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ABSTRACT

India and Africa's complementary sectoral priorities and similar roles in the evolving global food markets present numerous opportunities for collaboration in the agricultural sector. This paper analyses the potential for India-Africa cooperation towards food security and capacity building. It makes an assessment of Indian partnership with African countries in the areas of agriculture and food security, outlines current initiatives in both regions, and explores possible interventions through technology-based services. The paper also looks at India's trade in agricultural products and machinery and argues that the country's investments in African agriculture need to be focused on high-impact priority areas to achieve immediate and sustainable returns.

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INTRODUCTION

Lack of food security remains one of the most formidable challenges facing the African continent. To begin with, 'food security' is not concerned solely about the amount of agricultural output; rather there are three interrelated areas that need attention: Availability, Accessibility, and Affordability.[1] Availability is a function of production, utilisation, stocks/reserves, and trade (exports and imports). Accessibility comes with an efficient distribution system across the entire country's population. Nobel laureate Amartya Sen, in his 1981 seminal work, 'Poverty and Famines: An Essay on Entitlement and Deprivation' wrote about people being "plunged into starvation" when their entitlement to food ends.[2] This implied that hunger and starvation resulted from some people not having access to enough food, not because there is not enough food available in a specific country or region. Affordability, meanwhile, is increasing the purchasing power of the rural poor so that they can buy food.

India produces massive amounts of cereal and has a huge buffer stock: according to the 4th advance estimates for 2018-2019 released by the Ministry of Agriculture & Farmers Welfare, total food production in the country stood at 285 million tonnes in 2018-2019.[3] The total stocks of wheat and rice held by Food Corporation of India[a] as of January 1, 2020 stood at 74.9 million tonnes as compared to 63.4 million tonnes as of January 1, 2019.[4] Even with such high numbers, however, many people in India go to bed hungry; although there is food available, the poor cannot afford to buy it. It is not a surprise therefore, that undernourishment is a fundamental health issue for India. According to

a FCI procures produce like wheat and rice, sometimes directly—i.e., centralised procurement, and other times under decentralised procurement in which state agencies store and later distribute the stock.

a 2019 report from the Food and Agriculture Organization of the United Nations, 194.4 million Indians (or some 14.5 percent of the country's population) are undernourished.[5]

The problem is even more complicated for Africa. Yet, the continent has the potential to not only become self-sufficient in food production but to serve as a global food basket. With the right support, African countries can leverage their resources – land, water, people, knowledge and markets – to overcome food insecurity and compete in global food markets.

Indeed, a huge 60 percent of the uncultivated arable land in the world can be found in Africa.[6] Moreover, the continent has a huge working-age population, which is estimated to increase from 705 million in 2018 to almost 1 billion by 2030.[7] At present, African food imports account for US$ 35 billion per year; this figure is expected to reach US$ 110 billion by 2025.[8] Such high level of food imports is detrimental to African economies and severely affects the agriculture sector, resulting in, among others, the massive export of jobs from the continent. Even assuming, however, an average annual population growth of three percent, food production in Africa needs to be increased by 60 percent from its current levels over the next 15 years.[9] The continent needs to increase its grain production by almost four times and its animal production by seven times, given a population of 2,200 million in 2050.[10]

At the same time, it is noteworthy that Africa's food markets encompassing agriculture and agri-business—valued at US$ 313 billion a year in 2013—could triple by 2030.[11] This means that "Africa's farmers and agri-business could create a trillion-dollar food market by 2030."[12] The growth generated by agriculture in sub-Saharan Africa alone is estimated to be 11 times more effective in reducing poverty than GDP

growth in other sectors. Agricultural growth has a multiplier effect given that 65 percent of Africa's labour force is engaged in the agricultural sector.[13]

The African Development Bank Group (AfDB) estimates that for an agricultural transformation to take place, there is a need of US$ 32 – 40 billion per year for the next ten years.[14]At present, there is only US$ 9 billion of financing available per year, leaving a gap of US$ 23 billion – US$ 31 billion.[15]

AFRICA'S AGRICULTURE SECTOR: CURRENT CHALLENGES

In the 1960s, many African countries were self-sufficient in food. However, due to various failures in policymaking, African agriculture, especially in Sub-Saharan Africa, began to suffer and deteriorate in the subsequent decades. Rather than focusing on providing food to the local populations, African governments became increasingly dependent on food aid from western governments and aid organisations. Furthermore, severe droughts, famines, protracted conflicts and never-ending civil wars worsened the agricultural situation. "Between 1970 and 1997, armed conflicts caused losses of agricultural production estimated at about US$ 52 billion, that is the equivalent of 75% of the total public aid African countries received during the same period."[16]

Another principal reason for food insecurity, according to economists such as Sam Moyo, is the historical overemphasis on export agriculture—i.e., the concentration on growing *cash crops* such as cocoa and coffee, rather than producing *food crops* for self-sufficiency.[17] As a result, Africa became a net food importer by the mid-1970s and has yet to recover since.[18]

Other analysts attribute Africa's lack of self-sufficiency in food to the Structural Adjustment Programme (SAP) of the International Monetary Fund (IMF) in the 1980s. Under the SAP, many African countries were forced to withdraw agricultural subsidies, leading to a decline in state investments in agriculture, in turn resulting in low agricultural productivity.[19]

The following paragraphs outline the most crucial challenges facing African agriculture.

