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Raising Farming Efficiency for Sustained Agriculture in Asia Africa Growth Corridor

T. P. Rajendran

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Key Recommendations

- India and Japan must collaborate to provide conducive financial mechanism to the African farmers, manufacturers and suppliers in order to help the African countries to overcome the problems faced by them in their agriculture sector.
- Exchange of technical, financial and business expertise amongst African nations can help in bringing about mutually integrated commodity productions to feed their markets through meaningful supply chains.
- There is a dire need for capacity building in the agriculture sector of African countries and the policies that enable capacity building must incorporate technological advancements and innovation. The native expertise blended with international expertise for such programme shall be mobilized for capacity building of the target youth from farming families.
- The projects undertaken under AAGC should be in line with the needs and aspirations of the African people and stakeholders of the respective nations. Farmers and farming groups of every nation must be consulted before developing agricultural development programmes and implementing partnership projects in those countries.
- Important sectors for projects in Africa are manufacturing infrastructure for agriculture, finance and credit-facilitation system, building network to provide land and water connectivity, establishing rural value chains for major commodities of respective countries and instituting business for knowledge and technology diffusion.

Raising Farming Efficiency for Sustained Agriculture in Asia Africa Growth Corridor

T. P. Rajendran*

Abstract: Agriculture is important for Africa for generating income and employment. Considering the prevailing scenario and the perceived benefits of agricultural mechanisation for intensification of African agriculture, efforts are required both at policy and industry level to manufacture all the useful machines, implements and tools for the various countries. Supporting and enabling policies can provide for creating conducive financing mechanisms and tools for both farmers and suppliers of the African nations to overcome the challenges faced by the sector. Exchange of expertise between the countries of the continent could bring about mutually integrated commodity production for their markets. The expertise from Asia in both manufacturing sector of farm machinery and food processing could enhance the continent's capacity to increase the agricultural productivity as this continent offers twenty first century food requirement of increasing African population. Advancements in science and technology in all modern branches of innovations could be funneled to foment the capacity and enabling policies of African nations either as sovereign or as collective missions. Africa seems to have risen in this millennium for taking up this humongous challenge to make its own revolution in Agriculture.

Keywords: Gene revolution, agro-processing, value chains, manufacture of agro-machinery, food Processing

Agriculture is Africa's largest economic sector, representing more than 15% of the continent's total gross domestic product (GDP) (more than 100 billion USD annually), and employs more than 70% of its workforce on approximately 783 million hectares of its arable land (27% of the world's total). However, agricultural GDP in Africa is highly concentrated, with Egypt and Nigeria alone accounting for one-third of the total agricultural output. Over the last decade, countries that have increased investments in agriculture as per the Comprehensive Africa Agriculture Development Programme (CAADP) targets

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(or have exceeded) have seen reductions in hunger and poverty, and increases in productivity. Ghana, Togo, Zambia, Burundi, Burkina Faso, Mali, Niger, Congo, Senegal, Ethiopia and Malawi are some examples. However, as is evident from the agricultural performance numbers, Africa still needs substantial efforts to boost investments and productivity, deepen intra-African trade and establish market-oriented agri-food value chains. African agriculture therefore needs business models that can significantly increase the level of investment from the private and public sectors, as well as donors.

Sectoral Profile

Agriculture is the basic sector that has stood with Asia and Africa for sustaining the food and nutritional requirements of people. The evolution of this human activity by utilising natural resources to grow crops that are primary food sources is historically a major achievement of the countries in these two continents. The component of animal husbandry in agriculture could add better nutrition and scope for higher health management in farm families. Modern agriculture has provided opportunities to practice integrated farming through incorporation of cropping, livestock, fisheries and such other components that can make farming profitable. The derived benefits in terms of higher income, employment and the mainstay for food and nutrition could enlarge the scope for making agriculture as core sector for national growth. Its inter-linkage with other national growth-sectors such as health, industry, commerce and trade has drawn attention towards enhanced emphasis on further improvement and acceleration of agriculture.

