

## Review Article

# Technical Promotion and Poverty Reduction: A Review of China's Efforts in Africa

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## Abstract

This study is an overview of the effectiveness and challenges of China's Agricultural Technology Demonstration Centre (ATDC) in Africa. The Chinese government aims to enhance Africa's self-reliance capacity through ATDC. It is an aid approach with typical Chinese characteristics combining aid and commercial activities. The paper analyses the structure and function of ATDC, followed by a case study in Tanzania to highlight the efficiency, effectiveness and challenges in the current scheme. To identify institutional prescriptions, we performed a comparative analysis between ATDC and the technical support provided by Japan, the United States and Republic of Korea to Africa. The results show that it is necessary for international development assistance to emphasize African countries' national agricultural strategy or regional development plan. It is crucial to balance and coordinate technological promotion efforts, poverty reduction efforts that target agricultural and rural development as well as infrastructure assistance in African countries. Trilateral cooperation and community pilot projects with local experts, private investments and international partners can facilitate technical demonstration and poverty alleviation. In particular, a sound monitoring and evaluation system should be developed to evaluate the effectiveness of and stimulate the progress of the technological promotion and poverty reduction in Africa.

**Keywords:** Rural poverty; Agricultural development; Economic transformation; Poverty Reduction; Resilience; China-Africa

## Poverty and Agriculture Development in Africa

### Overview of poverty

According to the 2014 Human Development Report, around 72% Africans (558 million) still live under international poverty line and lack basic services, such as education and medical treatment. The report also indicated that although significant progress has been made in Sub-Saharan Africa, it is still one of the world's most under-developed regions.

In the past decades, poverty rate of Africa has been on the decline. The proportion of people living on less than \$1.25 a day in Southern, East, Central and West Africa decreased from 56.5 percent in 1990 to 48.5 percent in 2010. In the same period, the population in Africa increased by 65.08% from 0.63 billion to 1.04 billion [1]. Despite the drop in poverty rate, the total number of African people (excluding North Africa) living below the poverty line (\$1.25 per day) increased from 290 million in 1990 to 376 million (1999) and 414 million (2010) Figure 1.

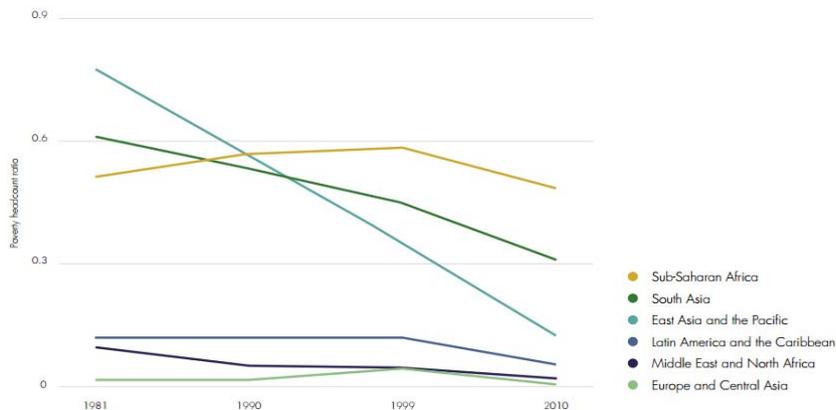
In addition, poverty reduces disproportionately across African countries. As is shown in Figure 2 and 3, countries with a poverty headcount ratio of 50% or more are: Democratic Republic of Congo, Liberia, Madagascar, Burundi, Zambia, Nigeria, Malawi, Rwanda, Tanzania, Central Africa, Mozambique and Sierra Leone. Countries with over 15 million of population in poverty are Nigeria, Democratic Republic of Congo, Tanzania, Ethiopia, Madagascar and Kenya.

### Rural and agricultural development in Africa

Agriculture and agribusiness in total are projected to be a US\$ 1 trillion industry in Sub-Saharan Africa (SSA) by 2030, compared to US\$ 313 billion in 2010. They account for nearly half of the gross domestic product (GDP) in Africa, where agricultural production is the most important sector, contributing to 24 percent of the GDP on average. Therefore, rural and agricultural development is a significant component of the grand scheme of poverty reduction in Africa.