Low Productivity

Although two-thirds of the African population depend on agriculture for livelihood and sustenance, the sector contributes to less than one-third of the continent's GDP.[20] A primary reason is the small size of landholdings: 80 percent of farms in Africa are less than two hectares, worked by smallholder farmers cultivating low-yield staple crops on small plots, with minimal use of inputs.[21] Moreover, as much of agriculture in Africa is rain-fed, fluctuations in production can be as high as 15-20 percent mainly due to erratic rainfall.[22]

On average, farmers in sub-Saharan Africa produce only 1,433 kg of cereal per hectare—this is less than half of what, for example, is grown by Indian farmers who are themselves not considered as high producers.[23] The cereals include wheat, rice, maize, barley, oats, millet, sorghum, buckwheat and mixed grain.

Lack of Technology Inputs

A 2019 report by the Alliance for a Green Revolution in Africa (AGRA) observed that although "Africa has more than 60 percent of the world's phosphate resources and vast reserves of oil and gas to produce

fertilizers, the African continent only accounts for 5 percent of global fertilizer consumption."[24] A large part of the fertilisers produced by African countries is exported to other regions.

The average fertiliser consumption in Africa is 16.24kg/hectare, which is one-sixth of the world average consumption of 98.2kg/hectare.[25] This is the lowest in the world, region-wise. There are various reasons for such low levels of consumption. In some African countries, fertilisers can cost up to ten times more than in other developing countries. In addition, the costs of transport and logistics are high, as those of importing raw materials. Producing nitrogen fertilisers is also costly, especially since they require a great deal of energy to produce.[26]

Poor-quality Seeds

The seeds industry in Africa is hobbled by various issues, primary of which is that cumbersome procedures often dissuade many African countries from importing seeds. At the same time, the initial costs of establishing a seed company are often very high. Once set up, these seed companies are in constant need of qualified human resources, reliable research facilities, and most importantly, access to credit.[27]Therefore, there is an urgent need for producing new seed hybrids suitable for African climate and soil on a continuous basis.

Missing Viable Value Chains

A viable value chain from the farmers to consumers is largely absent in Africa, and the level of value addition and crop processing of agricultural commodities remains low. A major reason is the low level of mechanisation in agriculture. Moreover, there are various infrastructure problems like transport to markets and poor retail

networks or sales points. Due to such impediments, post-harvest losses in sub-Saharan Africa alone average 30 percent of total production, which amounts to a loss of US$ 4 billion a year.[28]

Lack of Access to Microfinancing

Poor farmers lack the required collaterals for them to qualify for bank loans. An alternative is microfinancing, especially for the small and marginal farmers; yet this, too, is not easily accessible. Indeed, financing is required throughout the value chain—from procuring the seeds, tilling the land with machinery, maintaining the land, insuring it from uncertainties, harvesting mechanically, storing produce in warehouses, processing them, and selling in the markets.[29]

Large-Scale Farming

Since the turn of the century, foreign companies have been engaging in large-scale acquisitions of agricultural land in African countries. Research suggests that the continent remains the most targeted region for large-scale land purchases in the global South. As per Land Matrix data, a total of 593 deals comprising 15,321,960 hectares of land have been concluded in the continent.[30] Three broad trends have triggered the surge in investments in African lands for agricultural use. First, predominantly rich countries are increasingly outsourcing agricultural production for their domestic consumption. Second, the demand for agro fuels has been rising with an increase in prices of crude oil. Third, high food prices, coupled with low land prices in many parts of the world have made investments in land attractive due to higher financial returns. To be sure, however, not all investments have been successful. There are various questions on loss of livelihood and environmental degradation.