Agricultural science offers sufficient opportunity to utilise genetically robust crop varieties and animal breeds that can offer higher yield and better tolerance to both biotic and abiotic stresses. The utilisation of available agricultural technologies would provide sustainable food production. The African countries from various geographies possess wide variety of agro-ecologies and weather patterns. Their longitudinal variations of natural resources demand tailored technologies for the improvement of African agriculture.

The dryland and rainfed farms that are in majority shall be serviced with specifically tailored services of knowledge and technology. The African growth in agriculture can be leveraged with the technological advancement that Asia pursued to trigger faster growth in this sector. Shared growth and development experience in Asian agriculture would enable to harness the untapped African potential to accelerate prosperity and stability towards peace.

The high-growth ambitions for the African countries have laid emphasis on agriculture for mitigating hunger / nutrition and also for achieving the growth in economy. Recognising this, the Agenda 2063 or the African union has categorically mentioned in its Aspiration-1 that for a prosperous Africa based on inclusive growth and sustainable development, Africa's agriculture needs to be modernised and productive; using science, technology and indigenous knowledge; and the sector has to be made profitable and attractive. African Agricultural Technology Foundation (AATF), Alliance for a Green Revolution in Africa (AGRA) funded by Bill and Melinda Gates Foundation and Rockefeller Foundation, African Seed Trade Association's (AFSTA) Alliance for the Seed Industry in East and Southern Africa (ASIESA), GROW AFRICA, One Acre Fund, International Fertiliser Development Center (IFDC), Syngenta Seeds2B Project, USAID's Feed The Future Initiative etc. are some initiatives that are operating across this continent to increase the productivity in order to free millions of people out of poverty and hunger.

Asia grew with its agricultural progress of the last century through mainly 'gene revolution' that produced visible and marked impact on the productivity and profitability in this sector. Intensive agriculture has been in vogue in Asian countries to increase the velocity of agricultural growth. This ideology was aided by 'gene revolution' in seeds and breeds. The phenomenal developments in agricultural technologies to accommodate the improved high-yielding seeds and breeds provided the best background for perceptible growth in Asian agriculture. The current century has visualised the impact of

climate change to impact on the natural resource systems in various measure in both the continents. In the recent times, success stories of Asian Green Revolution have been considered as models for adaptation in African countries with the aspiration to improve the efficiency of food production.

Value chain development and regional manufacturing and service hubs shall bring about farm gates to consumer chains. The strengthening of inter-country manufacturing network could take many countries into surplus and exportable stock of plants and machinery. In the context of quality products for plants and machinery through extensive turn-key project-based development cooperation with elite Asian business houses could be achieved. Scope for enhanced investment is visualised in East Africa (EXIM Bank, 2017). The scope of contract farming towards producing commodities that serve the nutritional security of African countries where such projects can be taken up. The medium and small-scale processing factory units can be around such contract farms to ensure that the harvested commodity is taken into these processing units and prevent any loss of commodities. The farmers can be given premium price for the freshness and higher nutritional status. The stakeholders of each African nation for the nutrition-mission shall be keenly integrated with the contract-farmed agricultural commodities that can be customised for processing and further use in the supply chain for nutrition programmes in the interior country side through effective campaigns amongst the local communities.

Cooperation Scope and Priorities

The scoping and prioritisation for Asia-Africa cooperation in agricultural sector need to be set upon the population growth and influence of climate change in these continents in the next two decades of the century. The prediction of wider changes in agro-climate and agro-ecology calls for looking into smart agriculture technologies that would help offset the adverse impacts in the prevailing farming systems. The following are some of those specific areas of cooperation:

Seed Industry Sector

In furtherance of Africa-India cooperation in agriculture, collaboration in seed sector seems to be a win-win proposition for both India and Africa. As Indian companies gain access to new markets, African farmers/distributors have access to better quality seeds and increase their productivity and income. The African Union (AU) initiated a policy framework called Comprehensive Africa Agriculture Development Programme (CAADP) in 2003. The overall goal of CAADP is to "help African countries reach a higher path of economic growth through agriculture-led development, which eliminates hunger, reduces poverty and food insecurity, and enables expansion of exports". It has been declared as an integral part of the New Partnership for Africa's Development (NEPAD). NEPAD is AU's strategic framework for pan-Africa socio-economic development. The AATF and other initiatives mentioned above can help momentum in African agricultural. International seed testing standards and quality management protocols for ensuring genetic purity and quality of crop seeds can be the plank on which necessary logistics, legal framework, policy settings, implementing system, capacity enhancement and maintaining enabled environment can be taken up through the AAGC.