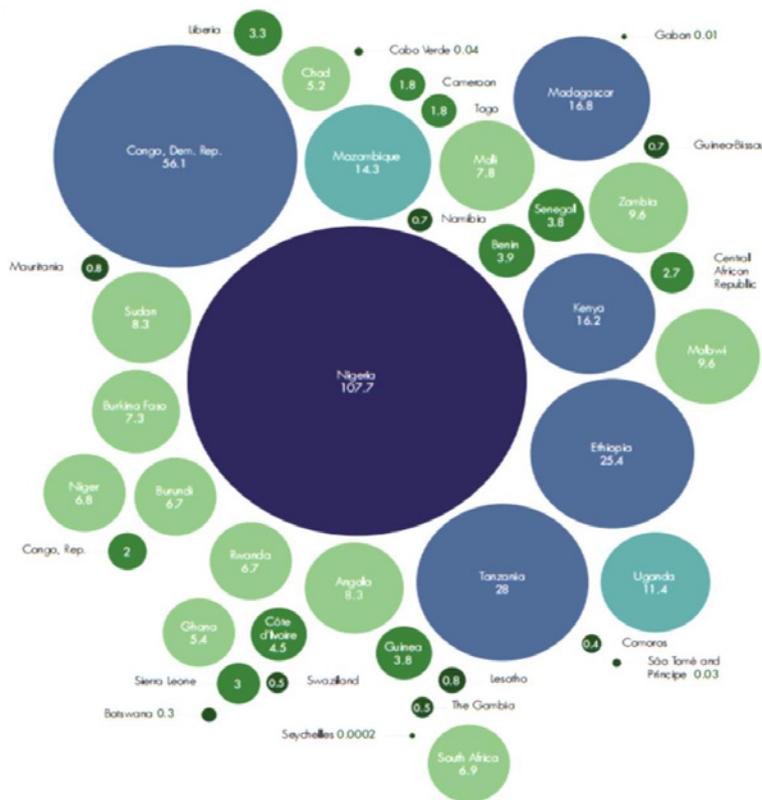
However, African agriculture and agribusiness are underperforming, and are losing competitiveness. The share of African agricultural export in the global market fell from over 7% in 1970s to 2% in 2009. Poor competitiveness in turn results in low and stagnant productivity. For instance, crop and livestock yields are half of the average in Asia and Latin America. This can be partly explained by infrequent use of more productive factors, such as improved seed, fertilizer, and irrigation etc. In Africa, growth in agriculture derives largely from land expansion, which may exert negative impacts on the environment. Constraints to the development of agribusiness in Africa have been studied extensively and can be classified into four broad categories:

- (i) Erratic policies in agricultural output and input markets and trade [2].
- (ii) Limited access to individual ownership of the land and respect for community land rights [3].
- (iii) Poor infrastructure and high transportation costs.



Source: The World Bank Group (2014), PovcalNet

Figure 1: Africa's poverty rate is falling.



Source: Brookings Institution and Africa Progress Panel research.

Figure 2: Mapping poverty across Africa: estimated number of poor by country.

(iv) Difficulties for smallholders and small firms to access technologies, information, skills, and finance; Confronted with the bottlenecks, solutions have been proposed to address these.

In the World Bank report “Growing Africa: Unlocking the potential of agribusiness”, facilitating access to inputs and technology is suggested to be included as a crucial part of the development agenda, in addition to improving performance of output markets, upgrading infrastructure, and additional financing for agribusiness.

Moreover, wider uptake and application of more productive inputs is highly recommended, with the support of market development.

Considering the significance of agriculture for economic development in Africa, development aid agencies, as well as emerging South aid providers, including China, start to enhance cooperation in this sector.

China is a large agricultural country, it has achieved self-

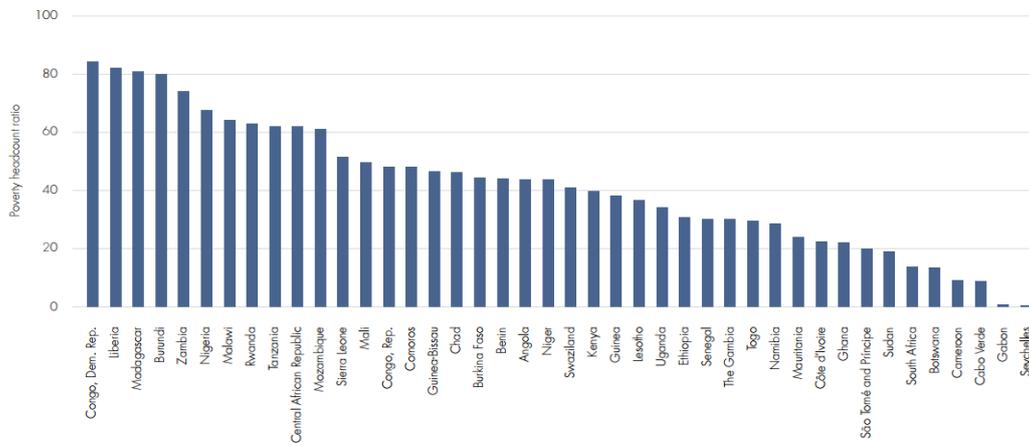


Figure 3: Poverty varies countries: estimated poverty rates (%) in 2010.