For example, the environmental impact of large-scale farming covers issues like soil erosion and degradation, release of toxic chemicals in the air, salinisation, eutrophication (i.e. oxygen depletion in water bodies), and reduction of genetic diversity in crops and livestock. At the same time, the human costs of large-scale investments can also be severe especially for certain communities. There are projects that cause the displacement and forceful eviction of people from their homes and land, without any proper relocation strategies in place. Sometimes, jobs are not created for the local people who are forced to relocate. Indeed, large-scale land acquisitions are a politically sensitive issue. Therefore, investors have an important role to play and an equal responsibility in ensuring that people's rights are upheld. A case in point is that of the Indian firm Karuturi Global's project in Ethiopia, which brought about issues related to the lease of land in the Gambella region.[31]

CURRENT INDIA AND AFRICA INITIATIVES

India

The agricultural sector plays a pivotal role in the Indian economy. Agriculture, with its allied sectors, is the largest source of livelihood in the country,[32] with around 70 percent of rural Indian households dependent on income from agriculture for livelihood and sustenance. A massive 82 percent of Indian farmers are small and marginal.[33]

Agriculture has significant linkages to food and nutritional security. Due to advances in Green Revolution,[b] India achieved self-sufficiency in food grains production by 1970s, particularly in rice and wheat.[34] Soon,

b 'Green Revolution' refers to the period of the 1950s and 1960s when the productivity of global agriculture, particularly in the Indian subcontinent and Mexico, increased drastically as a result of new advances in chemical fertilisers, high-yielding crops, and development of synthetic herbicides and pesticides.

however, it emerged that the 'green revolution' was leading to unintended negative consequences. To begin with, the benefits accrued were distributed unequally and remained concentrated in a few wheat-growing states like Punjab and Haryana. The programme also resulted in ecological and environmental problems.

The programme's reliance on the heavy use of chemical inputs and the introduction of the practice of monoculture resulted in various problems such as low water tables, vulnerability to pests, and social marginalisation. Moreover, the techniques used neglected the rain-fed areas, as well as nutrition crops like millets and non-cereals, and consequently, caused hardships to resource-poor farmers.[35] In the 1980s, there were higher incidents of violent conflicts between the farming communities, especially in Punjab, as illustrated by Vandana Shiva, an eminent environmental activist in her work. Farmers were left debt-ridden and, consequently, filled with discontent due to the degradation of soil and the heightened vulnerability of their crops to pests.[36] The Green Revolution commercialised all relations and "created an ethical vacuum where nothing is sacred and everything has a price."[37]

In the following years, India's agriculture sector continued to suffer from various problems like climate change, rapid urbanisation, and tariff wars. Eventually, other developments would play into the changing nature of Indian agriculture, including those in value chains, the emergence of startups, and technological innovations as well.

In the past, India had only focused on raising productivity and agricultural output; today the goals are different. Broadly, three overarching goals inform India's quest for agricultural development: achieving high growth by raising productivity through better technology and varieties; promoting inclusiveness by focusing on regions that are lagging and integrating small farmers and women into the agricultural value chains; and sustainability.[38]

Under Prime Minister Narendra Modi's administration, the Government of India has launched various schemes for achieving sustainable agricultural growth. The most vital paradigm shift in Indian agricultural policy is a specific focus on "profitability" rather than simply the "productivity" aspect of farming. The clearest example of this shift is the ambitious plan of doubling farmers' incomes (DFI) by 2020.[39] Various other schemes for achieving sustainable agricultural growth have been launched, including Pradhan Mantri Krishi Sinchayee Yojana, Pradhan Mantri Fasal Bima Yojana, Soil Health Card, Neem coating of Urea, and e-NAM i.e. Electronic National Agriculture Market. These initiatives are borne out of a realisation that adaptation and mitigation strategies to address climate change challenges lie at the heart of any agricultural policy agenda. Moreover, inclusive growth is impossible to achieve without nutritional security. Consequently, emphasis needs to be placed on shifting focus from calorie intake towards delivering nutrition. As a result, neglected crops such as pulses, millets and "smart crops" and "non-cereal" crops need to be paid due attention.[40]

Furthermore, digital agriculture needs to become a backbone for modern agriculture. Towards this goal, the use of Information and Communication Technology (ICT) has proven to be beneficial for timely delivery of cropping, weather, and price information to farmers. The ultimate aim for India remains the integration of Indian farmers into the modern agricultural value chains. This will not only help reduce the risks associated with intermediaries but will also augment the income of farmers.

Africa

Agriculture has been accorded high priority at the continental level by the African Union (AU), at the regional level through the Regional Economic Communities (REC), and by individual African countries in

their respective jurisdictions. Agriculture is an important part of both the Sustainable Development Goals (SDGs) and AU's Agenda 2063. The African Development Bank (AfDB) in May 2016 launched the High-5 Priority Projects for the continent:

1. Light up and Power Africa
2. Feed Africa: Strategy for Agricultural Transformation in Africa, 2016-2025
3. Industrialise Africa
4. Integrate Africa
5. Improve quality of life for the people of Africa

The 'Feed Africa' programme has the following focus areas:

- Scale up agriculture as a business through value addition led by private sector and enabled by public sector using innovative financing mechanisms
- To curb hunger and poverty in a decade with the aim of lifting 320 million people out of undernourishment by 2025
- Turn Africa into a net exporter of agricultural commodities representing the substitution of US$ 110 billion worth of imports
- Opening up Africa's agri-business which could be worth more than US$ 100 billion by 2025