Micro-propagation and tissue culture technology ensures the supply of disease free, high-yielding clones of fruit crop planting materials as in the case of banana, papaya, etc. Investment to establish suitable factories in many African countries could be a business plan that is pursued by the Asian companies. The horticulture crops of local importance can get strong fillip through this route of supply of healthy and genetically pure planting materials to small farmers. The benefit from such an intervention is to harvest good quality and market-ready fruits by farmers.

Agro-Processing Machinery and Knowledge Sector

Agro-processing would enhance farmers' profitability and give the African countries the choice to utilise the processed food for consumption (Konig et al. 2013). Indian efforts for robust development

cooperation to build up capacity has been visible in many African countries. Setting up of industries related to cotton, sugar, leather, farm wastes (cellulosic and non-cellulosic), food products, nutrient supplements, biofuels etc could be scoped through AAGC. Few examples with high economic potential for improving farm gate profits and reducing farm gate commodity loss are given in Table 1.

Table 1: Agro-Industries for African Countries

1	Sugar production plants with cogeneration of electricity / molasses / alcohol (fuel grade), industrial chemicals
2	Coffee processing plants
3	Groundnut processing plants
4	Fruit pulp, juice and jam making plants
5	Tomato paste and ketchup production plants
6	Oil extraction mills for oilseed crops
7	Cassava processing plants, methanol, industrial chemicals
8	Cattle ranch and beef meat production plants
9	Rice mills of various production capacities
10	Livestock feed manufacturing plants
11	Dairy processing plants
12	Modern abattoirs
13	Poultry feed manufacturing plants
14	Honey processing plants
15	Cotton processing: ginnery, spinning mills, hand loom/ power looms / cloth mills (textiles), high quality cellulose and industrial chemicals
16	Agricultural farm waste processing into high value byproducts including fortified manure / paper / fuel etc.

The products from these industries can be available for both African and Asian consumption. Private initiatives to establish markets for supply of different levels of agro-processing equipments are available in certain parts of the African continent. E-extension service has unique potential in Africa in service knowledge on various aspects

of agriculture including post-harvest processing and marketing. Indian investment in information and communication technology sector in African nations could stand in good stead to sustain this effective mechanism for bringing in the much-needed knowledge service sector. Energy sufficiency to run these industrial clusters that can be established around villages can be ensured through non-conventional sources as well as from existing electricity transmission grids. Skilled manpower from within African countries to run these plants shall be organized to make the products viable and cost effective for competitive markets within African continent and other continents.

Manufacture Sector for Farm Machinery and Implements

Considering the prevailing scenario and the perceived benefits of agricultural mechanisation for intensification of African agriculture, efforts are required both at policy and industry level. Policies should provide for creating conducive financing mechanisms and tools for both buyers and suppliers to overcome the challenges faced by the sector. Investment by international players can be explored to increase the spread of farm mechanisation. Agricultural equipment from India can be adapted in Africa, with minimum customisation, as both continents have similar landholdings and farmers have limited disposable incomes for utilising (purchasing / custom hiring) such assets. Similar opportunities also exist in the irrigation sector, where the internal rates of return on irrigation projects are estimated to reach as high as 28 per cent, depending on the type of irrigation and other conditions. Solar pumps could be an option for African agriculture also.