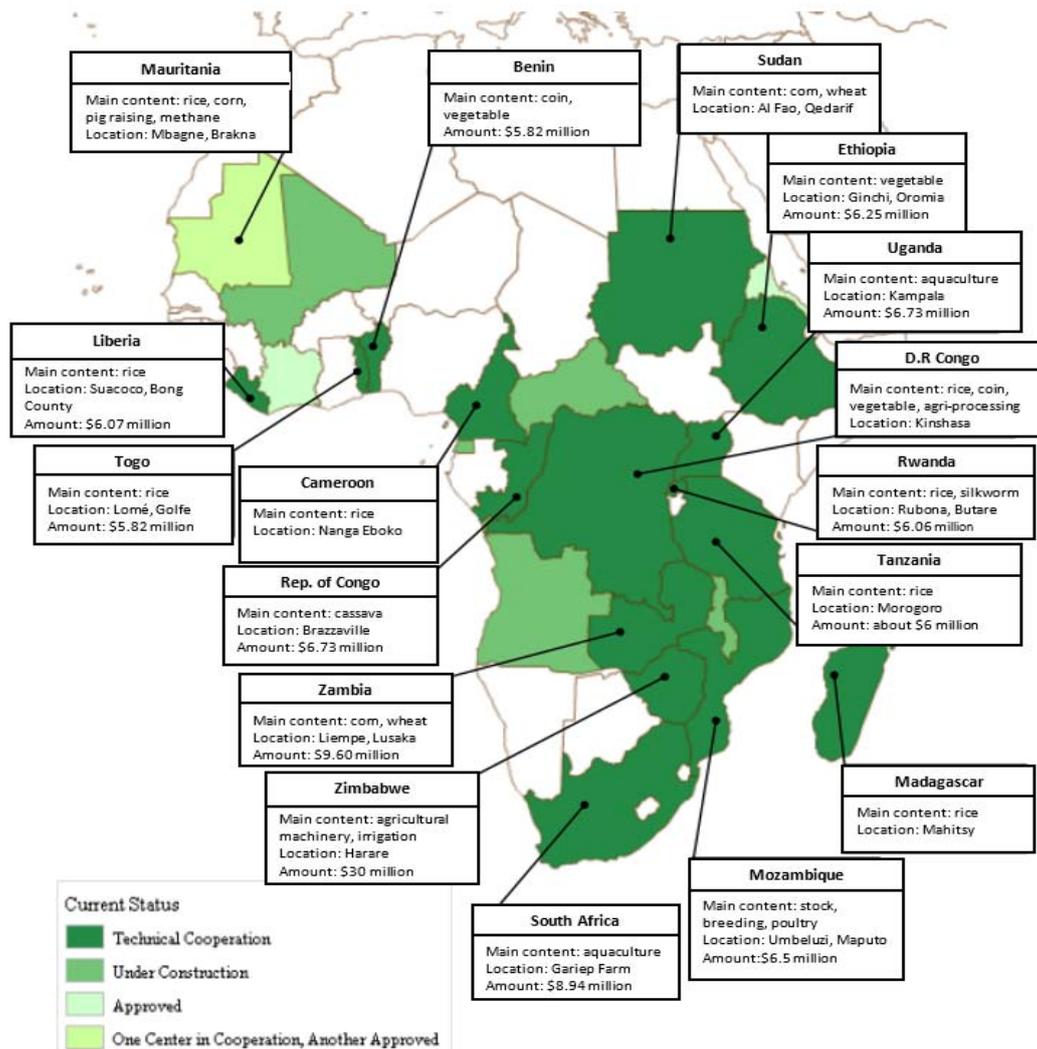


Figure 4: Overview of China's ATDCs in Africa. Source: own research 2015 © United Nations Development Programme.

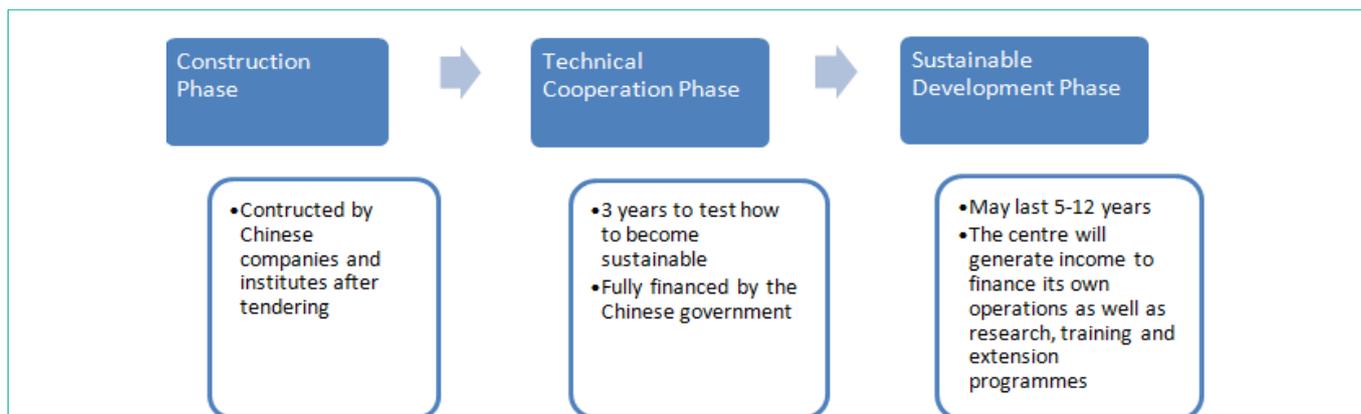


Figure 5: Common stages of ATDC establishment.