According to AfDB estimates, "a sum of US$ 280-340 billion over the next decade is required in order to transform an initial set of agri value chains. Such an investment is likely to create new markets worth US$ 56-65 billion per year by 2025."[41]

Another initiative was the Comprehensive Africa Agriculture Development Programme (CAADP) adopted by the AU in 2003 to address food insecurity and poverty. The main goal of CAADP is to help African countries reach higher economic growth through agriculture-led development. The CAADP's intervention focuses on four main pillars:[42]

1. Extend the area under sustainable land management and reliable water control systems
2. Improve rural infrastructure and trade-related capacities for market access
3. Increase food supply, reduce hunger, improve responses to food emergency crises
4. Improve agriculture research, technology dissemination and adoption

A lot of work is also being done in the agriculture sector by groups such as the International Institute for Tropical Agriculture (IITA) in Ibadan, the West African Rice Development Agency (WARDA) in Bouake, and the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) in Niamey. To be sure, however, there is plenty of work that remains to be done in the form of extension activity – i.e. knowledge generated to reach the farmers.

A major continental effort is the AU-led Great Green Wall of Africa.[43] The idea for this project first emerged as early as in 2007, although it has only gained momentum in recent years. The main idea is to grow an 8,000-km "green belt" across Africa from the West to the East coast. The original idea was to have a 15-km barrier and trees to contain the spread of Sahara southwards. It has since been modified to surround Sahara from North and South. This will help provide food, jobs, and a future for

232 million Africans living in the frontlines of climate change-induced events. Around 20 African countries are part of this project, extending from Senegal to Djibouti.

AREAS OF COOPERATION FOR INDIA AND AFRICA

Both India and Africa have abundant natural resources and production potential, and therefore share a central role in ensuring global food security in the near future. Yet, food insecurity has been a major issue for both countries. In the past decade, there has been increasing awareness about the imperative of producing better food in terms of both quality and quantity.

India has coordinated with many African countries for interventions across multiple sectors such as rural infrastructure, health services, and empowerment of local communities. The Indian government supports several development programmes in this area especially in Francophone West Africa. The most important among them is the food security promotion programme, which India supports with financing and technology assistance. Various other agricultural development projects have also been undertaken by GOI in countries like Senegal, Burkina Faso, Mali, Ethiopia, Rwanda and Tanzania.

Considering India and Africa's complementary sectoral priorities, numerous opportunities exist for collaboration between them in food processing and agriculture. Although the two countries share similar sectoral characteristics, they are at different levels of maturity. Moreover, these economies have long realised the benefits of partnerships. Due to the impending global production and food security pressures, there is an urgent need to channel these investments towards high-impact priority areas in order to achieve immediate and sustainable returns.

India's approach to development partnerships is well-received in Africa and it fits in well with both the SDGs and Agenda 2063.[c] India believes in African solutions for African problems; however, India is ready to collaborate within this framework. The development partnership framework of India, hinged on three pillars–no conditionality, no prescription of policies, and no questioning of sovereignty – has received appreciation in Africa.

The following sections discuss the different aspects of India-Africa partnership in the agricultural sector.

Promoting agribusiness in Africa

The Government of India (GoI) is working to promote agribusiness in Africa by launching various incubation centres under which four main types of institutes/components have been proposed.[d,44]

1. Vocational Training Institutes/Incubation Centers

2. Agri-Business Incubation (ABI) Programme – Under this initiative, five Food Processing Business Incubation Centers (FPBICs) in countries like Ghana, Cameroon, Angola, Mali, and Uganda.

3. The Government of India has also proposed setting up food-testing laboratories in countries like Nigeria, Zimbabwe, Gambia, Rwanda, and Republic of Congo, with International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as the implementing agency.

c The Agenda 2063 is a document that was adopted by African Union member-states in 2015. It is a vision, strategic framework and an action plan that aims to create an integrated, prosperous, and peaceful Africa, owned and driven by Africans

d These four types of institutes and components have been proposed by the Government of India under the three declarations of India Africa Forum Summit

The labs have already been set up in Nigeria and Zimbabwe; work is underway in the other three countries.

4. Soil Testing and Soil Health Card – This scheme, launched in 2015, provides soil health cards to farmers. The card carries crop-wise recommendations on nutrients and fertilisers required for farms of various soil types. Countries like South Africa and Kenya have already established soil-testing laboratories.