Veterinary Service Enterprises for Efficient Livestock Production

The livestock sector of African countries is significant to boost small farm income[1]. Veterinary services make vital contributions to livestock supply chains, from farm to fork, and must be strengthened for the benefit of people, animals and the environment (Higham et al., 2016). Mainstreaming livestock into village enterprises has been kept in the CAADP framework[2]. Prof. Andrew Mude, an economist at the International Livestock Research Institute, Kenya, won the 2016

Norman Borlaug award for developing an index-based insurance scheme providing a safety net for herders in drought-prone East Africa, in which the loss of livestock equates to a loss of livelihood and cultural identity. Safety nets through livestock herds with attendant veterinary service are a model that African continent shall seriously pursue.

The sector can be supported with modern therapeutics and suitable diagnostic kits and prophylactic vaccines. Establishing strong technical collaboration with suitable Asian countries provides ample scope to produce the much-needed diagnostic kits for disease surveillance and diagnostics. Vaccine production is possible with foreign direct investment to manufacture major animal vaccines for African countries. Large-scale production of these essential items in livestock production can bring down their cost to affordable level by mall farmers. Asia has made giant leap in the manufacture of these health management tools in livestock production. These experiences along with sufficient investment can turn around the egg, dairy and meat industry substantially.

Food Processing Sector for Plants and Machinery

Value chain development and regional manufacturing and service hubs shall connect farm gates to consumer chains. The strengthening of inter-country manufacturing network could take many countries into surplus and exportable stock of plants and machinery. In the context of quality products for plants and machinery through extensive turn-key project-based development cooperation with elite Asian business houses could be achieved. Scope for enhanced investment in this sector is visualised in East Africa.

The extent of food commodity loss from farm gate to consumption level is vast and huge in monetary terms. It forms the best argument for investment in food processing and products that can save advertent commodity loss. 'Save grain' campaign in India of the 1980s and the pilots that were undertaken by the UN-Food &

Agricultural Organisation in African and Asian continents signify the importance given by nations on the concerns related to loss of commodities from farm gate to consumers' tables. The studies[3] conducted under the 'Initiative – SAVE FOOD – solutions for a world aware of its resources, the FAO published Working Papers on Rice Value Chain-Food loss analysis: causes and solutions (FAO, 2017a) and Chickpea (FAO, 2017b) Value Chain-Food loss analysis: causes and solutions and Milk Value Chain-Food loss analysis: causes and solutions (FAO, 2017c). The economic burden of such loss to nations has been enormous. The value chains built up on the food processing sector is a major trigger for economic growth through enhanced industrial infrastructure and consequent employment in and around villages.

According to a 2011 report by the World Bank, FAO and the United Kingdom's Natural Resources Institute, grain losses in sub-Saharan Africa alone are about $4 billion a year and could meet the minimum annual food requirements of at least 48 million people. This estimate shall be further increasing over the last six years. It is relevant to imbibe the Support to African Union[4] in the development of policies and strategies for country-specific plans to reduce post-harvest food losses. Based upon the Malabo Declaration, the African Union has developed the Implementation Strategy and Roadmap, with strategic actions and milestones from 2015-2025. To facilitate the process, FAO and African Union co-organized a high level regional consultation in October 2014 to inform the development of a continental food loss reduction strategy. Consequently, Malabo Strategic Action Area 1 (SAA1) targets 'Support to Post-Harvest Management', with the aim of establishing effective post-harvest loss (PHL) reduction systems by 2025 on the African continent. Under the UN initiative on "[5]mainstreaming food loss reduction initiatives for smallholders in food deficit areas", many pilot projects have been launched in SSA such as 'reducing food losses through improved post-harvest management in Ethiopia - Phase 1' a Swiss project[6] that targets to reduce the post-harvest losses of commodities along with

the development of a postharvest policy and strategy framework for the Ethiopian Ministry of Agriculture.

Specific Projects & Recommendations

The suggested projects are for manufacturing infrastructure for agriculture, establishing rural value chains and instituting business for knowledge and technology diffusion for improving farm productivity and for creating medium and small enterprises for manufacture of farm machinery and those for agro-processing.

