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A Case Study on China-Guinea-Bissau Agricultural Technical Cooperation Project

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China International Development Cooperation Agency

United Nations Development Programme

2018

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Acronym Index

ATCP	Agricultural Technical Cooperation Project
ATDC	Agricultural Technology Demonstration Center
CAD Fund	China-Africa Development Fund
CIDCA	China International Development Cooperation Agency
CPDA	Policy and Agricultural Development Charter
DAC	Development Assistance Committee
ECOWAS	Economic Community of West African States
EFSA	Emergency Food Security Assessment
EPC	Engineer, Procure and Construct
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FECC	Foreign Economic Cooperation Center of Ministry of Agriculture and Rural Affairs of the People's Republic of China
FOCAC	Forum on China-Africa Cooperation
HDI	Human Development Index
IFAD	International Fund for Agricultural Development
INPA	National Institute for Agricultural Research
LDC	Least Developed Country
MDG	Millennium Development Goal
MARA	Ministry of Agriculture and Rural Affairs of the People's Republic of China
MOFCOM	Ministry of Commerce of the People's Republic of China
NGO	Non-governmental organizations
UNDP	United Nations Development Programme
UNIDO	UN Industrial Development Organization
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
PEDSA	Agricultural Development Strategy Program
PNIA	National Agricultural Investment Program
PPP	Public and Private Partnership
PRSP	Poverty Reduction Strategy Paper
SDG	Sustainable Development Goal
TC	Technical Cooperation
WFP	World Food Programme

Executive Summary

For more than sixty years, China has been providing development cooperation to developing countries under the framework of South-South Cooperation, thereby making concrete contributions to the achievement of the United Nations (UN) Millennium Development Goals (MDGs). In the context of the UN-led 2030 Agenda for Sustainable Development, China is not only making efforts to achieve the 17 Sustainable Development Goals (SDGs) domestically but is also proactively supporting other developing countries in achieving them. To better understand China's efforts in development cooperation, and to introduce and promote China's experience in this field among the international community, the United Nations Development Programme (UNDP) and the government of China decided to jointly develop case studies on China's cooperative developmental projects, which represents the first cooperation between the two parties in examining China's development assistance projects.

Agricultural assistance has always been one of the major components of China's development assistance. Providing agricultural assistance to Africa is not only a prime example of China's participation in international development cooperation, but also a key area for cooperation between China and Africa. Agricultural technical cooperation projects(ATCPs) are one of the major forms of China's agricultural assistance in Africa. Centered on transferring China's agricultural technology, technical cooperation projects are executed by Chinese experts responsible for organizing agricultural technology training sessions and providing relevant assistance—such as in-field demonstrations and guidance for production activities. These activities are carried out with the intention to help other developing countries improve their capacity for agricultural self-development and production. This case study examines the China-Guinea-Bissau agricultural technical cooperation project (ATCP) as a typical epitome of hundreds of Chinese agricultural technical cooperation projects in African countries.

The study was jointly initiated by UNDP and the government of China. The Foreign Economic Cooperation Center (FECC) of Ministry of Agriculture and Rural Affairs of the People's Republic of China was entrusted by the government of China to be the Chinese implementing agency in this case study. UNDP participated throughout the research process as the international partner.

The case study design drew from approaches to assessments used by the international community, including its framework and indicators. Field research is the primary method, complemented by desk reviews and questionnaires. The case study combines both qualitative and quantitative analytical methods and looks at the project from six aspects, namely "relevance", "efficiency", "effectiveness", "results", "sustainability", and "cooperation and partnership". In September 2016, UNDP China and the FECC formed a joint research team and conducted field research on the ATCP in Guinea-Bissau.

The research team found that the China-Guinea-Bissau ATCP contributed to agricultural development in Guinea-Bissau in four aspects. First, the project delivered positive results for both agricultural development and more generally, people's production and livelihood in the countryside, which is aligned with Guinea-Bissau's national development priorities and in line with priorities of international organizations' development work. Second, the project brought agricultural technologies suitable for local conditions and provided relevant training to local communities; this led to an improvement in technological capacity and mechanization in Guinea-Bissau of participated farmers. It also contributed to poverty reduction in the Guinea-Bissau region. Third, the project identified and extended rice varieties suitable for the local environment through years of breeding refinements, which contribute to hunger reduction and food security in Guinea-Bissau to some extent. Fourth, through

capacity building activities, a great number of local agricultural technicians have been trained to improve their technical knowledge and skills. As a result, women were able to improve their family and social status. The China-Guinea-Bissau ATCP also employed community-based approach focused on establishing partnerships with local communities and farmers, which thereby stimulated their interest in rice production activities. Interestingly, an increasing number of farmers hope that the Chinese experts of the China-Guinea-Bissau ATCP could build demonstration sites in their regions.

ATCPs are a type of South-South Cooperation from China that emphasize local involvement from inception onwards and aim to provide demand-driven agricultural assistance and promote self-development capacities in African countries. This is valuable experience that China can offer to the international agricultural assistance community. Such experience provides the foundation for China to more effectively carry out agricultural development assistance in the future, thereby further supporting the agricultural and socio-economic development of other developing countries. Moreover, it has inspired China's work on global agricultural assistance and has contributed to the provision of new ideas for international communities in this area.

To improve the effectiveness of China's agricultural assistance in the future, this case study provides two recommendations. First, it is important to strengthen China's exchanges and cooperation with other actors, such as international organizations, local governments, and non-governmental institutions, in terms of research, synergies between programs, planning, and so on. Second, continuing to explore ways to enhance the sustainability of agricultural assistance, which could provide more support for South-South Cooperation in the field of agriculture.

I. Background

1.The Background of International Aid to Africa

In September 2000, world leaders met at the United Nations (UN) headquarters in New York, where they endorsed the Millennium Declaration and adopted the eight "Millennium Development Goals" (MDGs). The event marked the beginning of an international development agenda focused on synergy-building over the course of the following 15 years. As a result, there was a range of achievements made in terms of poverty reduction, access to basic services, and so on. Building on such results, world leaders gathered in New York at the UN Development Summit in September 2015 and adopted the 2030 Agenda for Sustainable Development along with its accompanying 17 Sustainable Development Goals (SDGs) that represent a more ambitious trajectory for global development until 2030.

A continent of 54 countries, Africa has made significant contributions toward the achievement of the MDGs. According to an MDG report issued in 2015, Africa's average GDP growth rate has reached 5% during the time period from 2011 to 2015,[1]and represents some of the fastest-growing countries in the world, such as Ethiopia (10.39%), Cote d'Ivoire (8.89%), Tanzania (6.96%), Senegal (6.49%), and Mozambique (6.61%)[2]. However, development within and across African countries is not balanced. The continent is still home to 34[3]of the world's 48 least developed countries (LDCs) and many African countries, particularly sub-Saharan African countries, are still facing challenges such as gender discrimination, high unemployment rates, and imbalances in rural and urban development. While Africa made progress in achieving the MDGs, it encountered difficulties in achieving other goals, especially with regard to eradicating extreme poverty and hunger, reducing child mortality, improving maternal health, and ensuring environmental sustainability. In the past decades, sub-Saharan African countries have made progress on poverty reduction, with the poverty rate falling from 56.5% in 1990 to 48.4% in 2010. Yet, this was still far behind the 28.25% poverty reduction target rate set out in the MDGs[4]. The sub-Saharan African region also suffers from food scarcity. Data shows that from 2011 to 2013, 25% of its total population was still living in hunger and experiencing malnutrition.

Since 1990, Africa has been the largest recipient of net official development assistance (ODA) from the members of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD)— excepting certain years. The net ODA Africa received from OECD DAC member countries reached USD 51.0 billion in 2015 and USD 50.2 billion in 2016.

In contrast to the declining trend of OECD DAC member countries' aid assistance to African countries, nations of the global south are increasingly playing a significant role in supporting Africa, a development in line with the principles of South-South Cooperation[5]. South-South Cooperation partner countries are not only providing

1. The Millennium Development Goals Report 2015:
http://www.cn.undp.org/content/china/zh/home/library/mdg/mdg-report-2015/
2. Source: data from the World Bank and the International Monetary Fund in 2015.
3. The Least Developed Countries of the United Nations Conference on Trade and Development Report 2015:
http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=1393.
4. Ibid, 1
5. According to the Framework of Operational Guidelines on the United Nations Support to South-South and Triangular Cooperation, South-South Cooperation (SSC) is 'a process whereby two or more developing countries pursue their individual and/or shared national capacity

financial support to African countries, but more importantly are sharing critical knowledge, skills, and relevant technologies to enhance partner countries' capacity for self-development. Given similarities in terms of development background and context among the global south, such experiences and lessons may fit well and add new dimensions to their development. This also applies to China's support to Africa.

2. China's Foreign and Agricultural Assistance

Over the last few decades, China has become a major South-South Cooperation partner. As the largest developing country in the world, China's experience in poverty reduction and economic development provides important lessons for other developing countries to draw from. As a means of sharing resources and experiences, China's South-South Cooperation has gradually expanded its scale and scope over the last decade, aiming to improve people's livelihoods and contribute to social and economic development in recipient countries (see The Right to Development: China's Philosophy, Practice and Contribution, a white paper issued in 2016). In addition to financing and materials, China also shares its expertise and technology with other developing countries.

China has published two white papers on "China's foreign assistance" in 2011 and 2014, which provide official data, relevant policies, and running achievements of its development cooperation efforts. The 2014 White Paper on China's Foreign Assistance shows that during 2010-2012, China provided USD 14.41 billion in development assistance to 121 countries. Africa was the largest recipient region, accounting for 51.8% of the total; The latest official data shows that over the past 60 years, China has provided more than RMB 400 billion in financial aid to 166 countries and international and regional organizations and trained more than 12 million personnel from developing countries (see The Right to Development: China's Philosophy, Practice and Contribution, 2016).

As the world's largest developing country, China has proactively promoted international development and cooperation in the field of global agricultural assistance. China has directed the majority of its agricultural assistance to low- and middle-income countries, especially in Africa. To date, China has established diplomatic relations with 53 African countries. It issued two African policy documents in 2006 and 2015 respectively, which provide policy guidance for cooperation between China and Africa. The African policy document released at the end of 2015 clearly identifies two major factors hindering Africa's development: backward infrastructure and inadequate professional and skilled personnel. It also proposed two priority areas for cooperation between China and Africa in the following decade: industrialization and agricultural modernization (China's Africa Policy, 2015). In the policy document, China suggests that it will not only provide "hardware" support to Africa—physical infrastructure construction—but also strengthen "software" cooperation, that is, professional training and technology transfer. Thus, China-Africa agricultural cooperation in the next decade will combine both "hardware" and "software" and focus on helping African countries move up the global value chain.

Agricultural technical cooperation projects (ATCPs) are one of major forms of China's agricultural assistance. Centered on sharing China's agricultural technology, ATCPs are executed by Chinese experts who are responsible for organizing agricultural technology training seminars and providing assistance, such as in-field

development objectives through exchanges of knowledge, skills, resources and technical know-how.' This process can also comprise 'regional and interregional collective actions, including partnerships involving governments, regional organizations, civil society, academia and the private sector, for their individual and/or mutual benefit within and across regions.' As such, SSC contributes to increasing countries' adaptive capacity by building capacities and enhancing abilities for greater sustainable development.

demonstrations and guidance for production activities. This is to help other developing countries improve their agricultural self-development and production capacities. These ATCPs employ community-based practices that focus on establishing harmonious relations with local communities in recipient countries.

As China-Africa relations expand through development assistance and investment and trade opportunities, agriculture will remain a key area cooperation. Although some policies and data have been released, China's agricultural cooperation projects in Africa are still largely unknown to the international community. This report aims to shed light on these projects.

3. Overview of Guinea-Bissau and its Agricultural Development

The Republic of Guinea-Bissau (Guinea-Bissau), located in Western Africa, is a member of the Economic Community of West African States (ECOWAS). The continental parts of Guinea-Bissau are bordered by Senegal to the north, Guinea to the east and south, and the Atlantic Ocean to the west. Including the Bijagos Archipelago islands, the country's total land area is 36,125 square kilometers.[6] Guinea-Bissau has a tropical marine monsoon climate. Being hot all year round, Guinea-Bissau has an annual average temperature of around 25℃ . The country is home to around 1.84 million people, of which 50.7% are rural and 49.3% are urban.[7] There are total of 27 ethnic groups in Guinea-Bissau. The official language is Portuguese, while Creole is the common colloquial tongue. The whole country is divided into 3 provinces, 8 regions, and 36 sectors, which are then subdivided into villages. The capital of Guinea-Bissau is Bissau. Currently, there are 32 political parties in the country. Four presidents successively held office from 1998 to 2010.

