Chapter 8

Sustainable Food Production

8.1 **Zambian Solar-Powered Mill Program**¹

8.1.1 *Background*

Adequate and safe supply of food, especially the access to adequate, safe and affordable by low-income families is a top priority for many African countries.

Cornmeal processed from corn is the main food in Zambia, but the cornmeal market is dominated by several large commercial mills with the amount produced failing to meet the market demand, resulting in a high price. Since 2014, reduction in rainfall caused shortage in electricity supply in Zambia with hydropower as the main energy resource, and the shortage of power made it impossible for the mills to produce at full capacity, leading to the soaring price of cornmeal. In response, the Zambian government has invested a large amount of financial subsidies to lower cornmeal prices, but failed to achieve the expected effect. For example, the price for a bag of cornmeal of 25 kg in 2015 was ZMK 65 (equivalent to USD 6.50); with a government subsidy of ZMK 5 per bag, the ex-factory price dropped to ZMK 60. However, due to the serious shortage of supply, price rose up to ZMK 140 (equivalent to USD 14) in the market, which brought huge burden to the Zambian people, especially the rural population.

In addition, World Bank highlighted in the *Zambia Economic Brief* issued in September 2018 that Zambia's external debt and government-guaranteed debt stocks climbed from USD 7.9 billion in 2016 to USD 8.4 billion in 2017, USD 10.2 billion in 2018, and USD 11.4 billion in 2019. By 2019, the present value of external debt-to-GDP ratio in Zambia was expected to reach 40%. At the same time, higher bank interest rates and increasing risks in many sectors made it difficult for public welfare projects to make profits.

¹ Case source: Inclusive Development Research Center, 2019.

8.1.2 Project Overview

The Zambian solar-powered mill program aims to construct 1,583 solar-powered mills and 8 production service stations in 10 provinces within Zambia to process and produce cornmeal (or rice in some areas based on local conditions) to ease food shortage in Zambia. The 1,583 solar-powered mills that were finally constructed in 79 regions in 10 provinces in Zambia with limited access to electricity to provide high-quality cornmeal for rural residents and address the problems of the rising price of cornmeal and the lack of machines for processing. It brought an end to the current state of producing cornmeal by manual labor and guaranteed local food supply. Its success also led to a drop of 1/3 in the price of food, which was recognized as the No. 1 project from the Zambian government due to its contribution to improving people’s livelihood (Fig. 8.1).

The total amount of the contract is USD 200 million, among which USD 30 million was raised by the Ministry of Finance of Zambia, while USD 170 million was funded by a loan provided by China Development Bank (CDB) to the Ministry of Finance of Zambia.

Fig. 8.1 The location of solar-powered mills in different provinces across Zambia

Zambian Ministry of Finance arranged sovereign loans for this project. The Ministry of Commerce, Trade and Industry of Zambia and Zambia Cooperative Federation (ZCF) organized implementation respectively as the owner and the executive owner. Considering that this is a major livelihood project, CDB has charged no other fees in accordance with international practices. With medium and long-term credit insurance support from China Export and Credit Insurance Corporation (SINOSURE), China Shandong Dejian Group designed and constructed 1,583 solar mills as the EPC general contractor.

8.1.3 Actions

As one of China's first financial institutions to join the UN Global Compact and one of the active advocates for "green credit", CDB has long been committed to supporting poverty alleviation, environmental protection as well as energy conservation and emission reduction with financial products for development.

Through the combination of Zambian cooperative system and mill operation, the project formed a sustainable business model through the new practice of green and sustainable credit (Fig. 8.2).

The executive owner and operator of this project is Zambia Cooperative Federation (ZCF) which was registered in April 1973 under the joint efforts by cooperative organization, Ministry of Market Cooperation and donation organizations. Designed to enhance the lives of its members and all Zambian people by providing technical, professional, commercial and other support to empower members, ZCF is a four-level structured agency consisting of 13,000 grassroots cooperatives (providing single or

Fig. 8.2 The business model of Zambia solar-powered mill project

multiple functions), 72 regional alliances, 9 provincial alliances, and ZCF. ZCF is the top organization of the entire structure, with a total membership of over 2 million.

Based on the economic reality of rural Zambia, there are 2 kinds of business operation models for solar-powered mills: 1) ZCF members raise funds to purchase corns from famers nearby, the market or Zambian Food Reserve (FRA) and sell cornmeal to the market at the suggested price from the government, making their profits from the gap in pricing; 2) considering its impact on people's livelihood, the Zambian government requires that in addition to business operation, cooperatives with mills should also process cornmeal for villagers nearby. The villagers brought the corns used as their own food to the mills and would be charged by certain processing fees (ZMK 15–25 per bag) or corns by the cooperatives.

ZCF created a special account into which all member agricultural cooperatives needed to deposit ZMK 1,700 (about USD 170) every month continuously for 15 years. ZCF collected the funds to the Ministry of Finance for the repayment of loans. After 15 years, the solar mills will become the property of various agricultural cooperatives. Based on the performance of existing mills, the project has been quite successful.

