in roots and tubers, and up to 50% in fruits and vegetables. According to data from the AfDB (2010), the annual quantitative post-harvest losses of cereal grains, roots and tuber crops, fruits and vegetables, meat, milk and fish in Africa are estimated at around 100 million tons with a monetary value of US$ 48 billion. This figure is rather conservative as it excludes costs related to loss of quality and market opportunity and lost resources (land, water, inputs, labor, etc.). We have simulated the effects of reducing this type of food losses (15% loss in grains, and 50% in fruits and vegetables) in sub-Saharan Africa. Figure 4 suggest that Ghana's food manufacturing sector could expand by about 35% as a result of eliminating food losses in the production of grains, fruits and vegetables. Other Sub-Saharan economies with large gains in food processing are Tanzania (20%), Senegal (13%), Rwanda (13%), and Ethiopia (12%). Cote d'Ivoire and Namibia experience small gains in food processing because most of their grains, fruits, and vegetable production is not channeled to final demand through the food processing industries. To make possible the expanded production levels in food manufacturing, the sector would have to increase its investments in capital and equipment as well as it labor employment (figure 5).





5. DEVELOPING SSA'S AGRIBUSINESS SECTOR

There is a general consensus that investments in agriculture should go beyond improvements in on-farm productivity to cover agribusiness and agro-industrial development, if agriculture should be the engine of economic growth and poverty reduction. This will require promoting policy and programmatic initiatives that will facilitate the transformation of the agriculture sector with a focus on the following immediate objectives: (i) effectively linking small and medium size agricultural producers to markets; (ii) contributing effectively to increasing farmers' incomes through value-addition processes;(iii) supplying higher-valued and differentiated food, fiber, feed and fuel products to consumers at local, regional and global markets; (iv) leading to retention of a higher proportion of the consumer price in the communities or countries where the

primary production takes place; (v) utilizing natural resources in an overall sustainable manner; and (vi) acting as an effective basis for industrialization and generation of increased and high quality employment. In the medium to long term, such initiatives will lead to the emergence of efficient agribusiness and agro-industries which are profitable and competitive, provide inputs and services to smallholder farmers, and are able to mobilize investment resources from domestic, regional and international financial institutions; and public sector policies and institutions which facilitate increased investments in the agriculture sector and efficiently provide services and inputs to the sector on their own or in collaboration with the private sector.

Because there is wide variation across countries and sectors in SSA (diversity of economic, social and political conditions), a "one size fits all" strategy would be inappropriate to advance a reform agenda for the agribusiness and agro-industries sector. But, the priority interventions to be considered can be organized under the following four interlinked focus areas: (i) enabling policies and provision of public goods; (ii) innovative institutions and services; (iii) reinforced financing and risk mitigation mechanisms; and (iv) skills and technologies for the post-production segments of agricultural value chains. These are detailed below:

a) Enabling policies and provision of public goods: Most SSA countries have relatively well defined agricultural and rural development policies but in many cases these give insufficient attention to agribusiness and agro-industries. During the next five to ten years, there will be a need to formulate and implement policies and provide public goods that can enhance profitability and competitiveness, while ensuring that agribusiness and agro-industries contribute to the development of smallholder farming, food security and nutrition, job creation and poverty alleviation. The main intervention areas relating to enabling policies and provision of public goods would include investments in public R&D, grades and standards, food safety control systems, infrastructure, market information systems, business climate and building the capacity of public agencies to formulate and implement policies and regulations that facilitate efficient trade along agro-industry value chains. In the specific case of trade, governments in SSA must develop and implement trade policies that minimize distortions and harmonize regional trade.

   Another element also of critical importance as public goods is property rights (either physical or intellectual) which include enforcement mechanisms to resolve disputes and defend rights. Establishing the "rules of the game" in the form of property rights is an essential aspect of an enabling environment for agribusiness and agro-industries, including for land (use, control, and transfer), contract farming, etc.

b) Innovative institutions and services: There is a need to establish new or re-orient existing agricultural institutions and support services in SSA to create a versatile network of institutions capable of dealing with the needs of agribusinesses and agro-industries, especially agro-SMEs. There is a need to further validate, upscale and replicate these innovations through pilots and prototypes, combined with evaluation and capacity building. The main intervention areas relating to innovative institutions and services would be based on best practices from other regions of the world (including Asia and Europe), including business development services, incubators, agribusiness parks, clusters, networks, warehouse receipts, and contract farming, which have been instrumental in strengthening agro-SME linkages and smallholder access to national, regional, and global industry supply chains. In the specific case of agribusiness parks, if well designed, they can address important challenges that hinder the development of competitive and inclusive agribusiness value chains in SSA. Their concept is based on a concentrated agro-industrial estate or zone/cluster, mainly focused on value addition/agro-processing services of food products, including crops, livestock and fisheries. It is also based on a public-private partnership scheme aiming at facilitating: (i) access to infrastructure; (ii) shared investments; (iii) shared common services and facilities and creation of economies of scale in service provision, including warehouse, cold storage facilities, transport, quality control services, waste management, etc.; (iv) improved access to technical support and information and management services; and (v) improved agri-business linkages between and within value-chain actors through effective network between primary producers, markets/ traders/retailers, and agro-processors.