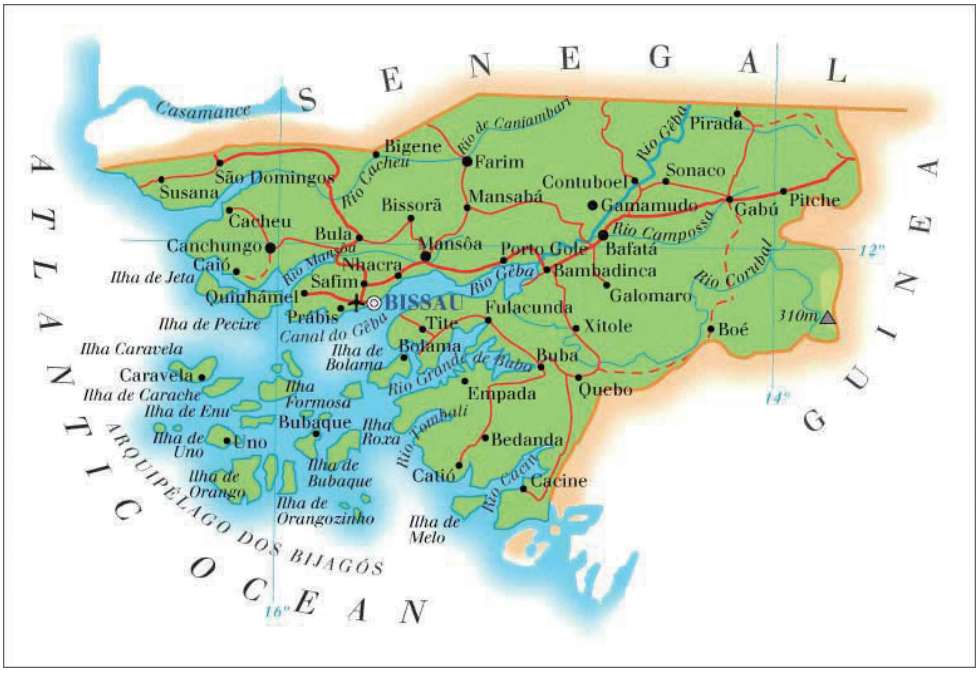


Figure 1. Map of Guinea-Bissau

6. http://data.un.org/Search.aspx?q=Guinea-Bissau
7. http://www.fao.org/faostat/en/#country/175

Table 1. Basic Data of Guinea-Bissau's Economic Development[8]

Gross Domestic Product (GDP)	USD 13.47 billion (2017)
Gross National Income (GNI), per capita	USD 660 (2017)
GDP Growth Rate	5.92% (2017)
Poverty Rate	69.3% (2010)
Life Expectancy	57.4 years (2016)

Guinea-Bissau has a weak industrial base. As there are only a few processing plants in the country, it relies primarily on the rough processing of agricultural products and food. Guinea-Bissau is not self-sufficient in its food production. Given its fishery resources, the country largely relies on granting fishing permits and exporting fishery products and cashew nuts for foreign exchange revenue. Since 2005, the Guinea-Bissau government has implemented poverty reduction plans, seeking to actively develop the agricultural sector and promote a diversified planting strategy focused on rice and cashew production. Classified as one of the least developed countries in the world by the UN in 2016, Guinea-Bissau's GNI per capita was USD 640, which saw significant and steady increases since 1998 when the figure stood at USD 150.[9] According to statistics released by the United Nations Development Program (UNDP), with a human development index (HDI) of 0.455 in 2017, Guinea-Bissau ranked 177th out of 188 countries.[10]

Guinea-Bissau has around 0.3 million hectares of arable farmland across the country, of which permanent cropland accounts for 0.25 million. The major food crops include rice, cashews, palm, cassava, peanuts, cotton, potato, corn, and sorghum, among others. Climatic and water resources are rich in Guinea-Bissau, but the country stands as one of the most vulnerable countries to the effects of climate change.[11]With a flat landscape in most parts of the country, Guinea-Bissau's agricultural production is dominated by extensive traditional farming techniques. The country has almost no irrigation or water conservation facilities and is experiencing a shortage of agricultural materials and machinery. Guinea-Bissau is also rich in forestry resources, with 1.98 million hectares of forests and 55% forest coverage. For the past seven years, Guinea-Bissau has been producing over 0.1 million tons of cashew per year; in 2014 cashew production reached 0.15 million tons[12]. As a primary export item and economic pillar for Guinea-Bissau, cashew nuts remain largely raw and unprocessed.

In 2016, the World Food Programme (WFP) launched an Emergency Food Security Assessment (EFSA) survey in Guinea-Bissau, covering seven regions, 20 sectors, 59 villages, and 748 households. The results showed that among the surveyed households, 25.7% enjoyed food security but 6.2% still suffered from moderate or severe food insecurity[13]. The survey points out that, except for political and natural causes, the primary factors contributing to Guinea-Bissau's food insecurity are man-made, namely, the government's excessive emphasis on cashew production at the expense of rice production. While Guinea-Bissau's natural conditions do allow

8. Data source :FAO, World Bank
9. https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=GW
10. http://hdr.undp.org/en/composite/HDI
11. https://reliefweb.int/sites/reliefweb.int/files/resources/Climate_Change_Vulnerability_Index_%202014_Map_0.pdf
12. http://www.fao.org/faostat/en/#country/175
13. Programme Alimentaire Mondial Evaluation Rapide sur la Sécurité Alimentaire:
http://documents.wfp.org/stellent/groups/public/documents/ena/wfp288836.pdf?_ga=1.223578780.686373169.1469437252

for rice production to be self-sufficient, due to the government's preference for cashew exports, 44% of the country's rice needs are being met by imports every year.

4. Background of the China-Guinea-Bissau ATCP

1. Technical cooperation

Since the 1950s, when China began to conduct foreign assistance, agriculture has been the key field throughout and Technical Cooperation (TC) has become one of the most important forms of China's agricultural assistance. From the late 1960s to the early 1990s, the Chinese government assisted several agricultural EPC (Engineer, Procure and Construct) projects in developing countries; however, such projects lacked operational sustainability. To improve the effectiveness of these project operations, Technical Cooperation (TC) was brought in to aid EPC projects. This meant sending Chinese agricultural experts to conduct technical training for farmers and technicians in recipient countries after the completion of construction. The endeavor was named "EPC+TC" mode. Compared with ETC projects, "EPC+TC" mode further facilitated sustainable development. TC made enough progress for the Chinese government to scale up TC projects in many fields.

To sum up, there are three types of agricultural technical cooperation projects: (1) China sending experts to provide technical instruction for a set of completed agricultural projects; the scope of such projects include subsequent production, operation and maintenance, and training the agricultural management and technical workers from the recipient country locally; (2) help developing countries to carry out experimental planting, rearing and production, and training in the techniques of China's agriculture and traditional handicraft; (3) help developing countries to complete agricultural exploration, piloting, research, consulting, and so on. Typically, TC is executed within a period of 1-2 years; if necessary, however, the period can be extended. Agricultural technical cooperation is the main method for China to help recipient countries to increase their agricultural self-development abilities.

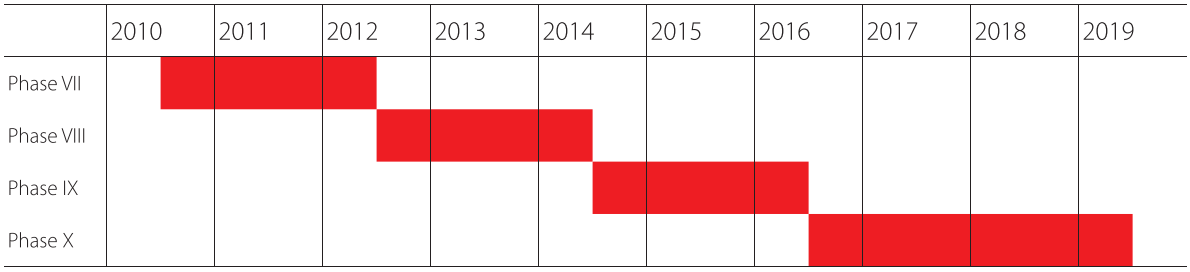
The China-Guinea-Bissau ATCP is type 2. The first type 2 ATCP was started in 1961 with seven Chinese agricultural experts who were sent to Mali to experiment with planting tea tree and sugarcane. To begin a type 2 ATCP, the project implementation entity will send agricultural experts to the recipient country after being selected through a competitive bidding process. Normally, recipient countries offer land, while China, in addition to sending experts, provides machinery, seed, fertilizer, pesticide and some agricultural materials to conduct breeding, planting, and stock breeding training. Each project is based on an agreement signed by the collaborating countries and is focused on sharing China's agricultural technology. It is to carry out activities in identified areas, including agricultural technology training, introduction and breeding of improved crop varieties, demonstration and guidance for field production activities, and other relevant assistance.

2. Project history

Since China and Guinea-Bissau established diplomatic relations, China implemented a number of projects therein, such as the construction of the China-Guinea-Bissau Friendship Hospital, the maintenance of the national stadium, and the construction of the government office complex. The two countries also signed a cultural agreement. Since 1976, China has been dispatching medical teams to Guinea-Bissau and started to provide agricultural assistance. In 1998, the China-Guinea-Bissau ATCP was officially launched. The project implementation entity was Hubei Yichang International Economic & Technical Cooperation, Ltd (Yichang International). The project operated in two-year phases and by the time of this research project, it had completed nine consecutive phases and is currently conducting the 10th phase. The progress of the project

after 2010 is shown in Figure 1 (Phase 9 of the ATCP was launched on August 3, 2014 and ended on August 2, 2016).

Figure 2. Progress Chart of the China-Guinea-Bissau ATCP



3. Project activities

Based on Guinea-Bissau's agricultural production needs and its level of socio-economic development, the Guinea-Bissau ATCP focuses primarily on rice cultivation. It aims to gradually improve the country's technical capacity in rice production and its overall rice output through agricultural technology training, the introduction and breeding of improved varieties, and technical guidance on production activities. This will support the development of Guinea-Bissau's agriculture industry. The main activities of the Guinea-Bissau ATCP include:

(1) Agricultural technology trainings

Agricultural technology trainings focus on rice cultivation techniques and the use of mechanical technology. The trainings target technical personnel, farmer technicians and agricultural machinery technicians in Guinea-Bissau's rice production areas. Centralized trainings are complemented by on-site trainings at demonstration sites. Some of the trainees are selected to participate in agricultural technology training in China.

Rice cultivation trainings involve the breeding of improved rice varieties, high yield cultivation, pest prevention, and knowledge of soil and fertilizers. Training on the use of agricultural machinery include the operation, repair and maintenance of commonly used agricultural machinery. The hosting teams of the Guinea-Bissau ATCP, at all the demonstration sites, are responsible for organizing and managing the project activities; they help guide and convene trainees from their area to participate in planned activities at designated locations. The teams are also in charge of supervising trainees to ensure they use the improved rice varieties and their newly learned cultivation techniques.

(2) Breeding and extending improved varieties

The breeding of improved rice varieties includes introducing China's high-yielding, high-quality, and disease-resistant varieties to Guinea-Bissau. Through comparative breed cultivation pilots, the most suitable rice breed for Guinea-Bissau was selected. A Production and Breeding Center of Fine Varieties was set up, with a Chinese team of experts responsible for seed production, trainees and farmer associations responsible for producing the seeds used for production, and the experts and project hosting team responsible for supervising and managing the seed quality.

The extension of improved rice varieties and cultivation techniques involve key agricultural technicians being trained as core members of the fine varieties and technique promotion campaign. They extend the techniques to other farmers through the cultivation of pilot fields, while the Guinea-Bissau ATCP hosting team and farmer associations are responsible for organizing and supervising. Publicizing such activity is facilitated through traditional channels like broadcasting, TV, and newspapers.

(3) Building rice cultivation pilot zones

According to the project agreement between China and Guinea-Bissau, the project hosting team designated by the Ministry of Agriculture of Guinea-Bissau was sent to three regions: Bafata and Gabu in the east and Oio in the north. The team chose a rice area to build rice cultivation pilot zones, one with convenient transport, good conditions for rice production, and proper production management abilities.

Farmer associations organize and manage the pilot zones. Each pilot zone has one member from the hosting team to provide instruction and Chinese experts to assist. The pilot zone's demonstration site one hectare in size. The Chinese experts lead the demonstration of high-yield cultivation and seed production and provide fertilizers, pesticide, and seeds. They also train households in the surrounding farm areas in how to utilize fine varieties.

(4) Managing and distributing the project's supporting materials

Goods and materials, such as machinery fittings, fertilizers, and pesticides, along with the promotion of planting techniques, are managed and employed by Guinea-Bissau under the surveillance of Chinese experts. The distribution of materials is based on the needs of a given pilot zone.

To date, the Guinea-Bissau ATCP has set up nine demonstration sites within the country, including two state-owned farms and seven farmers' rice areas as below.

Table 2. Demonstration Area of the Guinea-Bissau ATCP

Regions	Locations	Types	Starting Time (Year)
Bafata (Bafatá)	Apalacof	farmers' rice area	2014
	Contuboel	state-owned farm	1998
	Campossa	farmers' rice area	1998
Gabu (Gabu)	Carantaba	state-owned farm	1998
	Coiatasf	farmers' rice area	2007
	Granjatude	farmers' rice area	2010
Oio (Oio)	Manhau	farmers' rice area	2007
	Mansode	farmers' rice area	2007
	Walia	farmers' rice area	2007

4. Cooperation between the two parties

China's Ministry of Commerce aids the Guinea-Bissau ATCP on behalf of the Chinese government and the Ministry of Agriculture and Rural Development of Guinea-Bissau acts as the recipient ministry on behalf of the government of Guinea-Bissau.

Yichang International, on behalf of China and as the project implementation entity, dispatches expert teams to aid Guinea-Bissau. The expert team for each phase is selected by Yichang International and sent to Guinea-Bissau to implement the project as required above. 15 Chinese agricultural technology experts are now stationed at the Guinea-Bissau ATCP, specializing in soil fertility, crop cultivation, and machinery maintenance.

Guinea-Bissau has appointed technological experts from the Ministry of Agriculture and technical personnel

from demonstration sites to form a hosting team for the agricultural technology program. This team cooperates with groups of Chinese experts and are together responsible for the following: organizing training activities, carrying out seed production with local farmers according to the technical requirements of the Chinese expert group, assisting the experts in the selection of demonstration sites, assisting the establishment of rice planting associations at said sites, improving the organization and management of the association, revisiting the trainees and facilitating technical practice sessions, setting up demonstration fields, providing office space and accommodation to the Chinese expert team, addressing their basic needs, coordinating relations with the surrounding areas, and providing for their security.