Trilateral cooperation, civil society partnerships, and multilateral cooperation

Apart from bilateral partnership with African nations through training programmes, providing soft loans in agriculture and allied sectors for improving farming techniques, irrigation and soil quality, the GoI is also engaging in trilateral partnerships to ensure food security in Africa. Few examples include interventions through the India, Brazil, South Africa (IBSA) Fund; as well as trilateral cooperation between the Indian Ministry of Agriculture and Farmers' Welfare, the National Institute of Agricultural Extension Management (MANAGE), and the United States Agency for International development (USAID) to train agricultural practitioners from African countries on specialised practices to improve income and productivity.[45] The target countries for this initiative are Kenya, Liberia and Malawi. During the period of April-November 2018, MANAGE completed 24 US-India-Africa Triangular International Training Programmes.[46]

Furthermore, through the United Kingdom's Department for International Development (DFID)-funded Supporting Indian Trade and Investments for Africa (SITA) programme, the first Indo-Africa Agribusiness summit was organised in 2017 in Indore in which agribusiness entrepreneurs and farmers from India and African

countries came together and explored trade and investment opportunities in agriculture and food-processing sectors.[47] The main idea is to facilitate the transfer of best practices from India and understand the economic sizing of units and processing technologies adopted in India.

In terms of civil society partnerships, Indian NGOs like the Self-Employed Women's Association (SEWA), located in Ahmedabad Gujarat, have been at the forefront of facilitating sharing of knowledge and best practices between smallholder women farmers in rural India with their counterparts in African countries.[48] Through their work, SEWA has developed close associations with unions in South Africa, Ghana, Nigeria and Senegal, and has worked towards developing an integrated 'bottom-up' approach, one that helps women and their families become self-reliant and adapt to changing technologies.

At the multilateral level, India and Africa are on the same page on issues related to food security. At the World Trade Organization (WTO), both India and Africa have collaborated at the Doha Round in 2001 to guard their collective interests and protect farmers' livelihoods. Both India and Africa also agree on public food stock holdings and special safeguard mechanisms to protect low-income farmers from import surges from developed countries.

Interventions through technology-based services

As the global population continues to skyrocket, the biggest challenge is to ensure a secure food system. Towards this end, the advances in digital technologies will have a massive impact on the agricultural sector, particularly as more and more sophisticated technologies and agri-tech companies and startups emerge.

a) No-till farming: One of the foremost innovations in conservation agriculture is no-till or zero-till farming. The essence of this form of agriculture is that it prepares the land for farming without mechanically disturbing the soil and retains crop residues on the soil surface. This technique of direct seeding, one that uses less soil is pertinent in the African context. African rocks are one of the oldest in the world and consist mostly of granites and gneiss. This implies low soil fertility and land degradation. Therefore, farming techniques that do not disturb the soil are a boon. It is here where the success story of zero-till agriculture in the Indo-Gangetic plains—as showcased by increase in rice/wheat yields—can be emulated in African countries. This method of farming is already being practiced in Kenya and Uganda.[49]

b) India's contribution in seed technology: For African countries, production of quality seeds is a pressing challenge. In order to feed the entire continent, Africa needs to double the production of seeds by 2050.[50] Indian companies have partnered with African companies in an attempt to provide improved quality seeds at affordable prices. An important advantage which Indian seed companies in Africa possess is their experience in dealing with small-scale farming and complex rural marketing systems.[51] A good initiative in this sector is the 'India-Africa Seeds Bridge' project which aims to provide quality seeds to African farmers and create a space for Indian seed companies in African markets. The main beneficiaries under this project are Liberia, Kenya, Malawi, and Senegal.

However, it is important to note that, according to Chaturvedi et.al (2016), India accounts for only 1.46 percent of the annual seed exports to Africa.[52]To begin with, Indian seed companies face stiff competition from their counterparts in China, Brazil, and the West. Second, the African seed market is highly segmented for different crops and seed technologies. Third, Indian companies lack sufficient knowledge about

African markets. Therefore, in order for Indian companies to overcome regulatory and policy barriers, India and the African countries need to collaborate closely. Some of the bigger Indian companies that are working in this sector are J.K. Seeds, Namdhari Seeds, Nuziveedu Seeds, and Nath Seeds. The main aim of these companies is to experiment on production of hybrid seeds like sorghum, millet, rice, maize, and vegetables.

c) Precision farming: The importance of collecting real-time data on weather patterns, crop maturity levels, soil health, and correct equipment cannot be overemphasised for helping farmers take timely and informed decisions. Precision farming is a management system that is information and technology-based, is site-specific, and uses one or more of the following sources of data: soil, crops, nutrients, pests and moisture, for optimum profitability, sustainability and protection of the environment.[53] In India and Africa, where most of the farm holdings are small, precision agriculture techniques such as global positioning system (GPS) and technologies such as sensors and remote sensing techniques can help in providing geographic coordinates of the fields, evaluating soil and crop health, and collecting data from a distance.[54] Furthermore, many ICT tools can be utilised to provide relevant information to end-users such as mobile apps, SMS services, and web-based information systems. Therefore, given that both the Indian and African precision farming markets are expected to grow in the coming years, it is mutually beneficial for both the regions to collaborate in this space.