Manufacturing Infrastructure

The significant impact of robust manufacturing infrastructure in African countries can drive growth in Agriculture. Some of the following examples can be illustrative.

i) Manufacturing set-up of alternate energy-based cold chains in various regions of Africa can secure all perishable agricultural commodities from farm gate to markets. Development of horticulture has dependence on the energy sufficiency for managing cold chains to preserve the commodities from high post-harvest losses in many SSA countries.

ii) Manufacturing of machinery for sugar, textile, meat, dairy, coffee, tea, cocoa, honey and leather industries is considered significantly crucial, as the raw materials from farms for feeding these industries is expected to flow into the national food baskets. Fruits and vegetable processing for various products is a prospective niche area for the food processing sector. In the light of the intense demand for processed horticultural food items to satiate nutrition to population, the food processing industry is expected to grow in all the regions of Africa. Industries for natural colours and various chemicals from flowers are also promising sector for developing and production of suitable machinery for their extraction and processing.

iii) Manufacture and installation of solar water pumps is required for improved water use efficiency in agriculture. Innovative lift irrigation technology using solar pumps and energy efficient water lifting machines could alter the water use efficiency in farms.

iv) Manufacture and service of various power capacity motor bearing water pumps and related minor equipments and machinery could be of immediate relevance to the SSA.

Rural Value Chain Infrastructure

The rural value chains for agricultural commodities such as food and industrial raw materials have to be crafted in accordance with the local economic strength as well as influencing the socio-economic development of people. Utilising rural food commodities, advertently lost/wasted, can be used for value enhancement through various levels of processing to provide economic benefits to the local producer communities in all countries.

The following core areas are believed to achieve considerable progress in building up rural value chain infrastructure in Africa.

a) Transport System including Land / Water Connectivity

The transport network system is designed to facilitate cross-border movement of goods and services amongst countries of Africa. This network would absorb transport requirements of agricultural inputs to farms and agricultural commodities / raw materials from farms to processing hubs. The resultant gain in economic growth would be the visible growth of GDP of each African country. Employment and labour market would grow to steer better micro-economies.

b) Finance and Credit Facilitation System

The African Development Bank as well as African national banks could organise primary financing and refinancing of the above projects

through efficient and smart project documents. These documents can be prepared for African countries through expert consultants from Asia and other parts of the world. Institutions such as National Bank for Agriculture and Rural Development could be developed by African Development Bank for processing the financial needs towards achievable agricultural growth trajectories and consequent rural development in African countries.

c) Integrated Marketing System

The success of farm economy rests with robust and transparent integrated markets. Such markets would integrate the value addition as well as processing of farm commodities to create commodity processing environment. The marketing networks of each country shall fan out to cross borders and root in neighbouring African countries by utilising opportunities arising out of growth in farm productivity and availability of farm commodities. E-marketing, future marketing, contract farming etc with buy-back assurance can be used in the variegated economic situations of Africa.

Business of Knowledge / Technology Diffusion Service

The success of implementation of development cooperation in agriculture under AAGC would be centric to smart business of knowledge and technology diffusion in African countries on the farm commodities of interest to each country. Prioritised interest or enhancing the agricultural commodity production of crops and animal sectors would enable each African country to launch infusion of technology and associated knowledge into small holding farms. The following components may enable the aspiration to build up agri-business in every African country.

i) On-farm diffusion service: *In situ* set up of capacity and skill enhancement at farm gates utilizing information and communication technology (ICT) would create models that become self-financed business systems. Financing through banks and rural development institutions would create faith in

developing smart agri-business service including agriculture insurance or risk cover from aberrant weather patterns and other unexpected loss in farms.

ii) Farm inputs / farm output service: Many Asian models on cooperative societies for agricultural input financing and servicing stand to become replicable lessons to Africa. Credit-linked input service system and debit-linked farm output processing and marketing could be tested for sustainable growth of farm enterprises.

iii) ICT– the track for leap-frogging farm sector: The farms of all nations could be networked through ICT in order to diffuse knowledge and information that are updated according to the situations in order to equip farming families for Expert Decision Systems. The artificial intelligence (AI) based ICT environment and technologies can guide farmers and markets on the volume of seasonal commodity production of each country. However, this information could be used for regulating farm-gate commodity prices so that farms do not run into loss. Servicing of Good Agricultural Practices (GAP) in farms, information of the possible value chains of farmers' commodities in the neighbourhood, trans-national markets within the continent are few examples of deploying ICT applications. Modern agriculture technology of Asia has enlarged the utilization-potential of ICT immensely in African nations. Local capacity improvement in this sector could trigger employment generation.