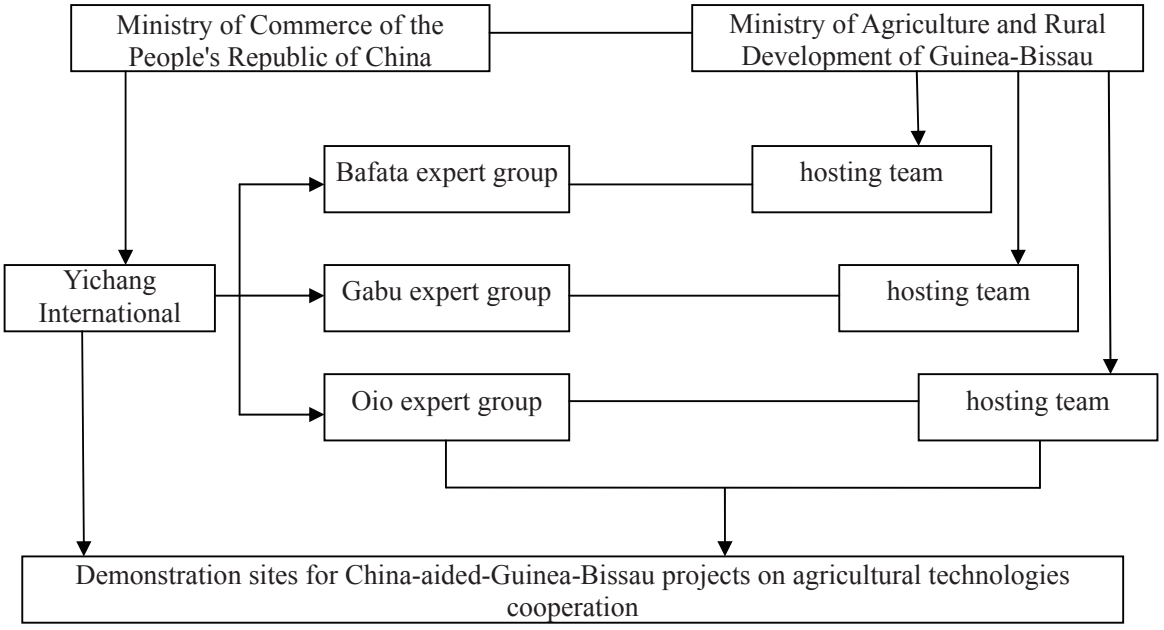


Figure 3. "China-Guinea-Bissau" cooperation mode for relative entities

II. Case Study

1. Background

In 2012, Rebecca Grynspan, then Under-Secretary-General of the UN and Associate Administrator of UNDP, met with Li Jinzao, former Vice Minister of Commerce of China. The two sides committed to enhancing the international community's understanding of China's development cooperation and decided to jointly carry out case studies on cooperative developmental projects. After internal discussions, the China-Guinea-Bissau ATCP project was selected as one of the subject-projects for development as a case study. The Foreign Economic Cooperation Centre (FECC) of the Ministry of Agriculture and Rural Affairs (MARA) was entrusted by the government of China to undertake the case study as the Chinese implementing agency. A researcher from the UNDP China office also participated in the project throughout the process, which officially began in 2016 and marked the first time UNDP and the government of China engaged in such a cooperation. The objectives of this partnership were to draw on internationally accepted standards to assess the results of China's development cooperation projects and share their experience with the international community.

2. The Basis of Research

This is the first time China has adopted the research methods, framework, and development project evaluation standards commonly used by the international community in assessing China's development assistance projects. Such standards provided the basis for all field research, desk reviews, and data collection and analysis. Due to severe limitations on data from the very remote and rural areas where this project operated, this study turns to be an assessment but not a strict project evaluation or impact assessment. However to the extent possible the research team applied evaluation criteria of relevance, effectiveness, efficiency, results, sustainability and partnership/cooperation in the study, and we hope that this first effort at evaluation will encourage others to do more rigorous assessments of other projects in the future. The guiding questions of the research framework are as follows:

(1) Relevance

Mainguidingquestions: Is China's agricultural cooperation project consistent with the priority development strategies of the recipient countries and local communities? Is it also in-line with China's development assistance policy and the development assistance policies of Africa?

(2) Efficiency

Main guiding question: Have the tasks of the project been completed as planned?

(3) Effectiveness

Mainguiding questions: Have the targets of the project been achieved? To what extent? What are the main contributing factors that led to these results?

(4) Results

Mainguiding questions: What changes has the project made to the social, economic, and political spheres of the recipient country? What are the main factors that led to these changes?

(5) Sustainability

Mainguiding questions: Can the project's operation and management continue without China's support? Are the effects of the project sustainable?

(6) Cooperation and partnership

Mainguiding questions: Are the project stakeholders satisfied with the project? Has the project facilitated the participation of multilateral organizations? Has the project promoted cooperation between China and the recipient country in other fields?

3. Research Methods

1. Assessment methods

(1) Field research

Field research was our primary methodology, referring to on-site research in Guinea-Bissau through staff interviews and case collection in the demonstration areas. The Economic and Commercial Counsellor's Office of the Embassy of China in Guinea Bissau recommended a local agricultural expert to join the research team and help coordinate all interviews and visits.

According to the indicator criteria and the core questions in the evaluation framework, a total of seven semi-structured interview outlines were developed for the assessment, respectively targeting central government officials, local government officials, and representatives of international organizations, local partners, community representatives, technicians, and farmers (Annex 1). The sample was chosen based on the convenience of Creole. Two rice fields and two state-owned farms from the Bafatá and Gabu regions and one rice field in the Oio region were selected as representative of their respective communities. The research team conducted a series of semi-structured interviews and focus group meetings with the managers of different communities, institutions, and organizations. In this study, "community" refers to the natural villages surrounding the demonstration sites, "institutions" refers to the state-owned farms cooperated with ATCP, and "organization" refers to the farmer associations around the demonstration sites. The farmer-interviewees were selected from the aforementioned natural villages around the demonstration sites by a random sampling technique. Representatives from the Ministry of Agriculture and Rural Development of Guinea-Bissau and the Bafata Provincial Department of Agriculture, on behalf of the central and local governments of the recipient country respectively, accepted semi-structured interviews. Representatives from relevant international organizations and some countries' embassies in Guinea Bissau also accepted semi-structured group interviews.

(2) Desk review

"Desk Review" refers to the on-line collection and sorting of electronic or paper documents for China's MOFCOM, the Ministry of Agriculture and Rural Development of Guinea Bissau, Yichang International, and the Chinese expert group from the ATCP. The files include data and reports from international organizations, Chinese policy documents, and reports related to foreign assistance, as well as reports on the agricultural development strategy of the recipient country and implementation documents for the ATCP projects. It aims to obtain information about the project and summarize and analyze the implementation process and results.

(3) Household questionnaires

Household questionnaires (Annex 2) were used to complement the above mentioned methods in order to collect basic information about the rural areas surrounding the demonstration sites, including the distribution of the population's age and gender, as well as other basic data on households and rural society. The project results, impact, and other feedback was collected as quantitative data to support the analysis and conclusions of the case study.

The questionnaires were distributed in the regions where the demonstration sites are located. They were distributed in equal numbers in the three regions that received assistance from local experts as well as the Chinese expert group of the ninth phase of the Guinea-Bissau ATCP. The research team provided basic guidance for the distribution, completion, and collection of the questionnaires. Eventually, 102 questionnaires were distributed in Bafatá, Gabu, and Oio and were completely re-collected. The response rate reached 100%.

2. Analysis methods

This case study was conducted through field research, desk reviews, and the collection and re-collection of household questionnaires. Both qualitative and quantitative analytical methods were adopted in the data analysis.

Qualitative analysis was used to clarify and analyze typical cases from interviews, questionnaires, and policy documents from governments and other relevant sources in order to better understand the project's achievements and effects using the six criteria (namely: relevance, efficiency, effectiveness, results, sustainability, and cooperation and partnership). Conclusions were drawn thereafter as the basis for recommendations to the Guinea-Bissau ATCP. Quantitative analysis was employed to calculate and analyze the data from the questionnaires using SPSS. The results were produced using software and presented according to the distribution and probability. This was used to support and supplement the qualitative analysis.

Triangulation was used in the process of data collection and analysis and was related to specific indicators of the assessment framework; in other words, there were different methods to collect data from different sources and cross-examine the information from different angles during the process of research. This was to ensure the credibility of the research results.

3. Limitations of the research

The research framework adopted in this case study drew from international practice. Given that the evaluation framework does not cover certain aspects of Chinese development cooperation projects, the research results were subject to certain restrictions. In addition, the demonstration sites are scattered and remote to each other, which made it difficult to ensure absolute rigor in the distribution and collection of questionnaires.

III. Findings

From September 13 to 21, 2016, the UNDP-FECC joint research team conducted fieldwork at the ATCP demonstration sites in Guinea-Bissau. Mr. Antonio Mendes Tavares, an agronomist from Guinea-Bissau, was invited to join the research team. The team visited five demonstration sites: the Campossa Farmers'Association, Contuboel farm, Coiatasf village, Carantaba farm, and Mansode village. They also interviewed the Minister of Agriculture and Rural Development, the Director of the Agricultural Department of Bafatá, farm representatives of the Guinea-Bissau ATCP, farmer representatives from the demonstration sites, representatives of the farmer associations, and local farmers living at the demonstration sites. The research team also held a roundtable with officials and representatives from UNDP, FAO, the World Bank, the African Development Bank, and the Portuguese Embassy in Guinea-Bissau. The research team collected 102 questionnaires and recorded 600 minutes of interviews.

Drawing from field work and data analysis, the research team concluded the following.

1. Meeting the Development Needs of Guinea-Bissau and Ensuring the Sustainability of the Project

According to the agricultural development needs identified by the Guinea-Bissau government, the ATCP focused on rice production and was designed to mitigate the various challenges faced by the rice industry. The ATCP includes training on rice cultivation technology, the extension of practical technologies for rice production, the production and extension of improved varieties, training on maintenance and application techniques related to agricultural machinery, and a supply of agricultural materials and machinery for demonstration sites.

Agriculture is the leading sector and economic backbone of Guinea-Bissau. The prioritization of agriculture in the country's development agenda is reflected in several national strategy and policy documents, such as the Poverty Reduction Strategy Paper (PRSP), the National Agricultural Investment Program (PNIA), and the Policy and Agricultural Development Charter (CPDA). Many international organizations and development agencies have prioritized agriculture, rural development, and food security in their support to Guinea-Bissau. China also attaches great importance to agriculture in its cooperation with African countries. Specifically, for more than 18 consecutive years the ATCP was driven by the long-term development needs of Guinea-Bissau. The four major strategies and policy papers issued by the government of Guinea-Bissau suggest that:

1. Agriculture is the main drive of Guinea-Bissau's export industry and agricultural production capacity is crucial for reducing poverty. It is necessary to improve rice yields through research on breeding techniques and seeds, as well as explore for and maintain fresh water and saline-alkali soil (PRSP I, 2005-2008)[14];

2. As the staple food of 95% of Guinea-Bissau's population and the leading crop of the country, rice plays a key role in Guinea-Bissau's national food security and poverty reduction plans. Increasing rice production is an

14. In 2004, the government of Guinea-Bissau drew up and began to implement the first poverty reduction strategy paper (PRSP I, 2005-2008), and amended the paper in 2005 and 2006, and the expiry date was extended to 2010. This strategy paper is a policy reference for Guinea-Bissau's political, economic and social development.

important policy for ensuring food security (PRSP II, 2011-2015)[15];

3. Agriculture-related infrastructure construction is a priority. Nearly half of the government's budget for food production is dedicated to supporting rice and other dry cereal industries (PNIA, 2010)[16];

4. The rice industry is one of the four major areas for Guinea-Bissau's development (CPDA)[17];

The international community has long focused on agricultural development in Guinea-Bissau. For example, since the African Development Bank's cooperation with Guinea-Bissau began in 1976, 19.4% of its funding has been used to support Guinea-Bissau's agricultural development18. The Food and Agriculture Organization of the United Nations (FAO), the World Food Program (WFP), and the India, Brazil and South Africa (IBSA) Fund have also played an important role in Guinea-Bissau's agricultural sector. In 2005, based on member states' agricultural development levels, ECOWAS formulated its regional agricultural policy, ECOWAP, in which rice was regarded as a strategic crop. This policy proposed a range of key areas for agricultural development, including promoting rice production, facilitating the modernization of rice production systems, and reducing dependence on rice imports.

So far, China has issued its first and second Africa Policy Paper in 2006 and 2015 respectively. In both papers, agriculture was identified as one of the main areas of China-Africa cooperation. The papers suggest that China "intends to further promote its agricultural cooperation and exchanges with African nations at various levels, through multiple channels, and in various forms. The Focus is on the cooperation in agricultural plantations and other aspects. China will intensify cooperation in agricultural technology and organize training courses of practical agricultural technologies. China will prioritize support for Africa's agricultural modernization in its cooperation with Africa in the new era (Chinese Government, 2006, 2015). In 2011 and 2014, the Chinese government released two white papers on foreign aid, indicating that more than half of China's foreign aid funds were used to support African countries and other lesser-developed countries. Promoting agricultural and rural development and poverty reduction in developing countries are some of China's foreign aid priorities.

Therefore, choosing the rice industry as the area of cooperation is not only consistent with the development policy of the Guinea-Bissau government, but also with other international development agencies' work priorities and China's own focus for China-Africa cooperation.

According to Mr. Rui Nené Djata, then Minister of Agriculture of Guinea-Bissau, Guinea-Bissau's annual rice gaps between 80,000 and 110,000 tons and the cost for imported rice amounts to USD 3 billion per year. Rice is regarded as a strategic industry for Guinea-Bissau, which can produce a "multiplier effect" on the income and economic development of the country and people. However, the development of the

15. In 2011, the second Poverty Reduction Strategy Paper (PRSP II, 2011-2015) was introduced.
16. National Agricultural Investment Programme (PNIA) is part of the Poverty Reduction Strategy (PRSP) of Guinea-Bissau.
17. The Agricultural Development Policy Charter (CPDA) is the main policy document for Guinea-Bissau's agricultural development.
18. The African Development Bank 2011 Report:
http://www.afdb.org/fileadmin/uploads/afdb/Documents/Financial-Information/Guinea%20Bissau%20-%20Completion%20Point%20Document%20HIPC%20Initiative.pdf.

rice industry has been restricted by certain factors, including the long distances between growing areas, the lack of regular maintenance of traditional irrigation systems, a lack of manpower, a lack of planting techniques for improved varieties, and an improper use of fertilizers and pesticides. Moreover, inadequate infrastructure and funding has also become a major barrier for the development of the rice industry.

Minister Djata mentioned: "Guinea-Bissau's agricultural sector is very traditional and has not achieved mechanization. Farmers use very traditional manual methods for small-scale farming. Guinea-Bissau is in need of agricultural technical personnel. Due to the sector's low productivity and low income, it is difficult for the country to retain agricultural personnel. The Guinea-Bissau ATCP has helped to train agricultural technical personnel, boost farmers' enthusiasm for production, and increase the income of farmers. It has effectively met the country's agricultural developmental needs, especially for the rice industry. The difference between China's ATCP and other countries' agricultural assistance projects is that China's practices are more consistent with our ideas. China focuses more on improving Guinea-Bissau's own capabilities and, therefore, the Chinese approach is more sustainable. Even if the Chinese experts withdraw, the farmers will be able to continue. The government of Guinea-Bissau has also hired technicians to work with the Chinese experts on the project."