	Phase I (2014-20)	Phase II (2021-25)	Phase III (2026-30)
Farmer	Yield of crops increases through transformation of practice into fixed farming.	Yield further increases by improvement in farming technology. Crop diversification starts.	Farmers are well-empowered to improve their farming. Diversification of agriculture expands, and some farmers specialize in specific crop.
Business Cooperative	Involvement of farmers in agribusiness starts.	Participation in agribusiness is strengthened by fostering a sound farmers organization.	Agribusiness development makes a considerable progress, and many agricultural clusters are established.
Business	Private investment in agribusiness starts in consistency with PRAI	Private investment in agribusiness expands, and the development of agricultural cluster starts	

Figure 6: JICA'S master plan for agricultural development.

sufficiency in grain through carrying out policies favorable to farmers, improving agricultural technology and innovation for promoting food production. Since the first Forum on China-Africa Cooperation (FOCAC) in 2000, the Chinese government has put agricultural cooperation with African countries in place, among many other cooperation areas. During the Beijing Summit and the 3<sup>rd</sup> Ministerial Conference in 2006, the proposal of establishing 10 agricultural technology demonstration centers (ATDCs) in Africa and sending 100 senior experts on agricultural technologies to Africa were listed in the FOCAC Action Plan (2007 - 2009). The target number for ATDCs was increased to 20 during the 4<sup>th</sup> FOCAC in 2009 and China committed to building more ATDCs in Africa in the 5<sup>th</sup> FOCAC in 2012.

The next section aims to provide an overview of China's ATDCs in terms of its location, function, and the challenges faced.

## Overview of China's ATDCs in AFRICA

### Current status of ATDCs development

Since 2006 till now, China has established 14 ATDCs in Africa. In addition, there are 11 ATDCs under construction or being approved (Figure 4).

### Institutional set-ups and operations of the ATDCs

The aim of the ATDCs is to enhance Africa's self-reliance capacity, given that the centers are maintained after being transferred to the host government or agencies. The centers embed an aid approach with typical Chinese characteristics; namely they combine aid and commercial activities. From the Chinese perspective, business is seen as a more sustainable way of engaging in agriculture in Africa because pure aid approaches are not profit-driven, thus tend to die out after a project is completed [4]. This approach is based on China's domestic agriculture development experience and the lessons learnt from historical engagement in African agriculture during the 1950s, when the focus was on large state-owned farms with highly political value, which failed to maintain a sustained economic impact in the long run.

Chinese companies and institutes, which are selected via a competitive tender system in China, would build the centers, and the Chinese aid budget would pay for equipment and Chinese personnel would help run the budgets for a period of time (normally three years). During this period of time, Chinese companies and institutes would seek out income-generation activities, including commercial opportunities that would enable the centers to generate revenue, thus sustain themselves in the long term (Figure 5).

The Ministry of Agriculture and Ministry of Commerce in China originally conceived the grant-financed agro-technology demonstration centers as an experiment. This experimental approach is an example of foreign aid coupled with mutually beneficial cooperation. It is based on a responsibility system that has been widely practiced in many of China's own domestic government centers and agencies, as evidenced in the operational models of most research institutes in China [5]. The functions of the centers include experimental studies, which showcase successful technology and production methods from China, all-round technical training for agricultural personnel, students by means of lectures, demonstrations, field visits and expert coaching, as well as sustainable development for commercializing its activities to support research and training as well as its operations.

### Challenges faced by the ATDCs

It is pointed out that in practice success in demonstration centers does not necessarily lead to higher yields and production in common farmers' lands. The promotion and application of the production technologies need a well-thought- and designed technical promoting system as well as powerful and vigorous support by the state, so that technologies can be widely disseminated to the targeted group. However, lack of basic infrastructure and productive factors, such as fertilizers and machinery, impedes production in many countries, due in part to the fact that the distribution system for these is absent or does not work well. This remains a challenge, especially for the poor who have difficulties of access induced by information asymmetry.

Adding to the challenge is that the Chinese Government has not formulated a set of systematic, standardized and scientific project assessment system for the aid projects, including the ATDCs, to supervise and safeguard the overall performance of such projects. To address these, some initiatives such as working at the village level with farmers directly has been piloted to promote technologies. There are also plans to conduct comprehensive impact assessment to review ATDC's social impact and its contribution to local communities' development as well as poverty reduction.

Despite that there are some preliminary results showing satisfactory outcomes of the centers, studies are scant with regards to overall impact evaluation.

According to a study by the World Bank, advanced technology introduced in developing countries typically reaches only 5% penetration before it stalls. It does not disseminate further until older foundational technologies catch up. Thus, scaling-up current practices and technologies are just as important as introducing new ones. In *What Technology Wants*, Kevin Kelly quoted the Economist, "Countries that failed to adopt old technologies are at a disadvantage when it comes to new one." The suggestion is based on the rationale that technologies require a sequence of developments to reach a particular stage. Thus, a stock-taking exercise of current technologies and practices is of utmost necessity before new ones are developed, so that the adoption level can be maximized. The next session reviews a case study of China-Tanzania Poverty Reduction Center which was initiated by the International Poverty Reduction Center in China (IPRCC) together with the Tanzanian government.

## Case Study: China-Tanzania Village-Level Learning Center for Poverty Reduction

### China-Tanzania effort

Agriculture and especially smallholder agriculture is central to any success in Tanzania's economic transformation journey. Agriculture remains the mainstay of the economy and principal source of livelihood for the majority of Tanzanian people. Agriculture contributes to about 24.1 percent of the GDP and employs about 75 percent of the labor force. Similarly, smallholder farming caters for up to 95 percent of the country's total food requirement. Despite this critical importance of the agriculture sector, its annual growth rate has stagnated at about 4.3 percent in recent years. Given the high average population growth rate of 2.6 percent, and lack of rural-based industries, it is obvious that the growth of the agriculture sector remains too low to make a significant dent on poverty in the country.