d) Contract farming: Contract farming is an important aspect of agribusiness. In this method, an agreement is reached between farmers and processing and/or manufacturing firms for the production and supply of agricultural products, at predetermined prices. Farmers benefit through assured markets for their produce. It is vital for African smallholder farmers as they derive the maximum benefits from their produce and are provided the necessary technical assistance. In India,

there are various private sector agro-based food companies that require continuous supply of raw materials. To make it a mutually beneficial situation, these companies can enter into contract farming agreements with African counterparts by providing supply of inputs and technical expertise, and in return are assured of continuous supply of raw materials. Typically, the agricultural commodities in which contract farming is practiced include wheat, basmati rice, fruits and vegetables, medicinal plants, poultry and dairy. The Government of India has already entered into contract farming model with Mozambique for the import of 100,000 tonnes of pulses.[55] Other possible partners are Tanzania, Malawi and Kenya.

e) Drip Irrigation: This low-cost irrigation technology saves water and fertilisers by allowing water to drip slowly to the roots of different plants, either onto the soil surface or directly onto the roots, through a network of valves, pipes, emitters and tubing. In Africa, a huge percentage of water withdrawals are directed towards agricultural use, especially in the arid and semi-arid regions of the continent. Moreover, only few African countries can afford the necessary financial investment in efficient irrigation systems. Therefore, focusing on low-cost drip irrigation systems is mandatory for African countries, and this is where India has garnered sufficient expertise. Indian companies like Jain Irrigation, Netafim, Kisan Irrigation, Finolex Plasson, and Indian institutions like the Central Institute for Cotton Research, have successfully developed low-cost irrigation systems. African countries can collaborate with such companies and there are already certain examples of these projects.[56]

India-Africa trade in agricultural commodities and machinery

Trade in agriculture and its allied sector products between India and Africa has been growing steadily over the years. The India-Africa

agricultural trade was registered at US$ 5.3 billion in 2017, just marginally up from the level of US$ 5.2 billion in 2013.[57] In terms of African exports of agricultural goods to India, topping the list are edible fruits and nuts; peel of citrus fruit or melons, followed by 'Edible vegetables and certain roots and tubers', 'Coffee, tea, mate and spices', Oil seeds and oleaginous fruits', and 'Cocoa and cocoa preparations'.[58]In terms of Indian exports of agricultural products to Africa, there is immense trade potential between Africa and India in certain products like cereals; sugar and sugar confectioneries; prepared animal fodder; coffee, tea and spices; and miscellaneous seeds, grains and fruits.

The African continent has a lot of arable land. However, although Africa is a huge producer of agro-commodities, much of its land continues to remain underutilised due to low application of farm machinery equipment. Therefore, the agricultural sector in African countries requires substantial mechanisation that will improve efficiency and increase the productivity of the farming enterprises. India has experienced considerable expertise in this domain and can collaborate with African countries. Out of the top ten export destinations of Indian agro-machinery products in 2017, two African countries are in the list: Kenya and South Africa.[59]

Although India has a negative trade balance with Africa in terms of its overall trade, owing primarily due to its overdependence on oil (crude and petroleum) and natural resources, India has a huge surplus in machinery related to agriculture and agro-processing. India has barely imported machinery products from Africa but has been exporting consistently to African countries over the last decade (See Figure 1 in annexure). These items include various products such as tractors, of an engine power ranging from 18 Kilowatts to 75 Kilowatts; road tractors for semi-trailers; parts of machinery for industrial preparation or manufacture of food or drinks; parts of agricultural, horticultural or

forestry machinery for soil preparation or cultivation; machinery for sugar manufacture; and machinery used in the milling industry.

Indian investment in African agriculture

The agriculture and its allied sectors drive an important part of Indian investments in many African countries. Broadly, three factors inform Indian agricultural investment in the African continent (Ndiaye, 2016). First is the quest for food security, since growth in population has not corresponded with a similar growth in agricultural production. The second factor is the lack and depletion of water resources, and third is the high rate of return of investments made in Africa, which relates to the low costs of factors of production.[60] It is important to note that African agricultural financing needs are not limited to the pre- or post-production stages, but are required throughout the value chains: from procuring the seeds, tilling the machinery, to selling the produce in the markets. Therefore, in order to meet this host of demands, financing agriculture-related infrastructure and providing technology hold the key. In this respect, India's Export-Import (EXIM) Bank has been extending several lines of credit to financial institutions, sovereign governments in African continent in various sectors, including agriculture. "As of March 31, 2017, Africa's share in the total value of EXIM Bank's LOC program stood at US$ 7.51bn – of which more than US$ 1.65bn has been to the agricultural sector alone."[61]

Table 1 in Annexure shows the details of Indian companies that have invested in African agriculture. In addition, Table 2 offers a snapshot of major investment destinations with key investment areas within the agricultural space for Indian companies.