From 1998 to 2016, the Guinea-Bissau ATCP has been in operation for nine consecutive phases. Through the "demonstration field + site / centralized training + training materials" approach, the project has extended rice cultivation techniques, agricultural machinery applications, and maintenance techniques to farmers, focusing on helping them improve technical capacities and rice production. The Ministry of Agriculture and Rural Development of Guinea-Bissau has extended the project nine times. At present, the government of China and Guinea-Bissau's Ministry of Agriculture and Rural Development have signed a cooperation agreement for the 10th phase of this project. The fact that such continued cooperation, which has lasted for 18 years and is confirmed to continue for at least the next three, was based on a request by Guinea-Bissau shows that the government therein is in need of the kind of support provided by the project, given its relevance to local needs. The ATCP's Chinese expert group also participated in the drafting of the Agriculture Development Plan of Guinea-Bissau and won the Championship of Good Progress Award on Science and Technology (2008), Special Award of Contribution (2016) and other awards conferred by the Ministry of Agriculture and Rural Development of Guinea-Bissau. The work of the Chinese expert group has received a high degree of recognition from the government of Guinea-Bissau.

The ATCP in Guinea-Bissau was not only aligned with the priorities of the national development strategies of the government of Guinea-Bissau at the macro-level, but also at the micro and practical level maintained long-term interactions with farmers and rural communities. The Chinese expert group provides appropriate support based on a full understanding of local needs.

Ten-Years of Cultivation and Close Relations between China and Guinea-Bissau

Peng, who is from Yichang of Hubei Province in China, is an expert in agricultural machinery serving on the Guinea-Bissau project. From 2005 to2015, he has been in charge of technical training and demonstration instruction for machine use and maintenance. He was also responsible for the maintenance of the expert group's car, hydroelectric equipment, electromechanical devices, and so on. Except for roughly one year when he was on leave caring for his family, Peng has been working on this project for about 10 years. He has been happy to witness the change of local farmers' lives over this period: "Chinese experts here not only taught them advanced agricultural production technology, which helped improve crop yields and increase income, but also many advanced ideas. For instance, they were taught how to accumulate funds to develop production, increase scale, and increase income. Now many local farmers are changing their perspectives."

Through the work in Guinea-Bissau, Peng believes he expanded his horizons in addition to increasing his income. Additionally, while training farmers to maintain their machinery, he has had the chance to go hands-on with many pieces of mechanical equipment donated by other countries, thereby advancing his own knowledge in the process of using them. Peng himself stated: "I developed deep relationships with the local people and we got along well. We agricultural experts are stationed here because of our friendship with all current and previous experts devoted to this work. Our challenges include the organization and training of interested persons. The Guinea-Bissau ATCP gained recognition and appreciation from the government and farmers. Though the conditions in Guinea-Bissau are hard, if I had the choice about whether to come to Guinea-Bissau to work, I would definitely come, as I am familiar with this land. I will never regret what I have chosen."

As mentioned above, the majority of the farmers in Guinea-Bissau use traditional methods to grow rice, without any agricultural materials or machinery, much of which is generally not available in the country. Moreover, farmers lack basic knowledge about agricultural cultivation and the rural communities that organize rice production need agrotechnical knowledge, agricultural materials, and small machinery to produce. The long-term presence of the Chinese experts in rural parts of the country allowed them to gain in-depth knowledge of farmers' needs and knowledge gaps in agricultural technology and machinery operations. The Chinese experts tailored their teaching methods to suit farmers' needs and learning capacities, transferred practical skills, and responded to all ad hoc questions and needs. This is what distinguishes the ATCP from many other agricultural assistance projects in the country and is an important factor for ensuring the project's sustainability.

"The Chinese expert group conducted demonstrations at the farmers' land, bringing seeds to our home. Sometimes they even worked in the fields until 9pm. Whenever we had questions, they would come to help even when they had already gone to bed, and we were deeply moved," said Micano from the Campossa Village in the Bafata Region. Other villagers said that when the birds in the village had affected their rice in the fields, they went to the Chinese expert group for help. Those experts did not hesitate to go to the village to help deal with the birds, even though it was beyond the Chinese experts' mandate.

Buhan, Director of the Bafata Region Agriculture Department, said, "More people in Bafatá Region want the Chinese expert group to expand their scope of work. But given the agreement between our two countries, the Chinese expert group could not extend technologies to all the sectors in this region or reach other regions in the country."

The unstable political environment of Guinea-Bissau has affected the continuity and implementation of the country's overall agricultural agenda. Long-term agricultural aid projects face numerous challenges. However, the Guinea-Bissau ATCP has explored ways to advance Guinea-Bissau's agricultural development, using a "bottom-up" approach based on local needs. This approach meets the urgent needs of local farmers to increase their production capabilities and is adaptable to the conditions of the country, conditions characterized by small-scale traditional agricultural production. As a result, the project has been carried out for 18 consecutive years.

2. Strong Applicability of Agricultural Technologies, Increasing Household Income, and Reducing Poverty

According to 2010 data from the World Bank, up to 69.3% of the total population of Guinea-Bissau live under the national poverty line— needless to say, poverty is a major obstacle to the country's development. The Guinea-Bissau ATCP has introduced technology suitable for local agricultural production conditions, helping local farmers increase rice production and income. This is playing an important role in poverty reduction and the improvement of household living standards.

The ATCP has introduced six agricultural technologies to Guinea-Bissau. The results of 100 questionnaires on the use of these technologies show that pest control technology has been used 78 person-time, high-yield cultivation and direct rice sowing technologies 70 person-time, soil and fertilizer technology 58 person-time, and rice seed breeding technology 56 person-time (Figure 4). Agricultural machinery operation and maintenance technology has been used 31 times, considerably lower than other technologies. The reason for this is that agricultural machinery training is not open to all households. Of the farmers that have used the agricultural technologies introduced by the project, 98.8% indicated that they were using these technologies consistently; the remaining 1.2% used them about five times a week (Figure 5).

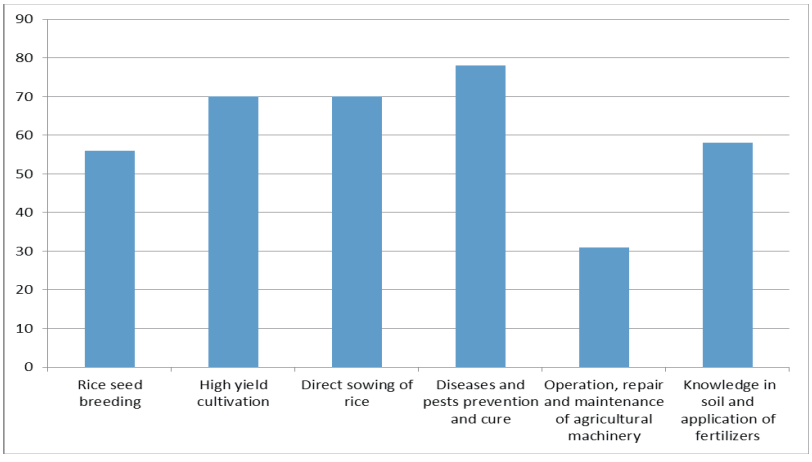


Figure 4. The number of farmers using different types of new technologies

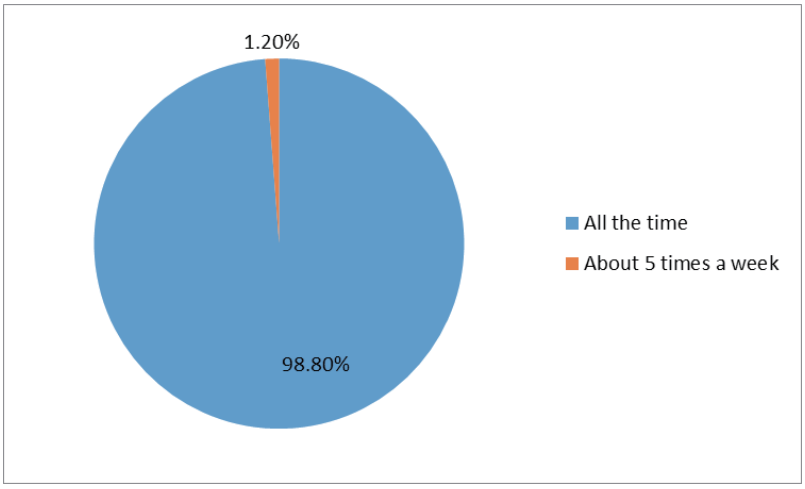


Figure 5. The percentage of farmers using the new agricultural technologies introduced by the ATCP

Questionnaire results show that the rate of technological application by households that participated in the survey is high. This was largely a result of the Guinea-Bissau ATCP's suitability to local conditions and the provision of agricultural production materials and machinery, which by extension helped increase local rice yield and household income. As shown in Figure 6, among 95 responses, the respondents' average monthly income in 2010 was FCFA 76,419.16 (according to the exchange rate on December 31, 2010 it roughly equals USD 155.82), but by 2014 had risen rose to FCFA 113,348.63 (according to the exchange rate on December 31, 2014 it roughly USD 209.23). According to the questionnaires, 100% of the respondents indicated that the Guinea-Bissau ATCP played a role in contributing to income increases since 2010.

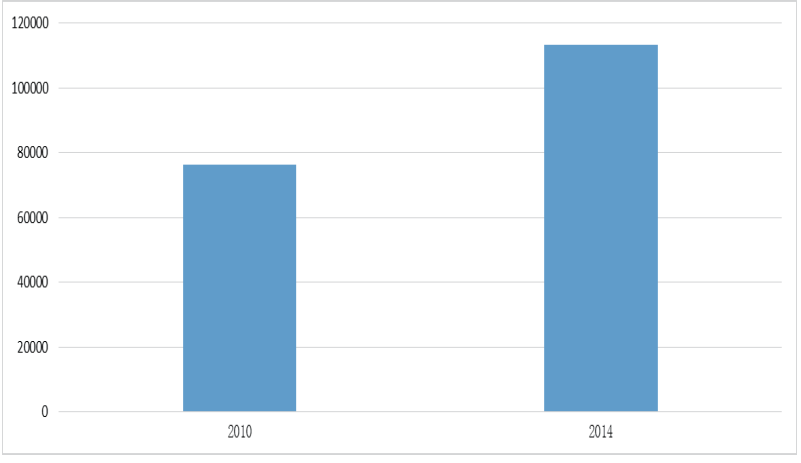


Figure 6. The average monthly income (CFA) of rural households in 2010 and 2014

Income growth provided the incentive for rural households to more actively cooperate with Chinese experts, thus producing an increase in the number of rural households willing to take part in ATCP activities, including both demonstrations and trainings and the application of new technologies. Farmers also helped extend these new technologies to their relatives and friends.

Wsumane is a primary school teacher and agricultural extension worker in Mansode village in the Oio Region. He started learning rice cultivation techniques from Chinese experts in 2007 and took training courses at least twice a month. His job as a teacher made it easier for him to understand the training courses. He also shared what he had learned about rice cultivation with other teachers in the village and invited people from other villages to his own to attend the training on-site. Wsumane said: "Our village still lags behind others in agricultural technology. Though agricultural technology has been extended, there is still a lot to be improved. I've gotten the chance to learn, but my own capacity to extend the technologies is limited. I hope more people will learn these new technologies and I myself want to learn more as well. I think the extension results are related to people's education level. Those who are educated tend to learn new techniques faster. Learning these technologies has changed my lifestyle and improved my social interactions with others. It has helped raise my income and my social status. Many people have come to make friends with me. The rice yield of my own family has increased too."

Through the "multiplier effect" created by individuals extending such technologies, the Guinea-Bissau ATCP used agricultural technologies to mobilize local households' participation in rice cultivation, which indirectly promoted the development of agricultural production organizations in Guinea-Bissau and improved local living standards.

Campossa Farmers' Rice Association: Life is Becoming Better

The Campossa Farmers' Rice Association in the Bafata Region is the largest farmer association in Guinea-Bissau. It was administered by Guinea-Bissau's Ministry of Agriculture and Rural Development and was included as one of the demonstration sites of the Guinea-Bissau ATCP. The revenue of the association depends on its labor force and comes primarily from seed or rice sales. The seeds are mostly purchased by the government, while the rice is sold in the market. The members of the association pay their membership fees according to their contracted planting area. Ms. Maria is the incumbent president of the association. Daily operations are managed and organized by different members. The Chinese expert group provides technical support to rice cultivation activities organized by the association, including demonstration sessions and training in rice planting techniques.

In the past, the association had few rice growing areas and relied on manual cultivation methods; as a result, the yield was very low. Originally, there were 65 members and two pumpers. Then Chinese experts came to Campossa and started helping the association carry out training in rice cultivation techniques and provided pesticide and agricultural machinery to help promote mechanization in rice seeding and other agricultural production activities. After witnessing the rise of rice yields under the guidance of Chinese experts, more and more farmers expressed their hope to join the association. Now there are 419 members in the association, comprised of 19 males and 400 females. It owns a total of 180 hectares of farmland and five pumpers, a part of which is rented to non-members. Campossa Farmers' Rice Association now uses agricultural implements for all rice cultivation activities except rice transplanting. The president of the association, Maria, appreciated the Chinese experts' contributions to the income growth and lifestyle improvement of its members. She pointed out that the rice yield increases derived from the training in agricultural techniques, the fertilizers used in the demonstration fields, and all the small agricultural implements provided by Chinese experts.