In 2011, the government of China and Tanzania agreed to set up a rural economic transformation and poverty reduction demonstration learning center in a village in Tanzania. It intends to bring to and test Chinese experience in developing household based agriculture for poverty reduction with Tanzania small holding farmers. Purpose is to build and enhance capacities of both the small farmers and village communities to develop financially viable, environmentally friendly labor intensive farming systems with high productivity for securing food as well as generating income for farmers.

**Peapea village:** The Peapea village located in Rudewa Township, Kilosa County, Morogoro Region, 360 kilometers away from Dar es Salaam. The village has 4 hamlets (sub-villages), 2481 persons (around 454 households). It has 606 labor, of which 408 males and 198 females. There's one public and private (under construction) schools. The major activities of the village are cropping, livestock (serious disease for chickens), workers and wage labor in China State Farms Agribusiness (Sisal Farms). The food shortage period normally happens from November to February. Christians and Muslims villagers live in peaceful co-existence.

The Peapea village in Kilosa district was identified jointly by the International Poverty Reduction Center in China (IPRCC) and the Planning Committee of Tanzanian President's Office to be a village-level pilot project. The experts from College of Humanities and Development, China Agricultural University (CAU) and China-Africa Agricultural Investment Co., Ltd. (CAAIC) provide technical support to the project.

In August 2011, a pre-demonstration field investigation was carried out through participatory approach; the farmers together with the consultants identified the following demonstration content to be focused on the issue concerning crops, machinery, fertilizer, and livestock. The main crops in the Peapea village were maize (820 acres), rice (581 acres), sunflower (33 acres) and sesame (21 acres). The maize and sunflower were selected as the main demonstration items for crops and intercropping was also selected. Due to lack of machinery, over 80% farmers ploughed the land manually using hoes and 90% of arable land of the village was deserted. This largely constrained the productivity and production volume. Affected by lack of machinery, the spacing (between plants and between rows) was not uniform and the density of planting was low (eg. 10,000 plants per

acre for maize, only half of the density in China). This also negatively affected the production and made weeding more difficult. Therefore the machinery was selected. In terms of fertilizer use, there's no habit of using fertilizers which constrained the production. Thus the pilot of fertilizer was selected. Also only around 20-30 families raise cows or goats and there was considerable risk of being stolen or getting ill. Every family raises hens and is for self-supply only. Hence the livestock was selected to improve livestock productivity.

### Efficiency and the effectiveness assessment

In the case of crop demonstration, 31 farmers were selected and endorsed by the village committee to participate in 2013 maize demonstration with one acre of land each demo farmer. Significant increases in maize yields were found between demo farmers and non-demo farmers [6]. A 124% increase was seen in 2013, while the yield increase got 169% in 2014. Since the introduction of the new farming system at Peapea village, productivity has increased from 4 bags of maize per acre to 23 bags. The new agricultural practices promoted the yields per acre of farmland by more than 120-150 percent with improved agronomic practices. Profit per area of land has also increased by more than 100 percent.

In case of farming practices, the planting/sowing of using improved varieties of S taha and Situ ka<sup>-1</sup> was demonstrated and then practiced by individual demo farmers by using special planting ropes to ensure a spacing of 30 cm x 75 cm with just one plant a hole for obtaining better nutrition from soil. Compared with traditional wide spacing planting (80cm x 90 cm with 3-4 plants a hole), thinning of excessive plants was demonstrated. And the demo farmers were educated to do an intensive farm management, such as weeding twice a week.

In summary, during the experimental period between 2013 and 2014, the yield per acre farm land increases by more than 120-150% with improved agronomic practices. The land productivity increases due to increased yield per area (e.g. 1 acre farm land) and the profit per area land increased by more than 100%. According to the survey conducted by the CAU with neighboring villagers, the demo farmers sustain their learned practices, other farmers also learn from demo-farmers. These initial findings show that the Labor intensive, capital saving sustainable farming is working in Peapea village and China's experience of developing small holding agriculture for poverty reduction is relevant as well [6].

### Challenges and opportunities

Although the China-Tanzania efforts have gained achievements, the development process is retarded due to lack of farmers' incentive. Also, the influence of demonstration needs to be increased. Skepticism regarding the effect of the demonstration center is grounded on the limited influence. Numbers of recipients of both crop demonstration and livestock demonstration are small and represent only a tiny fraction of Tanzanian population. Thus, the scaled up methodology needs to be discussed and feasibility studies in other areas should be conducted.

## Comparative Study between China's and other Countries' Efforts

Agricultural support on the African continent comes in various

forms and stems from a range of actors. In addition to China's Agricultural Demonstration Centers, German's GIZ and Japan International Cooperation Agency (JICA) have assisted in agricultural development in Africa through land and water management. Britain's Department for International Development (DFID) is equally greatly involved in the water sector. Swiss Agency for Development and Cooperation (SDC) and US Agency for International Development (USAID) ensure market access to African stakeholders in the agriculture market. According to the above discussed challenges and opportunities, we here have a look at the technical support by Japan, United States and Republic of Korea.