In May 2017, the 52nd Annual Meeting of the African Development Bank (AfDB) was hosted in Gandhinagar, Gujarat. The core theme of the

event was "Transforming Agriculture for wealth creation in Africa." One of the most important takeaways from the event was that 13 African countries, including Zambia, Mozambique, Togo, and Ghana, signed agriculture industrialisation partnership agreements with India to enhance the supply of agricultural machinery, credit advancement to farmers, and scientific cooperation.[62]

Leasing of land by Indian firms in various African countries is also common. Indian firms have acquired over 600,000 hectares of land in Africa for commercial farming.[63] These companies grow varieties of crops and cereals such as maize, palm oil, edible oil, cotton, rice to export back to India. Ethiopia has emerged as one of the most favourable commercial farming investment destinations for India. However, it is important to note that leasing of land is a politically sensitive issue. Companies like Karuturi Global's massive land leases in Ethiopia's Gambela region have been accused of land-grabbing and displacing people without creating jobs for the locals or enhancing food security; their projects also reportedly cause environmental degradation.[64] In the future, land deals involving Indian companies in African countries need to uphold human rights and be socially, culturally and politically accountable, environmentally friendly, and economically mutually profitable. Indian companies have to be sensitive to local problems if India and Africa are going to engage in mutually beneficial long-term cooperation.

Some Indian farmers from the state of Andhra Pradesh and Punjab have also taken land on lease and have migrated to those African countries. The Andhra Pradesh government has sent about 500 farmers to cultivate 50,000 acres of land in Kenya and 20,000 acres in Uganda.[65] One of the success stories of Indian investment in Africa is the Kirloskar Brothers Limited irrigation project in Senegal that helped the country's rice production to increase by six times to over 660,000 tonnes.[66] This

model can be replicated in other African countries. Overall, India has committed to raise credit facilities for African agriculture. The largest Lines of Credit (LOC) approved by EXIM Bank outside of India is with Ethiopia (US$ 640 million) for its Tindaho Sugar Project.[67]

Overall, the Public Private Partnership (PPP) model is best suited for Indian investments in African agriculture and allied sectors as it will allow both the public and private sectors to align their respective interests and share the risks associated with investments in a challenging economy like that of Africa. For its part, the private sector is crucial for providing financial resources that are critical requirements for strengthening value chains and enhancing sustainable productivity. The public sector is also important as it provides the private sector with an enabling environment to function, by revamping the existing policies. Farm technology, food processing, and irrigation facilities are the most important areas for Indian private firms to invest in Africa.

CONCLUSION

India and Africa's partnership goes beyond strategic concerns and economic benefits. The partnership is poised for achieving the greater goals of shared prosperity and food security for all. A vibrant agriculture sector is crucial in generating sustainable economic prosperity in both Africa and India, and is key to the twin goals of achieving food security and alleviating poverty. Food security and agriculture need to be accorded high priority in the fourth edition of the India-Africa Forum Summit (IAFS). Originally scheduled in September 2020, the summit will likely get postponed because of the ongoing Covid-19 pandemic.

Due to the existence of small and marginal farmers in emerging and developing economies like India and Africa, pure market forces do not work as they do in other developed countries. Therefore, the imperative

is for an integrated rural development approach, which will further help augment the incomes of the farmers through other activities like animal husbandry and rural crafts and industry. Innovative methods of microfinancing for small and marginal farmers need to be adopted to boost agricultural production. However, there is a need for substantial improvements in infrastructure, particularly for roads and transportation to enable a viable value chain to operate.

Although Africa has 60 percent of the world's arable land, the continent produces only 10 percent of the global output. During PM Narendra Modi's historic address to the Ugandan parliament in July 2018, cooperation on agriculture sector was declared as one of India's ten guiding principles for India's engagement with Africa. Therefore, strengthening capacity building in agricultural sector, and ensuring food security will remain a priority for India and Africa's partnership.

The ongoing Covid-19 pandemic has brought the issues of food security and malnutrition, especially for poor countries, at the forefront. It has not only resulted in a drop in foreign exchange earnings and export restrictions, but is now threatening to severely disrupt agricultural value chains. Such a situation will place Africa and India, with their huge demographics, in the crossroads.