Maria herself managed to raise her family's rice yield under the technical guidance of the Chinese experts. Before the Chinese experts came to the village, she owned 0.25 hectares of farmland, with a rice yield of 400-500kg/hectare. During the dry season, she had to toil all day, but now she has five hectares of farmland and is using agricultural machinery. Her rice yield is now 4-5 tons/hectare and her annual income is about CFA 7 million (about USD 11,200). In addition to her expenditures on housing repairs and her children's tuition, she saves CFA 2 million (about USD 3,200) every year for purchasing agricultural production materials. Maria became excited talking about her family income: "My own income grew a lot; otherwise I could not have imagined sending my kids to study abroad. One of my kids is studying in Russia and another one wants to go to France." Amida is the head of Campossa village, as well as a member of the association. In the past, he used local rice varieties with a yield of around 500kg/hectare. After using Chinese varieties, techniques, and fertilizers, his yield increased to 4 tons/hectare. He also sold high-quality seeds which gave him extra income to support his kids going to school.

Hannah, the cashier for the association, began to grow rice with her mother when she was a child, but the yield was very low. After using the techniques introduced by the Chinese experts, her rice yield increased from 1 ton/hectare to 5 tons/hectare, and her income began to grow as well. Supported by the income generated from selling rice seeds, she was able to afford to send her children to school, some in Bissau, the country's capital city, and others in Brazil. In addition to working with the Chinese experts to learn rice cultivation techniques, Hannah was also given the opportunity to travel to China for a foreign assistance training program focused on rice farming techniques. Now she is able to provide training in rice cultivation techniques to technicians in her village.

Asungto used to work in a gas station but then began to grow rice, eventually joining the association. In 1992, he began to participate in the trainings organized by the Chinese experts. Since then, his growing area has increased from 0.25 hectares to 2 hectares, while his yield has grown from 600 kg/hectare to 5 tons/hectare. He became convinced that the techniques introduced by the Chinese experts were truly useful. With the money earned from his rice cultivation, Asungto has been able to support his son who is studying in Morocco.

The agricultural techniques introduced by the Guinea-Bissau ATCP responded to the needs of households based on local production conditions. They helped to increase households' rice yields, income, and living standards. Nonetheless, it is important to recognize that the development of any sector cannot solely depend on the limited resources provided by foreign assistance. For example, for each project phase, including the current one, 15 Chinese experts were dispatched to the Bafata, Gabu,and Oio regions respectively, forming working groups of five and providing demonstrations, technical guidance, trainings, and extension services at three demonstration sites in each region. The distance between the sites is long and the road conditions are very poor, posing challenges to the coverage and impact of the project. Furthermore, besides applicable agricultural techniques, improving rice yields also requires agricultural machinery and fertilizers.

3. Breakthrough in Variety Breeding and Contributions to Hunger Mitigation

The breeding of rice varieties is an important activity of the Guinea-Bissau ATCP and one of the major areas of cooperation between Chinese experts and local partners. After ten years of breeding work, a major breakthrough was achieved: "Sabe-12", a regular rice variety, was developed. This variety has a maximum yield of 7.2 tons/hectare, about 14 times higher than that of other local varieties. As rice is the most important food item for local people, the increased availability of improved seeds and rice plays a direct role in helping reduce hunger.

Over the years, in order to ensure the purity of improved varieties and enhance their yield potential, "the Chinese side was to be responsible for providing guidance and quality control for seed production, while the Guinea-Bissau side was to be responsible for distribution and extension". The Chinese experts maintained a long-term and close relationship with Contuboel Farm, Carantaba, Campossa Farmers' Association and other local partners, using single-panicle breeding and other independent breeding methods to reproduce 300kg of basic seeds and 576 tons of production seeds. These seeds were purchased by the Ministry of Agriculture and Rural Development at prices higher than the market value and were then distributed for free to farmers in major rice producing areas around the country, which helped quickly expand the coverage of Sabe-12. In addition, the seeds of Sabe-12 were also sold to several other West African countries such as Senegal, Guinea and Cape Verde.

"Sabe-12": Contuboel Farm's Destined Choice

Contuboel Farm is located in the Contuboel Sector of the Bafata Region, where there are over 50 villages and about 4,600 farmers. The Contuboel Farm is directly affiliated with the Ministry of Agriculture and Rural Development, with a total of four technicians. It was formerly an agricultural institute supported by Switzerland (before they withdrew support) assisting the Ministry of Agriculture and Rural Development in carrying out various types of seed research. Since 2000, the farm began to collaborate with the Guinea-Bissau ATCP. The group of Chinese experts was responsible for seed breeding, demonstrations, extension, and trainings. Its demonstration and extension work covered all the villages in the Contuboel Sector. The farm had a total of 141 hectares of farmland divided into a demonstration field, afield for technicians, and a field for farmers. 1 hectare of demonstration land was cultivated by Chinese experts alone. The land for technicians totaled 10-15 hectares (including the 1 hectare of demonstration land), and was jointly worked by technicians and Chinese experts. The demonstration land can produce 5-6 tons/hectare of rice, which is a result of having a sufficient supply of agricultural machinery and fertilizers; the land for technician scan produce about 3-4 tons/hectare, as a result of training provided by the Chinese experts. In sharp contrast, the farmers' average yield reaches only about 0.8 ton/hectare.

Previously, the seeds from Contuboel Farm were only used for research; they were local varieties with a limited market. The Guinea-Bissau ATCP introduced a number of varieties, and after years of breeding and selection, one conventional rice variety dubbed "Sabe-12" was identified. "Sabe-12" is able to adapt to both dry and rainy seasons, as well as to the soil conditions in Guinea-Bissau. This variety is free from both pests and diseases and has a high yield. It has also become very popular among locals for its good taste. Sabe-12 nearly became a household name among local farmers and Guinea-Bissau's national TV programming has produced video clips for the project. Both regional and sectoral radio stations have reported it and in Contuboel Sector "Sabe-12" and its related technologies are broadcast to different villages. In 2016, "Sabe-12" seeds were planted on 10 hectares of fields for use by technicians and 7 hectares of fields for farmers in Contuboel. Chinese experts provided on-site technical guidance for technicians and farmers every day. Additionally, the farm stored 10 tons of "Sabe-12" seeds for distribution during the dry season.

Rice fields in Contuboel (pictured on the left is normal field, and on the right is the demonstration field)

The farm in Contuboel also demonstrates an approach to cooperation between the Guinea-Bissau ATCP and its local partners that combines demonstration with technical guidance. Under normal circumstances at a given demonstration site, the demonstration field managed by the Chinese experts is located next to the farmers' field, making it more convenient for local farmers to observe and practice the technologies and for Chinese experts to provide on-site guidance, dealing with any problems that farmers might encounter during the planting process.

"The farmers are learning very well from the Chinese expert group. The farm also teaches the farmers to plant rice through broadcasts," said Agusto, a technician at the Contuboel Farm."Today, farmers don't want imported rice; instead, they are able to plant rice on their own. In Contuboel, the Chinese experts provided guidance on rice planting direct to 43 households, with the remaining 283 households also seeking to turn their plots into demonstration fields. I myself own 1 hectare of rice fields. The yield can reach 4 tons/hectare in the dry season and 3 tons in the rainy season. All of the seeds I use are 'Sabe-12'. Now many Senegalese come here to purchase 'Sabe-12'."

According to Mr. Lassana, the deputy head of Contuboel Farm, the Chinese experts worked closely with local technicians, providing guidance, and were ready to help out on the farm whenever needed. Farmers and farm personnel maintained a good relationship with the Chinese experts, given that the experts worked for so many years to improve their lives. "Without the Chinese experts, the farm would not be able to operate," he said. "The Chinese experts' living conditions here and local road conditions are poor. But even on the weekends, the Chinese experts will respond to our request for help. Other agricultural projects provided by different partners provided us with agricultural machinery but no training or maintenance services; thus, we still rely on support from the Chinese experts."

Based on years of good cooperation between the project and its local partners, the ATCP expert group successfully bred improved rice varieties, which contributed to hunger reduction in rural communities in Guinea-Bissau to some extent. Although extreme hunger does not exist in this country, hunger nevertheless remains a challenge. The Global Hunger Index is an international indicator that measures the degree of hunger in a country, calculated annually by the International Food Policy Research Institute. With a maximum of 100, the higher the index, the higher the degree of hunger. Those that score between 20 and 34.9 are defined as

having "serious" hunger. 2016 statistics show that Guinea-Bissau's Hunger Index was 27.4, ranking 91 among 118 surveyed countries. However, it is worth noting that the figure dropped from 43.9 in 2000 to 27.4 in 2016, down by nearly 38%.

Increasing the yield and availability of crops is one of the most direct ways of reducing hunger. The survey results show that between 2010 and 2014, the respondents' average rice output increased. As shown in Figure 7, the average yield increased from 1309.83kg/hectare to 1936.77kg/hectare and the average total output increased from 1497.23kg to 2300.23kg. 95.6% of those surveyed received technical guidance or training from the Chinese expert group. Thus, it can be concluded that the ATCP has played a positive role in helping to increase the average rice yield in the demonstration area and its neighboring locations.

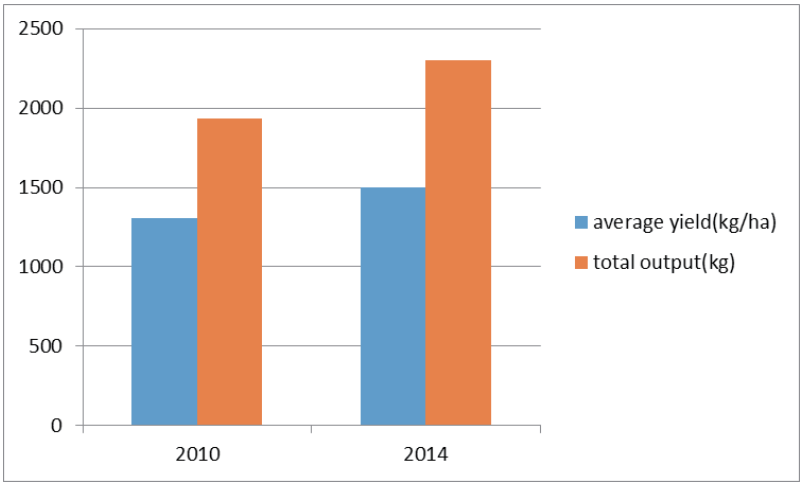


Figure 7. The average yield and total output of rice in 2010 and 2014

When asked if "the quantity and quality of the food in your home meets the needs of your family?", results from the questionnaire (Figure 8) show that 52.1% of the respondents answered positively in 2010, which increased to 86.6% in 2014. The percentage of the respondents that responded negatively fell from 47.9% in 2010 to 13.4% in 2014. This shows that during these four years, the supply and quality of food improved significantly.

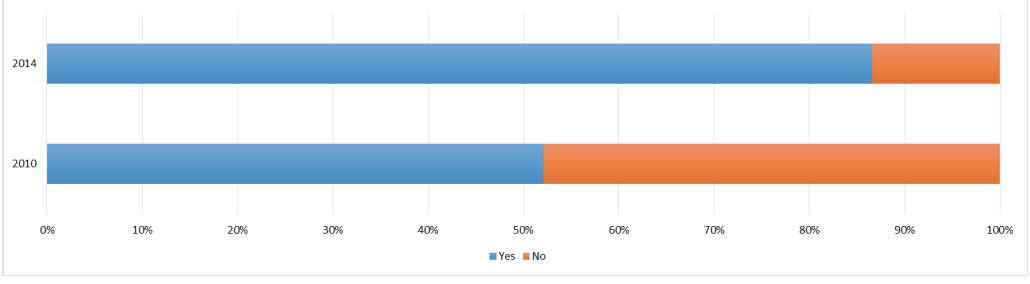


Figure 8. Whether the quantity and quality of food in farming households meets demand in 2010 and 2014

Due to dietary traditions, people in Guinea-Bissau mostly rely on staple foods, including rice, cassava, and corn, while the intake of meat, vegetables, and fruits is relatively small. As for the consumption of the three major staple food items, the survey showed that compared with 2010, the average consumption of all three food items increased in 2014 (Figure 9).

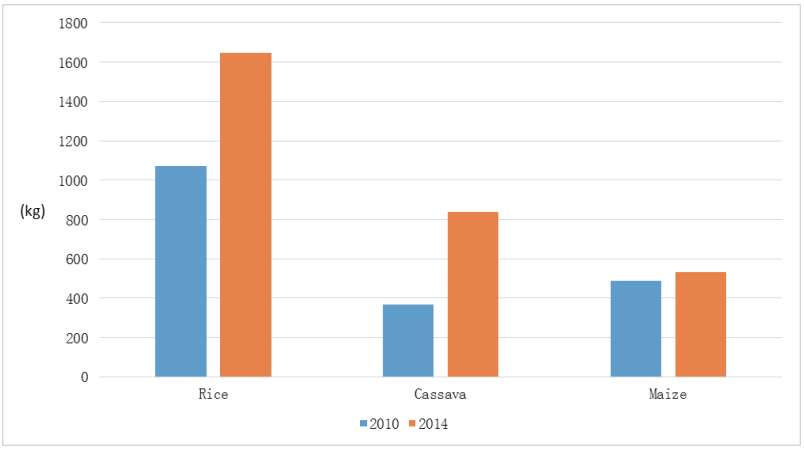


Figure 9. The consumption of rice, cassava, and corn products in 2010 and 2014

The mitigation of hunger is closely related to the availability of improved rice varieties. The extension and application of improved varieties in Guinea-Bissau have significantly helped farmers increase rice output and reduced dependence on rice imports.

Farmers in Coiatasf: Plant Well, Eat Well

The village of Coiatasf has been one of the demonstration areas of the ATCP's operation in Gabu since 2013. The farmers organized an agricultural group and the Chinese experts of the ATCP provided support to the group's activities in the village, including informational training sessions focused on rice seeds, planting techniques, and demonstrations of rice planting, among others. By 2016, the total area of the demonstration fields in Coiatasf had expanded from 1 hectare to 3 hectare.

Mamalu is the head of the agricultural group in Coiatasf and also one of the many farmers that benefitted from the ACTP. Before 2013, Mamalu had 1 hectare of rice fields, with a yield of 0.5 ton, which was far from sufficient to feed his family. Besides rice, he was also growing cashew nuts, corn, and other cash crops. Like most other farmers, he traded cashew nuts for rice at a rate of 1kg for 1kg. After the team of Chinese experts came to the village and provided new rice seeds and planting techniques, Mamalu was able to reach 0.8 tons using the 0.5 hectare of land he owned in 2016. By planting "Sabe-12", the output more than tripled. Today, not only can he feed his family, but he also made FCFA 0.25 million (about USD 400) by selling rice in the same year. His increased income can be used for housing, his children's education, medicine, and other expenses. In Guinea-Bissau, while the average market price of rice is about FCFA 350 (about USD 0.56)/kg, the price of "Sabe-12" can reach FCFA 400-500 (about USD 0.64-0.8/kg).