### Japan

JICA has operated in Burkino Faso, Djibouti, Ghana, Comoros, Kenya, Madagascar, Mozambique, Rwanda, Senegal, Sierra Leone, South Africa, South Sudan, Sudan, Tanzania, and Zambia. Agricultural cooperation projects have taken place in Cameroon, Ethiopia, Malawi, and Nigeria. JICA generally teams up with local research centers in the area of appropriate technology and other jointly selected topics. JICA has also partnered with regional agricultural research institutes, universities, representatives from Ministry of Finance and Economic Development or Ministry of Agricultural and Rural Development, Head of Technical Department of Extension Research and Farmer Linkage Coordinator (EIAR), NGOs and directly with farmers. The Farmer's Research Groups provide technical and innovation, participatory research, a platform for concerned stakeholders to collaborate easily to find solutions along value chain and combines local and scientific knowledge in order to make it client-oriented. The technical cooperation comes in many forms, yet there is a big emphasis on expert field-training for farmers and establishing demonstration centers that construct irrigation canals. Other forms of assistance comes in the form of official Development Assistance (ODA) loans, grant aid, citizen participation and public-private partnerships.

### Mozambique

In collaboration with Brazilian Cooperation Agency (ABC), JICA has utilized Triangular Cooperation for Tropical Savannah Agricultural Development in Mozambique, which includes both a Technical Cooperation Project for the Demonstration and Rural Extension and the Project for Improving Research and Technology Transfer Capacity and the Development Study. Mozambique Ministry of Agriculture is the counterpart in the development study. All parties incorporated private sector interest into the projects implementation by promoting private sector involvement for the development of the Nacala Corridor through investment. ABC and JICA stressed a public-private partnership mission to Mozambique.

- The first goal was to support family farmers, especially small scale farmers, by incorporating Mozambican nation strategies such as the Strategic Agriculture Plan 2011-2020 (PEDSA) and Principal of Responsible Agricultural Investment (PRAI) to support and developing an inclusive model of agricultural regional development focused on small, medium and large scale farmers.

- The second goal was to formulate an agricultural development Master Plan to engage private investments to promote sustainable production and poverty reduction. Pro-Savana's new model of

sustainable agricultural development in the tropical savannah region of Mozambique continued to stress preservation of the environment and seeking market-oriented agricultural, rural and regional development [7]. The phase I begins with research and planning before moving into the implementation phase II.

JICA has implemented a comprehensive plan to promote a more sustainable model of agricultural development. This plan includes a range of stakeholder, including businesses and farmers, with a combination of both private and public funding. By 2030, phase III will have been completed and farmers will be empowered through agri-businesses.

### Targeting small-scale farmers

In addition to Pro-Savana in Brazil, JICA has implemented a range of other projects that focus on small-scale farmers in Africa. The goal is to integrate farmers from the production phase into other parts of the value chain including the processing phase.

- In Ghana, there has been technical assistance to small-scale farmers for rehabilitation of existing irrigation system in terms of facilities and management through farmer participation in order to develop a sustainable farming system.

- In Malawi, JICA team implemented field trial to identify and formulate adequate horticultural techniques. Technical knowledge of vegetables, soil fertilizers, plant pests, and fruit trees were later diffused to farmers.

- In Tanzania's Sokoine University of Agriculture Center for Sustainable Rural Development, JICA established specific development methods of a local development center of an agricultural university through case studies of model areas under the concept of 'conventional potentials' and focusing on characteristics of the community. JICA also focused on Tanzania's small-scale horticultural development project in order to address poverty of farmers in Coast Region caused by unstable prices. JICA promoted technical transfer and evaluated the effectiveness of each project to build capacity of those in each pilot project.

- In Niger, JICA promoted forestation and developed seedling fields and agroforestry with local people to prevent desertification and promote vegetable and fruit farming.

- In Ethiopia, in addition to improving the productivity of facilities and assisting in anti-desertification, JICA also worked with local NGOs to implement empowerment projects for 600 poverty groups. The coordination of technical cooperation with rural development plans that supported poverty alleviation have been shown to improve food processing and training, particularly in cases where income is inadequate and labor shortages are prevalent as was the case in Sulawesi, Indonesia (Figure 6) [8].

### Challenges

The level of farmers that adopt the technology and research results is a key challenge. According to JICA's rice promotion project in Uganda, though more than 12,000 farmers were trained or introduced to productive techniques, low level of them adopted the technology. The reasons and lessons learnt should be considered in new developed projects.

### United states

USAID [9] has created the Feed the Future Initiative in targeted Focus Countries, which include but is not limited to the following African countries: Ethiopia, Liberia, Mali, Senegal, Tanzania, Zambia, Ghana, Kenya, Malawi, Mozambique, Rwanda and Uganda. FTF's strategy includes enhancing agricultural productivity, expands market and trade, and to increase the economic resilience of vulnerable rural communities. Generally, the focus is on new technology, new management practices, and improved policies offered by research that promotes agricultural productivity. USAID has contributed a wide range of agricultural development assistance in African countries, which includes developing markets for Africa's agri-products and value-added programs to promote policy-driven results. While there is no single US. agency solely responsible for coordinating an agricultural development strategy, there is a general agriculture-led approach for growth and poverty.