Furthermore, millions of locusts are plaguing and decimating thousands of acres of crops in East Africa, Horn of Africa, and Western India, thereby threatening their already-fragile food security. The most effective method of battling locust swarms is by aerial spraying of insecticides. Drones and other specialist equipment are also being deployed in order to monitor activities. India has insecticides manufacturing units in several countries. If African countries place the demand, then India will be ready to ramp up production. Only time will tell what a post-pandemic future will behold for India and Africa. ORF

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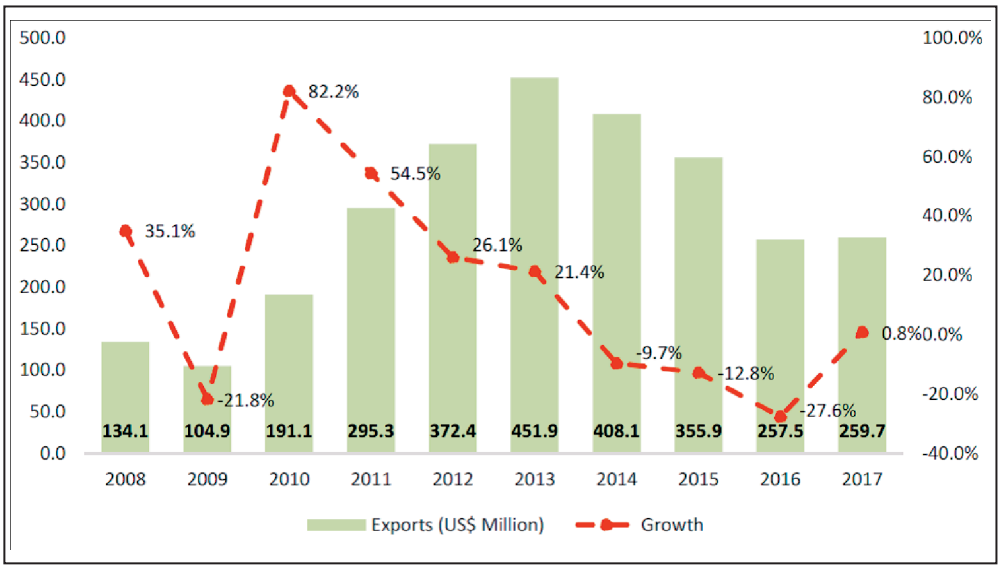
ANNEXURE

Figure 1: India's Exports to Africa of Machinery Relating to Agriculture and Agro-processing



Source: Export-Import Bank of India, "India-Africa Partnership in Agriculture and Farm Mechanisation" Working Paper No 89, p.48, June 2019.

Table 1: Select Indian Companies with Investments in Agriculture in Africa

Country	Indian Company	Details
Ethiopia	Karuturi Agro Products Plc	Acquired 100,000 ha in the Jakao and Itang districts of Gambela region for growing palm, with conditional option to acquire another 200,000 ha. This contract was eventually cancelled in 2017. However, after diplomat ic interventions by Indian Government and lawsuits filed by the company, a new deal for 15,000 hectares has been offered to the company in June 2019 for conducting agricultural activities.
Rwanda	Mcleod Russel	Owns five tea estates in Uganda and two estates in Rwanda
Ethiopia	Ruchi Soya Industries	Acquired 25 year lease for soybean and processing unit on 152,649 ha in Gambela and Benishangul Gumaz States
Ethiopia	Chadha Agro Plc	Acquired up to 100,000 ha in Guji zone in Oromia Regional State for a sugar development project
Gabon	Olam International	Acquired 30,000 ha in Gabon for palm oil
Rwanda and Uganda	Jay Shree Tea & Industries	Acquired two tea plantations in Rwanda and one in Uganda
DRC and Ethiopia	ACIL Cotton Industries	Plans to invest nearly $15 million (Rs. 68 crore) for land leases to start contract farming pulses and coffee
Ethiopia	Neha International	Leased land in Oromia region – in Holetta for floriculture and near Bako for rice, maize, oilseeds, and pulses
Mozambique	Nirmal Seeds Mozambique	Leased or purchased 2,000 ha of land in 2013
Madagascar	Varun International	Varun Agriculture Sari leased or purchased 232,000 ha to grow rice, corn, and pulses

Ethiopia	Sannati Agro Farm Enterprise Pvt. Ltd.	Acquired 25 years lease on 10,000 ha in Dimi District, Gambela region, for cultivation of rice, pulses, and cereals
Ethiopia	Vedanta Harvests Plc	Acquired a 50 year lease for 5,000 ha in the Gambela region for a tea and spice plantation

Source: Feed Africa: Achieving Progress Through Partnership, Export Import Bank of India Working Paper 63, 2017, p.43.

Table 2:

Major investment destination in agricultural space	**Strategic advantages from investment focus**
Ethiopia	Strong production belt for coffee, oilseeds, spices and grains
Cote d'Ivoire	Strong production belt for cocoa, coffee, palm oil and cashew nuts
Tanzania	Large commercial farming space; Strong production of coffee, tea and oilseeds; and Processing and packaging opportunities
Malawi	Strategic location with access to multiple markets like Mozambique and Zambia
Cameroon	Agriculture accounts for more than half of the country's non-oil export revenues; Strategically situated among countries that could use its exports, viz., Chad, Gabon, Nigeria

Source: "India-Africa partnership in agriculture: Current and future prospects" PricewaterhouseCoopers, p.9, 2016. Accessed on March 16, 2020.

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