Farmers in Coiatasf have stored many "Sabe-12" seeds. According to Mamalu, in order to have other varieties of rice with different tastes, farmers sometimes trade the seeds of 'Sabe-12' for different ones from other villages— 1 kg of "Sabe-12" can be traded for 1.5 kg of other seeds. People from surrounding villages are eager to do so and they often plant "Sabe-12" after the trade. Thus, the farmers of Coiatasf realize that they must keep a store of "Sabe-12" seeds.

"Growing rice has helped improve our lives, helped our children to go to school, and fed our families." said Mamalu. "My dream is to grow more rice. I also have the confidence needed to grow better rice. "The

Chinese experts have introduced to me the technology needed for rice cultivation and plant protection and have provided and trained me in the use of agricultural machinery. Now I can distinguish different types of pests and diseases. I'm very happy with the work of the Chinese experts."

As for the use of new seeds, 97 survey results show that 93 respondents "have always been using" new seeds provided by the ATCP, accounting for 96% of the total number of results (Figure 10).

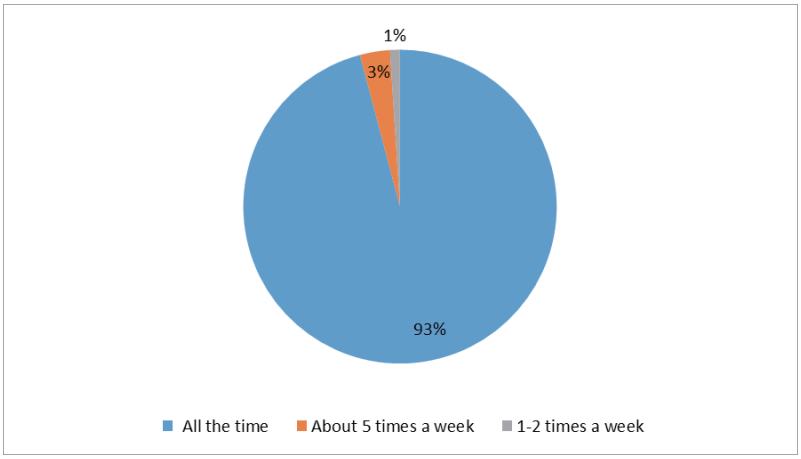


Figure 10. Frequency of farmers' use of new seeds

According to Aliu, head of the Mansode Village, Oio Region, the farmers were mainly growing cashew nuts, and traded them for rice. But through cooperation with the Chinese experts, they can now meet their own demand for rice, and the income from selling cashew nuts can then be used for paying for their children's education, house building, and medical expenses.

At the community level, the improved rice varieties extended by the ATCP have laid a solid foundation for increasing household rice production and has helping in the transition from trading cashews for rice to being self-sufficient in rice production. Farmers now have extra income to support their children's education or engage in other jobs, which in turn will generate more benefits. At the national level, it has helped to reduce the country's dependence on rice imports and cashew exports and thereby its vulnerability to price volatility in external markets. This not only helps to ensure local food security, reduce obstacles to the country's economic development, and weaken the negative effect from external price fluctuation, but also plays a role in mitigating hunger, which has a profound impact on the agricultural and economic development of Guinea-Bissau. That said, although the project has played a positive role in contributing to hunger reduction and food security, there is scope for expanding the results, as hunger remains a challenge for Guinea-Bissau. There are opportunities for the ATCP's to strengthen their communication channels with the international community. Over the years, there have been limited exchanges between ATCPs and international development agencies in Guinea-Bissau, which has not been conducive for cooperation between ATCPs and other development partners. Representatives from international development agencies and other countries' embassies all claimed little knowledge of the Guinea-Bissau ATCP and hoped that there would be opportunities to conduct exchanges with the ATCP on a regular basis.

4. Visible Results in Capacity Building and Raising the Status of Women

Training in agricultural technology is an indispensable part of each phase of the ATCP, which includes training in rice cultivation technology, maintenance, and the application of agricultural machinery. The agricultural technology introduced by the ATCP has received positive feedback from the participants. Through different forms of training— such as group training and one-on-one technical guidance—a number of participants have stood out and gone on to become heads, deputy heads, and technicians of different farms and rice fields, gradually taking on managerial and technical roles. Many women have also played important roles in rice production activities, which have helped raise their status both within their own families and in the greater society. Technicians engaged in the operation and maintenance of agricultural machinery have provided necessary support for rice production.

Training Participants: Learning Technology is the "Hardware"

Laiy is a 32-year-old Senegalese man. He has been engaged in agricultural machinery repair for over 20 years. In the beginning, he followed his family members to Guinea-Bissau and started working with the Chinese expert group to learn agricultural machinery maintenance and tractor operation. He attended five training sessions and received one-on-one guidance from Chinese experts. Today, Laiy has become an expert in agricultural machinery maintenance and has eight apprentices, two of whom have been studying with him for eight years. At first, he brought his apprentices to attend the training sessions of the ATCP. Subsequently, for the more basic sessions, he asked the apprentices to go by themselves. "The pictures in the training textbooks are systematic and helpful," said Laiy. "For agricultural machinery including harvesters, tractors, rice mills, walking tractors, water pumps, pumpers, and so on, I could not tell their differences at the beginning. But after the training, I understand them very well. Now I'm in charge of repairing rice mills for the entire country, because in this country only my apprentices and I know how to do this. And we learned all of these from the Chinese experts. But now the issue is a lack of tools and accessories; there is only one set of the repair tools. Currently, I make an average of FCFA 100,000 (approximately USD 160) per month, but can make up to FCFA500,000 (USD 800). I also grow rice myself. The money that I've made over the years was used for building houses and moving to Bissau. I have two children. One is in fourth grade and the other is now five years old. My children have also shown interest in agricultural machinery maintenance. I will teach them in the future if they want to learn."

Joao is the head of the local agriculture bureau in Mansode in the Oio Region. He graduated from a foreign-funded agricultural vocational college and has 30 years of experience in extending and managing agricultural technologies. He is also a core member of the hosting team for the ATCP's activities in Oio, providing coordination for the Chinese experts to carry out various tasks in the region, such as organizing training activities and providing assessments for participants. Previously, Joao's work focused more on management. In 2007, he started working with the Chinese experts of the ATCP. During this process, he learned a lot about agricultural technologies, practicing them based on his pre-existing knowledge. He helped farmers solve technical problems or helped them get in touch with the Chinese experts who could. Joao said: "After the Chinese experts came here, agricultural technological extension has become a lot easier. Before I was doing extension work on behalf of the Ministry of Agriculture, distributing seeds to farmers, and was mainly responsible for management. But now I have learned a lot about technology. My knowledge of both management and technology has made it easier for me to extend technology to

farmers. I am able to explain to the farmers very clearly and the farmers are able to understand, making my work easier. The farmers have now mastered the techniques of rice cultivation and other technologies; they have put the Chinese know-how to good use, which makes a difference compared to before such technologies were introduced. It is an important scientific step forward. The training is very effective, which enables more efficient technology extension. Now I am growing more rice myself using the training materials provided by the Chinese experts. I have also opened up a factory for purchasing and redistributing cashews. Now that I have more money, I would like to buy more walking tractors and grow more rice."

43-year-old Ms. Famata is of the Madinge ethnic group. She comes from the village of Mansode in the Oio Region and has never attended school. She has been working in a demonstration field in the village of Mansode and has participated in training sessions on rice planting techniques as part of the ATCP. As Ms. Famata is illiterate, the training materials and other written materials were not helpful to her. The Chinese experts came to the field and taught her by hand how to determine the number of seeds to plant, showing her other rice planting techniques. She then employed the techniques in her own field. Ms. Famata said: "Before the Chinese experts came to the field, my output was very low. I did not know how to improve. After the training, I now understand why the yield was low and learned how to use fertilizers and manage rice fields—now the yield has increased. My neighbors are all wondering how I have been able to reach such a high yield. I think that to be able to use the Chinese experts' knowledge and techniques, you need to visit the demonstration field and see for yourself. I hope that more people have the opportunity to visit the demonstration field and learn."

The trainees of the ATCP include agricultural technical personnel from rice producing areas in Guinea-Bissau, farmer technicians, and agricultural machinery operators. During the 7th, 8th, and 9th phases of the ATCP, 300 training sessions were held, with a total of 7,783 participants. It is found that the number of participants during the 6th phase may have reached as high as 4,746. The trainings covered rice seed breeding, high-yield cultivation, pest control, knowledge of soil and fertilizers, and the use, repair, and maintenance of agricultural machinery, among other subjects. The Chinese experts also compiled four manuals on rice cultivation techniques, as well as video materials in Portuguese on the repair and maintenance of agricultural machinery. Among survey respondents, 95.6% said that they participated in the training: 39.6% participated in more than three training sessions; 11% in three training sessions; 33% in two sessions and 12.1% participated in one training session (Figure 11). 96.4% of the respondents suggested that they had consistently used the techniques learned during the training.

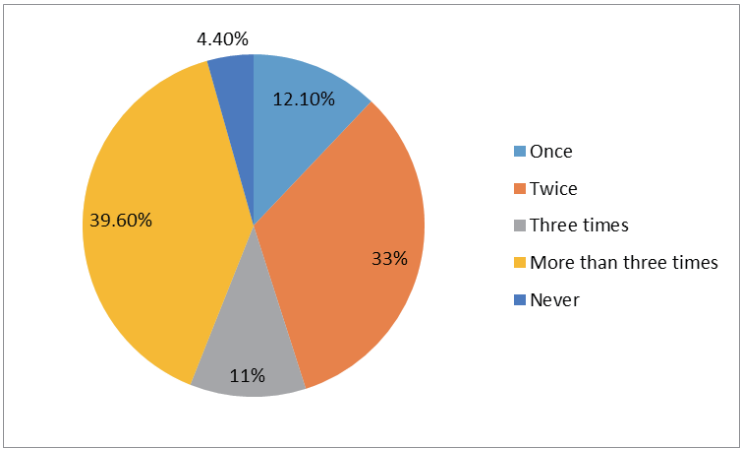


Figure 11. The percentage of farmers who attended trainings a different number of times

The technicians and farmers who participated learned about rice cultivation techniques, agricultural machinery operations, and maintenance techniques. They were able to apply such knowledge and technology to improve production levels and technical know-how in Guinea-Bissau. During each phase of the ATCP, the expert team recommended a number of trainees to come to China and participate in thematic training sessions on different rice planting technologies, as part of the agricultural management- and technology-related seminars and training programs that China carries out each year.

Across Africa, women play an indispensable role in agricultural production activities; however, at the same time, the issue of gender inequality is pervasive. Guinea-Bissau is no exception. As shown in Table 3, during field visits to farmer associations, farms, and villages in Guinea-Bissau, it was found that there were higher numbers of women both in the overall demography and among those engaged in agricultural production activities. These women had actively participated in the training and other activities organized by the ATCP. In Guinea-Bissau, it is women that are responsible for domestic work and agricultural production. But as such, they also have very little say and limited opportunities for education. The proportion of female staff working in national institutions is also very low. The ATCP has significantly improved women's agricultural skills and knowledge, thus indirectly enhancing their decision-making abilities and social status in their families through capacity building.

Table 3. Female to male ratio from the research team's field research observations

Communities/Organizations	Female	Male
Campossa Farmer's Association	400	19
Coiatasf Village Demonstration Field	53	10
Monsode Village	401 (5-14years old) 478 (15-61years old)	309 (5-14 years old) 385 (15-61years old)

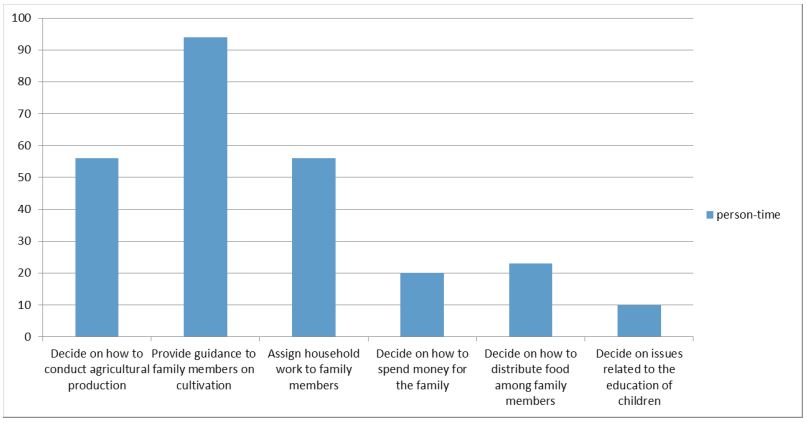


Figure 12. Numbers of people who think the ATCP has helped female members in the household in the ways listed

Survey results show that the ATCP has played a role in enhancing female family members' decision-making power (Figure 12). Among the six aspects determining the ATCP's role in helping female family members, 94 respondents said the project has enhanced female members' ability to provide guidance to family members on cultivation, followed by "decision-making on how to conduct agricultural production" (56 respondents) and "assigning household work to family members" (56 respondents). In terms of "decisions on how to spend money for the family", "how to distribute food among family members", and "issues related to the education of

children", there are fewer positive responses. It can be seen that the ATCP's impact on female members in the household is primarily related to agricultural production.

During field visits, the research team interviewed a number of women holding certain positions in the agricultural associations of their area, including Ms. Maria (President of the Campossa Farmer's Association), Ms. Hannah (Cashier of the Campossa Farmer's Association) and Ms. Famata (Cashier at the AAFAM Agricultural Association in Monsode village). Working with the Chinese experts of the ATCP has allowed female members to develop their agricultural production capacities and enhance their influence in their respective positions.