### Agricultural Demonstration Farms Funded by USAID

(1) In Ethiopia, the Agricultural Development and Settlement in Kobo Demonstration Farm is conducted jointly by MASHAV (Israel's Agency for International Development Cooperation in the Ministry of Foreign Affairs), the Ethiopian Ministry of Agriculture and USAID. It promotes the transition from traditional agriculture to modern farming, introducing new methods of cultivation, fertilization and irrigation and appropriate farming practices. The target group was families jointly cultivating about eight ha. Each farmer is responsible for his own separate plot. Eight families participated in the project and in the end; their yields were 8-10 times larger than those produced by traditional methods. Soil preparation, irrigation and input supplies, including marketing, are carried out jointly by the farmers. The objectives are:

- to display potential of utilizing a natural source of water for the irrigation of agricultural cultivation;

- to demonstrate the agro-technology of working the land in depth, and preparing for the sowing of planting in rows;

- to demonstrate proper fertilization and timing, as well as adequate use of pesticides;

- to promote larger cycles and maintaining clean fields ("farming culture");

- to instruct farmers on how to plan their daily schedule, learn to discern problems arising in the field, and finding proper solutions;

- to carry out on farm training in farm management and cost-efficiency, as well as plant cultivation to attain maximum yield; and

- to demonstrate the importance of marketing good quality produce and income-generation (buying inputs, such as seeds, fertilizers, etc.)

(2) Kenya's Agricultural Demonstration Farm promotes a range of advanced cultivation and irrigation technologies based largely on two main components: 1) a commercial farm and 2) a training and extension center. Approximately 42 hectare of vegetables and fruit trees are cultivated and irrigated within its pressurized irrigation network system.

The project's main goal is to demonstrate farming activities in typical semi-arid conditions, including research and various irrigation and fertigation methods under the joint efforts of MASHAV, the University of Nairobi, USAID and the Kenyan Ministry of Agriculture. New staff members were recruited and trained to instruct local farmers. Two professional experts from Israel made short-term consulting missions and provided on-the-spot training courses in subjects, such as fertilizer spreading. The local staff consists of 50 permanent workers and 150 farmers. The project staff comprises 12 members, including training officers and field instructors. Every night, members of the staff gather for course; visit the farms once a week and participate in a two-day seminar on the latest technological innovations in agriculture. The center works closely with the Kenyan Ministry of Agriculture.

Vegetables are grown for domestic and export markets. Water from the Kibwezi River irrigates a variety of crops, such as sweet corn, tomatoes, onions, garlic, green pepper, cabbage and pumpkin for local consumption, whereas aubergine, okra, karela and cayenne pepper are grown for export. Some of the seeds for these products are imported from Israel. Fruit trees are also grown, including bananas, oranges and mangoes.

(3) In Liberia, USAID Partnership for Economic Growth program has engaged local farmers in an agriculture project in partnership with nearby Amoud University and the Somali Agricultural Technical Group (SATG).

The program goals were: to test several varieties of seeds for six crops in order to find the best seed varieties suited for the Awdal region and to increase the farmers' agricultural skills and identify gaps in their traditional farming methods. With three demonstration sites in the towns of Amoud, Ruqi and Baqi and twenty-five local farmers from each town volunteered to participate, farmers and extension workers built shaded seed beds for several varieties of five crops including tomato, onion, hot pepper, lettuce, cabbage and watermelon. A month later, the trainers and farmers met again and transplanted the seedlings into the ground. In the process, farmers learned about crop spacing, soil fertility, furrow planting, and crop rotation.

### **Adapting the demonstration farm into practical courses**

Recently, USAID has partnered with the Food and Enterprise Development program (USAID/FED) and Liberia's Ministry of Education to improve access to valuable skills for the development of the agricultural sector in USAID-FED supported Centers of Agriculture. This is a 2-year vocational matriculation program that prepares high school students to move into agri-employment in the formal sector or through entrepreneurship. Drawing from Nigeria's vocational agricultural curriculum, it is fully approved by the Economic Community of West African States igniting the potential of regional integration of agricultural standards and methods. USAID-FED's Centers of Excellence in Agriculture leads practical training programs through demonstration farms, extension services and showcasing of best practices and innovative business models. These skills have been noted as the key needs of a post-conflict Liberia in the process of rebuilding its agricultural markets and connecting them to the region. As Liberian youth acquire skills, such as record keeping and financial management, needed to create a business,

the immediate employment needs of graduate are being met, while also developing the agricultural and food production sectors of the country.

### **Challenges**

Fragmentation of resources raises questions about coordination of agricultural development assistance with USAID, among US agencies, and with other international institutions.

The capacity of the local and central government to report and process data needs to be improved, especially in the post-conflict countries. The government should closely involve in tracking in order to allow rapid programming.

### **Korea**

The Korea Project on International Agriculture (KOPIA) worked closely with the Kenya Agricultural Research Institute (KARI) to boost food production by demonstrating new rice planting methods and introducing Kenyan farmers to simple and efficient pedal-driven bicycle thrashing machines, along with other affordable technology, that enabled farmers to increase the speed of thrashing and reduced the cost of labor. KOPIA has also introduced greenhouse investment, potato research and value-chain addition in the Democratic Republic of Congo (DRC). KOPIA Centers can be found in Kenya, Algeria, DRC, and Ethiopia. These partner countries usually provide office space, laboratories, experimental farms, equipment, staff housing and operation expenses.