Recommendations

- The project designs can be finalised after due consultation with stakeholders in the country of interest in this continent. Farmers and their groups, as 'Farm Producer companies' shall be important players in the consultation process to establish socio-economic merit of these projects. These initiatives shall

have the support of robust agricultural insurance systems and risk coverage plans through joint venture of government and private business houses.

- Modern marketing systems such as E-Commerce, future and forward markets shall support the commodities for profitable gains to farmers.
- Timely implementation would sustain costs that are envisaged as investments and can be ensured through professional project documents.
- Project implementation through globally reputed agencies would infuse professionalism and would empower African governments to establish transparent and cost-effective projects without time overrun and cost escalations therewith.

Conclusion

Exchange of expertise between the countries of the two continents could bring about mutually integrated commodity production for their markets. National food security for nutritional satiation of the African communities need to be the priority as envisioned in Agenda 2063. Advancements in Science and Technology in all modern branches of innovations could be funneled to foment the capacity and enabling policies of African nations either as sovereign or as collective missions. African nations could deliberate how this ambition can be achieved through regional cooperation within and outside African continent. Africa seems to have risen in this millennium for taking up this humongous challenge to make its own revolution in Agriculture.

The Way Forward

The immediate step shall be to organize a series of conclaves of African nations on a regional basis by the AAGC platform. This shall be steered by India and Japan with clarity on the potential requirements for the target African nations in relevance to their aspirations in making

agriculture their major growth driver. Identifying the existing gaps that decelerate agriculture in these African countries would enable the AAGC to develop new ground-plans.

The significant goal of AAGC is to reduce the nutrition and health burden on the African countries and sustain nutritional security of their population. While encouraging regional cooperation within the African Union for bringing in agricultural revolution, it would be a significant step to develop and enlarge existing trade and market systems. The African dream for attaining prosperity of the present young generation and the children in those countries with high economic and socio- political stability can be attained through very elaborate scheme to turn around the agriculture in these countries to be competitively profitable.

Native ingredients of skilled and educated citizens, modernised infrastructure, structurally transformed governance, objective security of energy, nutrition and health can spur the economic growth, and developmental needs of the African nations could be integrated with the industrialization based on agricultural processing enterprises. The growth of agriculture due to the immense and pristine natural resources including biological ones and well-structured application of science, technology and innovation in agriculture could be made sustainable to support the nutritional and health security of the people in African nations.

The AAGC may coordinate with the financial institutions of Asia and Africa along with World Bank to bring in financial inclusion to the Sub-regional growth of agriculture in relation to the climate-resilient farming systems. The financial institutions may value the natural endowments of African nations and the Sub-regional collectives and provide due support through favoured systems to enhance farm-gate value chains and improve financial stability of African farmers. The essential regional integration of African countries on the basis of the agricultural maps could promote collateral guarantee to financial institutions. The sustained economic growth might reduce poverty and improve health of people and enable the Sustainable Development

Goals of the United Nations to be achieved in the African countries. AAGC could play a realistic role with the African Sub-regional groups in envisioning a road map for agriculture that can spur regional trade and prosperity in agriculture.

Endnotes

1 http://www.scidev.net/sub-saharan-africa/livestock/opinion/strengthening-veterinary-services-benefit-poor.html

2 Framework for mainstreaming livestock in the CAADP pillars (African Union Inter-African Bureau for Animal Resources, 2010)

3 http://www.fao.org/save-food/projects/study-fl-india/en/

4 http://www.fao.org/save-food/projects/project-africaunion/en/

5 http://www.fao.org/save-food/projects/mainstreaming-flr/en/

6 http://www.fao.org/save-food/projects/swiss-ethiopia/en/

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