IV. Conclusions

As a prototypical example of China's agricultural assistance modalities, the Guinea-Bissau ATCP has been in operation for 18 years and focused on four areas of work. Its results have been on the whole positive:

1) Agricultural technical training. Different forms of agricultural technical training have been provided, targeting a diversity of groups and organizations. Through classroom teaching, on-site demonstrations, and one-on-one guidance, locally-adapted knowledge and agricultural production technologies were extended to nine demonstration sites and their neighboring areas in three regions of the country. Such trainings covered rice cultivation, agricultural machinery, and maintenance techniques. A series of training materials were also developed. Tens of thousands of farmers and technical personnel have been trained.

2) Rice variety breeding and extension. Through several years of breeding experiments, "Sabe-12" was identified as the improved rice variety suitable for Guinea-Bissau's environment, impressed and praised. "Sabe-12" has not only become the most popular rice variety in Guinea-Bissau but is also a favored variety in neighboring countries.

3) Development of rice cultivation demonstration sites. The ATCP developed a number of rice cultivation demonstration areas and conducted demonstration activities based on relevant rice cultivation techniques. Working together with local associations in the demonstration area, they extended improved rice varieties and agricultural technologies through a number channels, further helping to expand the project's reach. Major media outlets in Guinea-Bissau, including the national television station, the newspaper "The Última Hora", and others have reported on the ATCP. The local society is largely aware of the ATCP and the fact that the project enjoys high popularity in rural areas.

4) Management and distribution of project materials. The ATCP has provided a number of agricultural resources and small-scale agricultural machinery, depositing new technologies and ideas into local farming activities. This has been acknowledged and welcomed by local farmers. The project materials have also laid a solid foundation for local agricultural production activities.

Throughout this case study, five major results of the ATCP have been identified. First, the ATCP has contributed to Guinea-Bissau's national development priorities and responded to farmers' actual needs in agricultural production. It is also consistent with the international community's goal of promoting the development of the country. The ATCP has moreover made positive contributions to Guinea-Bissau's national agricultural development and its peoples' livelihoods. Second, the project promoted agricultural technology suitable for local production conditions, which improved the level of technology and mechanization as well as farmers' income levels. In this way, the ATCP has played a role in contributing to poverty reduction across the country. Third, through consistent breeding for many years, rice varieties suitable for the local environment have been selected and extended, thus promoting hunger mitigation in rural areas and food security across the country. Fourth, through capacity building activities, a large number of agricultural technical personnel have been trained and women have improved their familial and social status. The ATCP has worked closely with local communities and farms on trainings, demonstrations, and the extension of agricultural varieties and technologies. They have established partnerships that have effectively mobilized farmer participation in rice cultivation. An increasing amount of farmers now hope that the expert group could develop demonstration sites in their regions and other autonomous regions. Through joint efforts by China and Guinea-Bissau, the ATCP

has achieved sustainable development.

At the same time, the survey results show that all respondents were "very satisfied" or "satisfied" with the various project activities, including demonstrations, applications, training, and the provision of agricultural materials. They expressed satisfaction with the project overall. Over the years, the ATCP has accumulated a wealth of experience for China's agricultural assistance and has laid the foundation for more fruitful outcomes in the future. Nevertheless, it still faces many challenges, such as the instability of the political and economic environment in Guinea-Bissau, the limited allocation of personnel, insufficient communication with international societies, and the prohibitive cost of applying technology at the farmers' level. These issues need to be addressed in the implementation of the project in the future.

V. Contributions

The Guinea-Bissau ATCP has been operating in one of the most difficult rural areas in West Africa for nearly two decades. The ATCP has not only played a positive role in promoting local peoples' livelihoods and socio-economic development, but also integrating into the community's daily production activities and forming longstanding partnerships with local stakeholders. Chinese experts have managed to overcome language barriers and adapt to the challenging living conditions, while effectively meeting the needs of farmers. This has in turn promoted Guinea-Bissau's independent agricultural development capacity.

1. Providing Demand-Driven Agricultural Assistance to African Countries

The Guinea-Bissau ATCP aims to meet local farmers' demands for rice cultivation and agricultural machinery. The approach and activities of the project align with Guinea-Bissau's official development plans, adapted to the conditions of local agricultural development and for meeting farmers' demand for agricultural knowledge and technology. Thus, the project has been recognized by various stakeholders in Guinea-Bissau.

The agriculture sector of the country is composed of traditional and small-scale farming. The low literacy rate, lack of basic agricultural knowledge, low levels of cultivation technologies, and shortage of agricultural resources and tools, among other things, have imposed additional requirements for agricultural projects. Concerning project components and delivery methods, Guinea-Bissau is not suitable for advanced or large-scale agricultural technology; neither are classroom teaching and written materials sufficient for disseminating agricultural knowledge. Therefore, besides indoor training activities, Chinese experts combined demonstrations with technical guidance, thus providing on-site technical training and guidance in rice cultivation. The topics of these demonstrations include raising and transplanting rice seedlings, rice disease and pest identification, and the operation and maintenance of tractors, pumpers, and other agricultural machinery. This has ensured that farmers from surrounding areas benefit from these activities and that farmers who have mastered such technology and cultivated such knowledge are able to promote local rice production. Chinese experts are dedicated to promoting applicable agricultural technology to meet local demands and helping to reduce poverty, raise household income, and develop the agricultural sector.

China has been providing sustainable and demand-driven agricultural assistance for African countries. The Guinea-Bissau ATCP, as one example of China's agricultural cooperation projects, has met the demands of its host country to improve production and promote local agricultural development.

2. Improving the Recipient Country's Capacity to Develop the Agricultural Sector

Capacity building is one of the priorities of the ATCP and includes rice cultivation training, training for agricultural machinery operation, and maintenance training in demonstration areas. Chinese experts have also developed textbooks and filmed audio-visual materials for training, as well as provided one-on-one guidance at local farmers' households. Through these training activities, technicians and farmers have learned practical techniques, such as rice cultivation methods and machinery operation and maintenance techniques, and applied them in their production. This has helped improved rice yields, household income, and participants' social status. They are willing and able to grow rice of better quality and with higher yields and look forward to

more opportunities to participate in training activities.

Through local technicians, agricultural technologies have been extended to local farmers. The farmers who participated in training activities have introduced the techniques to family and friends, which has helped mobilize more people to participate in rice cultivation and expand the ATCP's coverage. Many technicians who have participated in the project have been hired by agricultural management departments in Guinea-Bissau, state-owned farms, and other institutions. A large number of technical personnel have become technical officials in Guinea-Bissau's agricultural system. Many farmer associations and other civil organizations that cooperate with the ATCP have expanded their scope and scale, becoming centers for technological dissemination and extension. They are active at the forefront of Guinea-Bissau's agricultural production.

In line with the principle "Tech One to Fish", capacity building has been one of the major objectives of China's assistance to African countries. It aims to nurture local agricultural talents, enhance their ability to develop independently, and share technology and experience. Agricultural technology, experience, and human resources are the foundations for recipient countries to develop their agricultural industries independently. Personnel training and technology extension not only help achieve the development goals of host countries, but also are consistent with China's concept of development cooperation. This improves the capacity of other developing countries to cultivate their agricultural sectors.

3. Maintaining Long-Term Community Partnerships

After a long period of communication, Chinese experts have been able to talk with farmers in Creole instead of communicating through Portuguese interpreters. For farmers and communities in demonstration areas, Chinese experts have provided training and helped them deal with problems in agricultural production, thus making sure that their daily agricultural work goes well. The ATCP, as China's major long-term assistance project for Guinea-Bissau, has for 18 consecutive years reached out to local communities and become an indispensable partner to local beneficiaries. This has ensured positive and long-term support for local agricultural development.

For the past 18 years, Chinese experts have worked and lived in the Bafatá region in East Guinea-Bissau. They stay close to ordinary farmers and fields in Bafatá and to demonstration farms and farmer associations. Compared with Bissau, the country's capital, the Bafatá region is closer to the other two demonstration regions, making it more convenient for experts to deal with any emergencies. This is why the experts in the beginning chose to live outside the capital city.

Long-term presence in local communities has allowed Chinese experts to establish direct communication with farmers, develop a deep understanding of local conditions and needs, and establish long-term partnerships with farmers and communities. For farmers and communities in the demonstration areas, Chinese experts have ensured the effectiveness of their daily agricultural production and have provided technical guidance when needed.

To facilitate technical cooperation projects at the community level, cooperation providers are required to commit long-term and regularly supply capital and human resources to meet the recipient country's demand. This imposes higher requirements for the provider. Experts in the field also face challenges in terms of cultural and language differences. Yet for agriculture, a time-consuming sector with long production cycles, providing long-term technical support for communities can guarantee sustainable and measurable outcomes. The ATCP is based in communities and is dedicated to long-term technical cooperation with Guinea-Bissau. This cooperation has ensured that agricultural knowledge and technology is extended on a large scale, thereby laying a solid foundation for local agriculture development.

VI. Recommendations

1. Strengthen Exchanges, Communication, and Cooperation

Over the past two decades, China's ATCP in Guinea-Bissau has had a positive impact on local peoples' livelihoods and Guinea-Bissau's agricultural development. At the same time, other donors and international development agencies have provided various forms of support for Guinea-Bissau's agricultural development. However, few of them have claimed knowledge of the ATCP and there has been little communication between them, including from domestic agricultural research institutions. Going forward, it is advisable that the ATCP and other Chinese agricultural cooperation projects strengthen their communications and actively look for opportunities to carry out multi-level exchanges with other provider countries, international development agencies, and local institutes such as the National Institute for Agricultural Research (INPA) and Rural Engineering National Directorate in Guinea-Bissau. For example, China could actively participate in global and regional dialogues on international development cooperation, in which it could promote its experience and the outcomes of its development cooperation projects. China would, in turn, learn from others about different approaches to development cooperation policy development. China may also use the communication mechanisms of international development partners in recipient countries, thereby enhancing mutual understanding regarding other countries' programs and projects. In addition, China could take stock of its development cooperation projects and conduct exchanges with different developmental partners in the same field. Through exchanges and cooperation with international development partners, China's own approach could become better understood by such partners. Everyone involved could thus learn from each other's experience and successful practices. Such exchange can help to expand the influence of China's projects. Moreover, feedback from the international community about its projects can help China improve its approach and enhance coordination with the international community in recipient countries.

2. Continue Exploring Ways to Enhance the Sustainability of Agricultural Assistance

For agricultural assistance projects to be self-sustaining, hybrid varieties and plantations are not enough. Irrigation, market access, and more broadly, an entire value chain is necessary to keep operations running. A systematic approach is needed for more strategic and long-term planning so that key facilities and processes are not left out. This in turn requires tools and approaches that can facilitate such engagement, such as local agricultural development plans and institutions. Such plans and institutions are to ensure synergy building from the inception and feasibility phases to implementation and completion. For ATCPs, which focus on spreading agricultural techniques in local communities rather than commercial operations, experts have become crucial for their sustainability. It is believed that the agricultural knowledge and techniques taught by Chinese experts will still be used after they leave the country. Providing more support for South-South Cooperation in the field of agriculture, such as links to other public and donor programs, is another way to contribute to Chinese agricultural assistance projects.

Annex 1

a. Guinea-Bissau Central Governmental Official Interview Guideline

1. What are the current development priorities in your country? Is the project consistent with the priorities? If so, how?

2. What is the current poverty reduction policy in your country? Is the project consistent with the policy? If so, how?

3. What are the current agricultural development policies in your country? Is the project consistent with the policy? If so, how?

4. What do you think is the most important contribution of this project to your country?

5. Could you tell us something about the nationwide promotion of Chinese varieties and techniques? How many regions have been covered by this promotion? How many farmers have adopted Chinese varieties and techniques? What role did the central government play during the promotion process?

6. Do you think the varieties and techniques introduced by the project are helpful to the agricultural development and food security of your country? If so, how?

7. Do you think this project has contributed to the increase of agricultural product supply in the market? If so, how?

8. Through cooperating with the Chinese project, have you identified any needs or possibilities to change the way you cooperate with other institutions or adjust the way you cooperate with other development partners. Have you identified any policy gap because of the project?

9. Have you seen any reports about the project in national mainstream media? If so, how did they report on this project and what do you think of it?

10. In general, what do you think about the project? Do you think this project has played an effective and efficient role in promoting agricultural development of your country? Do you expect China to continue to provide such support to your country in the future?

11. Did you work closely with Chinese colleagues during the project? Did this project facilitate other cooperation projects between the two countries in agriculture?

12. What can the Chinese side do more to support the project? What can the central government of Guinea-Bissau do more to support the project?

b. Guinea-Bissau Local Governmental Official Interview Guideline

1. What are the current development priorities of the sector/region? Does the project support these priorities? If so, in what ways?

2. What is the current poverty reduction plan of the sector/region? Does the project contribute to the implementation of the plan? If so, in what ways?

3. What is the current agricultural development plan in the sector/region? Does the project contribute to the implementation of the plan? If so, in what ways?

4. What do you think of the equipment and materials provided by China? Did they meet the local agricultural development needs? How about their quality? Do they work well?

5. Do you think the varieties and techniques introduced by the project are helpful to the agricultural development and food security of the sector/region? If so, how?

6. Do you think this project has contributed to the increase of agricultural product supply in the market? If so, how?

7. As far as you know, are there any new agricultural production organizations that have been established in the sector/region due to this project? If so, please tell us something about these organizations.

8. Over the past 5 years, has the scale of the existing agricultural production organizations in the sector/region increased in general? Did this project contribute to that? If so, how?

9. Over the past 5 years, has the productivity of the agricultural production organizations in the sector/region been improved? Did this project contribute to that? If so, how?

10. Has poverty been reduced in the sector/region in the past 5 years? If so, what do you think contributed to it? Did the project play a role? How? If possible, could you please share with us the annual figures of poverty and hunger rate in the sector/region for the past 5 years?

11. Is this project helpful for increasing farmers' income in the sector/region? How has this project changed the agricultural net income, non-agricultural income and overall income structure of farmers respectively? How has this project changed the agricultural employment rate in the sector/region? Do you have the annual figures of these categories?

12. Through cooperating with the Chinese project, have you identified any needs or possibilities to change the way you cooperate with other institutions or adjust the way you cooperate with other development partners. Have you identified any policy gap because of the project?