c) Reinforced financing and risk mitigation mechanisms: As reported above, the development of agribusiness and agro-industries in SSA will require a substantial infusion of fixed investment and working capital. Private investors and the financial sector in the region have the capacity to provide a significant amount of the resources needed, but for many reasons, the agriculture sector is not attractive to private investors and financial institutions. The key to unleashing resources from the private and financial sectors is to increase profitability and reduce risk in any investments undertaken. With this in main, the main intervention areas relating to financing and risk mitigation would include the following: (i) in the short term, governments need to take the lead in building confidence, trust, and stability among participants in agro-value chains. One way of doing so is to act as guarantee for loans to the agro-industry; (ii) establishing investment funds, either public or commercial, specifically targeted toward SSA agribusiness and agro-industries which can help spur needed growth in agro-enterprises; (iii)

investment promotion as a means to attract and diversify foreign investment; (iv) promoting crop insurance schemes which would be instrumental in mitigating production risks due to natural catastrophes.

d) Skills and technologies for the post-production segments of agricultural value chains: At present, agricultural research, education and extension systems are heavily focused on production systems issues such as breeding, agronomy, and soil management. Many special programs and initiatives also focus mainly on primary production, and as a result while there is ample skills set in the breeding and agronomic part of value chains, there is paucity of the same when it comes to post-harvest components of the chain. To accelerate agricultural sector development and enhance its contributions to overall economic development, there is an urgent need to build skills and technologies that improve efficiency and productivity along value chains as a complement to the support being provided to increase productivity in primary production. The priority interventions would consist of the following: (i) capacity building support to producers and SMEs, as well as their chain partners, in order to improve their capacity to be reliable suppliers and to improve productivity and efficiency along the value chains. Special attention should be given to training programs to encourage and enable the participation of women and youth in agribusiness and agro-industry; (ii) support for product and process innovation and for effective and efficient transfer of technologies to farmers and firms, including institutional arrangements for public-private partnership; and (iii) support for re-focusing and reinforcing university and vocational training in agriculture and engineering in order to mainstream the building of capacities in post-harvest handling, value-adding processing, agribusiness development and management, and agro-industrial skills.

References

1. Delgado, Christopher, Jane Hopkins, Valerie Kelly, with others. 1998. *Agricultural growth linkages in Africa*. International Food Policy Research Institute, Washington, D.C. Research Report No. 107.

2. Ehui, S. and Pender, J. 2005. Resource degradation, low agricultural productivity and poverty in sub-Saharan Africa: pathways out of the spiral. Agricultural Economics, Vol 31-S1 (pp 211-224).

3. Ehui, S. and C. Delgado. 2000. Economy-wide Impacts of Technological Change in the Agro-food Production and Processing Sectors in Sub-Saharan Africa. MSSD Discussion paper No 38. International Food Policy Research Institute

4. Goletti, Francesco and Christiane Wolff. (1999). "The Impact of Post-Harvest Research". Washington, D.C., International Food Policy Research Institute, Markets and structural Studies Division Discussion Paper No. 29. April.
5.

6. Hazell P. 2012. Options for African Agriculture in an Era of High Food and Energy Prices. Elmhirst Lecture: 7th International Conference of Agricultural Economists, Foz do Iguaçu , Brazil,(August)

7. Jelle Bruinsma. World agriculture: towards 2015/2030 - An FAO Perspective. 2003.

8. Jenane C. et al. Agro-industry in graphs. Overview of the food and beverages sector for selected countries. 2008. A joint report by FAO and UNIDO.

9. Wilkinson J. & Rocha R (2009). Agro-industry Trends, Patterns and Development Impacts. In Agro-industries for development. A joint FAO, UNIDO and IFAD publication.

10. Schmidhuber et al. Capital Requirements for Agriculture in Developing Countries to 2050. Paper presented at the FAO Expert Meeting on "How to Feed the World in 2050", 24-26 June 2009, Rome.

11. UNIDO. Agro-value chain analysis and development. The UNIDO approach. A staff working paper. 2009.

12. World Bank. 2013. Growing Africa: Unlocking the Potential of Agribusiness (January). Washington, DC.

13. World Bank. World Development Report 2008: Agriculture for Development. World Bank, Washington, DC.