The Korea-African Food and Agricultural Cooperation Initiative (KAFACI) [10] emphasizes capacity-building as part of an agricultural movement that stems back to Korea's 1970 mission to eradicate rural poverty. KAFACI's 16 members include Angola, Cameroon, Cote D'Ivoire, Democratic Republic of Congo, Ethiopia, Gabon, Ghana, Kenya, Malawi, Morocco, Nigeria, Senegal, Sudan, Tunisia, Uganda, and Zimbabwe. KAFACI invites member countries' scientists for an 8-12 week period to share knowledge of one another's agricultural conditions and identify technological needs and develop future joint projects.

Under the auspices of the Economic Development Cooperation Fund (EDCF), Korea's EXIM Bank offered \$35 million to Cameroon to assist in training industrial workers and \$200 million in co-financing with the African Development Bank in 2010. Korea has also indirectly contributed to Africa's agricultural advancement as partner agencies send their staff to Korea for technical aspects as well as institutional establishment and capacity building. For example, Ethiopia established the Agricultural Transformation Agency (ATA), which was developed with the Korean Economy Planning Board as a model. ATA aims to plan and coordinate comprehensive national agricultural development programs.

Korea has contributed to food security problems through its transfer of agricultural technology and related research. All technology and practices are not always high value, adaptable techniques and technology is equally useful depending on the country's level of development.

The major crops promoted are rice, maize, wheat, potato, livestock, and horticulture and technology range from breeding to bio-technology. In addition to KOICA, the Ministry of Trade,

Ministry of Strategy and Finance, and the Ministry for Food, Agriculture, Forestry, and Fisheries (MIFAFF) all work for the rural and agricultural development of developing countries through technological cooperation. The Rural Development Administration (RDA) is another stakeholder very active in this field. RDA recently carried out the Seed Potato Production in Algeria; the Rice Processing Complex project in Nigeria, and the Sericulture Project in Tunisia among many others. RDA has also partnered with the Green Revolution in Africa (AGRA) to share its experience and know-how of Green Revolution in order to achieve food self-sufficiency across Africa.

## Conclusion and Recommendations

1) International donors and partners, such as JICA and USAID, assisted Africa's agricultural development by working within existing plans. Whether national tailored as in Mozambique or regional support from ECOWAS, navigating already existing schemes allowed agencies to target specific groups (families or small-scale farmers) and anticipate challenges that the groups already faced. The Chinese agricultural or poverty reduction demonstration center should also be developed in line with African countries' national agricultural strategy or regional development plan. By doing so, it would be easier for the experimental result to be disseminated and scaled up at regional or national level.

2) Practical trainings from Agricultural Demonstration Centers are sometimes coordinated directly with broader schemes, such as rural development plans, in order to address related issues. In addition to creating rural development plans, poverty alleviation can also be maximized with gender-based plans. At the coordination of the Chinese government, closer linkage between ATDC and the poverty reduction center should be enhanced. Even a cross-sectorial strategic plan should be in place while providing agriculture, rural development, poverty reduction and infrastructure assistance in African countries. When adapting the technology and best practices, it may be best to first build the current development practices and technologies of the host countries before introducing new strategies, even if they have been proven successful elsewhere.

3) USAID works closely with local institutions and universities that already have expertise in agricultural development of the region. Sometimes, this is only in the form of financial support, but practice-based courses have recently been initiated and raised the potential of regional integration of agricultural standards and practices. As China's agricultural demonstration centers exist across Africa and are still being developed, examples and case-studies can be used to create models that would further support integrated agricultural standards that can be tried and replicated. The Chinese implementing agencies or institutions could also consider cooperating with local research institutes or universities in conducting village level pilot projects.

4) Trilateral cooperation between Brazil, Japan and Mozambique proved successful. China can explore similar options in

future agricultural development centers. USAID, DFID, and some UN agencies have also set up trilateral projects with Brazil, India, China and South Africa. In May 2013, DFID set up a collaboration project, the Agricultural Technology Transfer (AgriTT), with the Chinese Ministry of Agriculture, the Ugandan and Malawian governments, and the Forum on Agricultural Research in Africa (FARA), which is an organization of African stakeholders in agricultural research whereby DFID provided funding, Chinese partners provided expertise and the local government implemented the pilot projects. China's government has also explored trilateral cooperation with FAO in Malawi for the exchange of agricultural technical expertise in which 19 Chinese agricultural experts were sent to Malawi to share skills with district level government officials in the areas of agricultural extension.

5) Both JICA and USAID are providing favorable policies and encouraging private sectors to engage in the agri-business and investment in Africa. The Public-Private Partnership should be applied in developing poverty reduction center. The China-Tanzania poverty reduction center is a model to build enabling environment for companies' development by providing strategic and long-term support to the local communities and in return to obtain a sustainable development environment for company.

6) A sound monitoring and evaluation system should be developed to evaluate the effectiveness of ATDCs for local development and communities.

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