13. Do you think such cooperation modality is sustainable? Can this modality be borrowed by other agricultural assistance projects in the future? Why or why not?

14. In your opinion, what are the short-term and long-term benefits and challenges of this project? Are the benefits of this project sustainable? Why or why not?

15. Have you seen any reports about the project on local mainstream media? If so, how did they report on this project and what do you think of them?

16. In general, what do you think about the project? Do you think this project has played an effective and

efficient role in promoting local agricultural development? Do you expect China to continue to provide such support to the sector/region in the future?

17. Did you work closely with your Chinese colleagues during the project? What do you think of the collaboration? Did this project facilitate other cooperation projects between the two countries in agriculture?

c. International Organization Interview Guideline

1. What do you think of the role of China's foreign aid in this country in general?

2. What is the mandate of your office in this country? Do you think the Chinese project is in line with your mandate? If so, how?

3. Have any of your colleagues visited the project? Do you think the varieties and techniques introduced by the project are helpful to the agricultural development and food security of this country?

4. Has there been any collaboration between your organization and the project? If so, what was it like? What do you think of the collaboration?

5. Do you know about the modality of such a project and do you think it is sustainable in the future? What do you think are the short-term and long-term benefits and challenges of this project?

6. What do you think of the approach, results and effects of Chinese agricultural aid? To what extent is it similar with or different from that of Western countries?

7. Are there any other comments or suggestions that you would like to provide to this project?

d. Guinea-Bissau Local Counterpart Interview Guideline

1. What do you think of the equipment and materials provided by China in general? Did they meet the local agricultural development needs?

2. Have you been involved in the crop seeds breeding work with Chinese experts? If so, what challenges did you face during this work and how were they solved? What supporting measures did your organization provide to facilitate this work? What are the experiences and lessons of the breeding work?

3. What do you think of the methods of the breeding work? Are the methods scientific, efficient and effective?

4. What do you think of the results of the breeding work? Are the new seeds suitable for the local natural and technological conditions? Compared to the traditional seeds, what are the differences between their yields? What are the advantages and disadvantages of the new ones?

5. What is the role of your organization in the farmer trainings, technician trainings and other trainings (if any)? If your organization was involved in organizing the trainings, how did your organization select farmers and technicians to participate in the trainings and how did you motivate them to do so?

6. Do you think the approaches of the trainings effective? Why or why not?

7. How many technicians in your organization have participated in the trainings? Do you think the trainings have improved their working capacity?

8. Which Chinese crops varieties were demonstrated here? How many hectares of land were used for each variety demonstration respectively?

9. Did the cultivation demonstration successfully show these advantages of the Chinese varieties and techniques? If so, how did the demonstration achieve this? If not, what do you think needs to be done to achieve this goal?

10. Do you think the Chinese cultivation demonstration has advantages over the other methods? If so, what are the advantages? If not, why? If you think the cultivation demonstration doesn't have advantages, why?

11. Could you estimate how many farmers, technicians and governmental officials have been to the demonstration fields? Did they show interest in the demonstration?

12. Through cooperating with the Chinese project, has your organization identified any new ways to improve agricultural production and internal management, which made you and your colleagues work more efficiently? If so, how?

13. Do you think such cooperation modality between your organization and Chinese colleagues is sustainable? Why or why not?

14. In your opinion, what are the short-term and long-term benefits and challenges of this project? Are the benefits of this project sustainable? Why or why not?

15. What does your organization think of this project in general?

e. Guinea-Bissau Community Representatives Interview Guideline

1. Personal information of participating community representatives

2. How many households are there in this village? What's the total population? How many men and women? Which ethnic groups are there in this village and what's the population of each of them?

3. What was the average net income of the farmers in 2010 and 2014 respectively?

4. How many farmers can read in the village? How many of them graduated from elementary school, junior secondary school, vocational school and senior secondary school respectively?

5. Land use in the village

Type of land	Hectares
Total land	
Farmland	
Paddy fields	
Dry lands	
Woodland	
Orchard	
Land for livestock or poultry raising	
Homestead	
Other land (please specify)	

6. Is there any road access to the markets nearby?

7. Is there access to electricity and clean water in the village?

8. What are the main industries in the village? Is there manufacturing in the village? In terms of agriculture, what are the main activities in the village (crop farming, livestock and poultry raising, forestry, fruit production and fishery)?

9. What are the major development challenges of the village?

10. How many people in the village mainly engage in crop farming, livestock and poultry raising and factory work? How many men and women in these jobs respectively? Is there any change after the project conducted? If so, did the project contribute to it?

11. What are the major administration or management organizations (e.g. village committee or similar organizations) in the village? What about agricultural production organizations? When were they established and how many members are there in these organizations respectively?

12. Has the work of the village administration or management organizations become more effective and efficient over the past 5 years? Did the project contribute to it? How?

13. Has the scale of the existing agricultural production organizations in the village increased in the past 5 years? Did the project contribute to that? How?

14. Has the project changed the way organization members collaborate? If so, how?

15. Are farmers now able to organize activities such as trainings and agricultural technique mutual-help by themselves? Have farmers established any new agricultural production organizations? Did the project contribute to these? How?

16. Once the project ends, do you think villagers would be able to continue to use the varieties and techniques introduced by the project by themselves? Why or why not?

17. How many villagers do you think have adopted the new seeds and new cultivation techniques introduced by the project? Do they use these seeds and techniques very often? Which seeds and techniques are especially popular? Why? What do you think are the main reasons for some of the new seeds and techniques not being widely used?

18. Did the community administration or management organizations work closely with Chinese experts during the project? Do you think Chinese experts' work is helpful to the agricultural development of this village?

19. Do you think the current way of collaboration between the village and the Chinese experts can continue in the future? Why or why not?

20. What does your organization think of this project in general? (write down the comments from each organization)

21. How do men in the village participate in agricultural production activities and in household chores? How do women in the village participate in agricultural production activities and in household chores?

22. Ask female representatives to participate in making the female daily activity charts before and after the project.

23. Ask community representatives and Chinese experts to participate in making the seasonal calendars before and after the project.

f. Technician Interview Guideline

Name: _____ Gender: _____ Year of birth: _____

Contact information: _____ Address: _____

1. Are you a full-time or part-time technician? If you are a part-time technician, what is your main job?

2. How long have you been working as a technician? Which organization do you work for? What is the area that your promotion work covers?

3. Why did you decide to take part in the trainings? Which techniques delivered by the trainings attracted you the most?

4. What are the techniques that you have learnt from the trainings? Are they useful? Are the training methods (lecture and assessment etc.) effective? Why or why not?

5. Have you actively promoted the techniques that you acquired from the trainings? If so, which ones? How did you promote them? If not, why? During the promotion process, what were the challenges that you encountered?

6. Among all the techniques that you acquired from the trainings, which one is the most useful for you? Which one is the most popular in your village? Why?

7. In your opinion, has this project been helpful for improving the skills of local technicians? If so, to what extent?

8. Overall, what do you think about the training part of this project?

g. Guinea-Bissau Farmer Interview Guideline

1. Have you ever been to the demonstration fields of the project? If not, have you been interested in it? Why?

2. Have you used the agricultural machines of the project? Are they durable and easy to operate? Do they work well? Did they help you? How?

3. Have you used the fertilizers or pesticides provided by the project? Are they useful? If so, how?

4. Have you or your family attended the trainings delivered by the project? If so, how many times? Who in your family usually attended them?

5. Why did you or your family decide to take part in the trainings? Which parts of the trainings attracted you?

6. Do you think the techniques introduced in the trainings have been useful for your field work? If so, could you give some examples?

7. Have you or your family ever received any one-on-one technical guidance from Chinese experts? Where did you usually receive it (e.g. in the training room, the demonstration field, your house, your own field or somewhere else)? What have you learnt from the technical guidance? Do you think it is helpful? Why or why not?

8. Have you used the seeds and cultivation techniques provided by the project? If so, how often? Do you think they are helpful to you?

9. Are you a cultivation demonstration household now? If so, why did you decide to become one?

10. Which new seeds and cultivation techniques have you used? Please name them. How many hectares of land are used to grow the new seeds?

11. How did the yields change after you used the new seeds and techniques? What about other changes?

12. Compared to the seeds you used to use, what are the advantages and disadvantages of the new ones?

13. Are you planning to increase the use of Chinese seeds and cultivation techniques in the future? Why or why not?

14. Have you discussed with your friends and neighbors about using Chinese seeds and cultivation techniques? What do they think of your results? Are there any other farmers that also used Chinese seeds and techniques like you? If so, what do they think about the Chinese seeds and techniques?

15. Overall, how has the Chinese project changed your and your family's life? Are you happy to be working with Chinese experts and are you happy with the project in general?

16. Do you think this project has played a role in leading to the changes in your household agricultural production since 2010? Why?

17. Do you think this project played a role in leading to the changes in your household income since 2010? Why?

Annex 2

Questionnaire for Households for the Case Study on Chinese Agricultural Technical Cooperation Project in Guinea-Bissau

Questionnaire No._____

Name:_____ Contact information:_____

Date:_____ Investigator's name:_____

Address: _____ Village _____ Sector _____ Region _____ Province

Instructions:

Households within the communities where the project sites are located should account for 70% of all the respondents;

Female respondents should account for at least 30% of all the respondents.

Filled in by the investigator
Household in the communities of the project sites? (1) Yes (2) No
Gender of the respondent: (1) Male (2) Female

A. Basic information
1. In which year were you born?

2. Education level:
(1) Completely or nearly illiterate (2) Elementary school (3) Junior secondary school
(4) Technical secondary school (5) Senior secondary school or above

3. Changes in your family before and after the assessed project period (2010-2014) [For the families living in the project area between 2010 and 2014]

	2010	2014
How many male and female are there in your family?		
How many of your family members do farm work?		
How many female members in your family do farm work?		
How much does your family make each month? (XOF)		
On average, how much does your family spend every day? (XOF)		
Are the quantity and quality of food enough for your family?		

4. Changes in household agricultural production before and after the assessed project period (2010-2014) (yield: kg/ha; output: kg; revenue: XOF) [For the families living in the project area between 2010 and 2014]

Type	2010					2014				
	Yield	Output	Household consumption	Sales volume	Sales revenue	Yield	Output	Household consumption	Sales volume	Sales revenue
Rice										
Cassava										
Maize										
Other crops (Please specify)										
Livestock and poultry										
Vegetables										
Fruits										
Others (Please specify)										

5. Changes in non-agricultural income before and after the assessed project period (2010-2014) (XOF) [If you have another job now, please answer this question]

Type	2010	2014
Wage income (as official, village official or teacher etc.)		
Business income (handicraft making, repairing or sales etc.)		
Other income (please specify)		

6. Do you think the Chinese agricultural technical cooperation project has played a role in leading to the changes in your household agricultural production since 2010?

(1) Yes (2) No (3) Hard to say

7. Do you think this project played a role in leading to the changes in your household income since 2010?

(1) Yes (2) No (3) Hard to say

B. Knowledge about the Chinese agricultural technical cooperation project

1. Do you know there is a Chinese agricultural technical cooperation project site around here?

(1) Yes (2) No

2. If yes, how did you know? (Multiple choice)

(1) Accidentally found out by myself (2) Broadcast/TV/newspapers

(3) Informed by relatives or friends (4) Participated in trainings

(5) Introduced by Chinese staff (6) Introduced by local staff

(7) Purchased agricultural products from the project sites

(8) Others (please specify): _____

C . Participation in the Chinese agricultural technical cooperation project

1. Have you ever been to the demonstration fields of the project?

(1) Yes (2) No

2. How many times have you participated in the trainings organized by the project?
(1) Once (2) Twice` (3) Three times (4) More than three times (5) Never

3. In your practical work, how often do you use the skills you learned from the trainings?
(1) All the time (2) About 5 times a week (3) 1-2 times a week (4) Never

4. What other activities of the project have you participated in? (Multiple choice)
(1) Used agricultural machines provided by China (2) Worked for the site
(3) Sold improved seeds (4) Never participated in any other activities of the project
(5) Others (please specify):

5. During your participation in all the activities above, have you ever received one-on-one technical guidance from Chinese experts?
(1) Yes (2) No

D. Effects on agricultural production and livelihood
1. How often do you use the new seeds introduced by the project?
(1) All the time (2) About 5 times a week (3) 1-2 times a week (4) Never

2. How often do you use the new agricultural techniques introduced by the project?
(1) All the time (2) About 5 times a week (3) 1-2 times a week (4) Never

3. If you have used the new agricultural techniques introduced by the project, which ones have you used? (Multiple choice)
(1) Rice seed breeding (2) High yield cultivation
(3) Direct sowing of rice (4) Diseases and pests prevention and cure
(5) Operation, repair and maintenance of agricultural machinery
(6) Knowledge in soil and application of fertilizers
(7) Others (please specify):_____

4. In your family, who has participated in the project activities?
(1) Male members (2) Female members (3) Both

5. Has the project helped female members in the family to (multiple choice):
(1) Decide on how to conduct agricultural production (e.g. which crops to grow, which seeds to buy, and which agricultural technology to use)
(2) Provide guidance to family members on cultivation
(3) Assign household work (housekeeping, farm work etc.) to family members
(4) Decide on how to spend money for the family
(5) Decide on how to distribute food among family members
(6) Decide on issues related to the education of children
(7) Others (please specify): _____

6. Has this project made you interact and cooperate more often with other farmers?
(1) Yes (2) No

E. To what extent are you satisfied with the various activities delivered by the project?

Activity	Very satisfied	satisfied	Fairly satisfied	Dissatisfied	Very dissatisfied
Variety demonstration and application					
Training organization					
Technical guidance in farmers' houses					
Providing free seeds					
Providing agricultural production materials (machinery, fertilizers, and pesticides etc.)					
Others(please specify):					
Overall satisfaction					

F. Opinions on and expectations for the Chinese agricultural technical cooperation project

1. Overall speaking, do you think this project is useful to you and your family?

(1) Yes (2) No

2. Do you expect China to continue such projects in your community?

(1) Yes (2) No, reasons:

3. What do you think is the most valuable contribution of the project?

_____

4. What do you think is the biggest challenge of the project?

_____

5.What suggestions would you like to give to this project?

_____