8.1.4 Outcomes

A total of 1,583 solar mills have been built so far (for provinces producing cornmeal, all the 1,583 plants have completed construction with 1,583 sets of equipment successfully installed and tested. All the 1,583 solar mills contracted have been delivered). The implementation of this project makes a huge difference in Zambia and is seen as a milestone success for the government led by President Edgar Lungu. He commented that the project accounted for an ambitious and unprecedented initiative in ensuring food security in Zambia, especially in rural areas (Fig. 8.3).

The specific contributions from this project to food security, economic growth and environmental sustainability are displayed in Table 8.1.

8.1.5 Experience and Insights

This project is a “small but exquisite” project on processing agricultural products financed by Chinese bank for Zambia with the latter in urgent need for capitals for economic construction. It is an investment related to people's livelihood and realized by designing reasonable financing structures along with the government and private sectors. Operating in line with market principles, this project constitutes a classical case that assisted project development agencies to realize debt sustainability.

Fig. 8.3 Zambian minister of finance inspected the project

- Coordination among diversified stakeholders to realize sustainable financing and investment

National debt issues triggered by the economic growth pattern of trading off resources for growth has been a shared concern of the international community. This project introduced the involvement of multiple stakeholders, including government, banks and insurance agencies and private sectors, to innovate the business and investment model and guarantee the sustainability of project investment and financing activities.

The project was implemented by the Ministry of Commerce, Trade and Industry of Zambia and ZCF respectively as the owner and the executive owner. CDB provided loans and SINOSURE provided medium and long-term credit insurance support to minimize the potential commercial and political risks. Chinese business executed specific construction work as the technology supplier. As the operator at the later stage, ZCF provided sustainable economic returns for the project to pay loans and helped to avoid debt crisis for Zambia.

- Green finance levered local sustainable development

Starting with fulfilling the basic livelihood needs of citizens in the host country, the project used the low-cost renewable energy technologies and agricultural product processing techniques in China to help Zambia to construct a large number of new township enterprises through green finance, which improved agricultural economy while protecting people's livelihoods and promoted south-south cooperation and the sustainable development of rural areas in Africa.

Table 8.1 The specific achievements and contributions of the Zambian program on solar-powered mills

Alleviating poverty and improving welfare	After the completion of construction, the solar mills in this project effectively reduced the cornmeal price in the rural areas of Zambia by 1/3, benefiting tens of thousands of families in poverty, and finding a good market for surplus corns in rural areas. The income of rural residents was increased, which set a good example in poverty alleviation
Reducing government subsidy and financial expense on cornmeal	By the construction of a large number of solar mills that are stable and profitable, the supply of cornmeal in the market has been greatly increased, which effectively reduced the annual financial subsidies on cornmeal provided by the Zambian government and increased the disposable budget for the central government
Improving employment and the skills of workers	The implementation of the project has effectively improved employment in Zambia. 1,583 solar mills nationwide will provide at least 4,749 long-term stable jobs, which is a huge breakthrough in rural Zambia. The project contractor and the executive owner have carried out comprehensive trainings for professional engineers, lecturers, operators, and cooperative leaders among other staff and personnel from the mills, which improved local labor quality and technical skills as well as stimulated business development
Facilitating industry development and stimulating economic growth	Through the construction of the solar mills, the project brought vitality to a large amount of township businesses and improved rural economic development. At the same time, these solar mills catalyzed local economic growth through carrying out regional transactions, and their plants have gradually become local centers for small market trade
Reducing GHG	PV technologies of the project provide affordable clean energy, resulting in an annual average emission reduction of 27,633 tons of carbon dioxide, which contributed to mitigating climate change. At the same time, the successful operation of the project has enabled the local government and people to have a deeper understanding of clean energy projects, which will facilitate the development of more local renewable energy projects

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Enhancing cooperation and exchange on trade and commerce between China and Zambia	The implementation of the project promoted the exportation of advanced equipment manufactured in China and galvanized the development of support industries such as steel structure plants in Zambia

8.2 Wanbao Mozambique Rice Farm²

8.2.1 Background

Located in the southeast of Africa, Mozambique witnessed steady economic growth since the end of the civil war. Rice gradually became one of the main crops of this country. In recent years, the rice consumption in Mozambique has grown at an average annual rate of 8.6%, much higher than the consumption growth of traditional food crops such as corn (5.5%), wheat (7.4%) and sorghum (4.7%). The annual demand for rice in Mozambique is about 750,000 tons, yet only 28% of the demand could be met with domestic production, leaving a huge gap between supply and demand, causing high dependency on imports. About 900,000 hectares of land in Mozambique is suitable for growing rice, among which the developed land covers an area of about 310,000 hectares with 97% cultivated by individual farmers. There is still a lot of room for improvement in production efficiency. Developing and promoting the rice industry are critical to ensuring food security in Mozambique. In addition, there are favorable natural conditions for the development of agriculture in Mozambique. Promoting rice cultivation in Mozambique is of great significance in helping African countries solve food security problems.

² Case sources:
[1] China-Africa cases/ programs, China-Africa Economic and Trade Expo, China-Africa Development Fund. https://www.caetexpo.org.cn/html/2019/nyl_0614/169.html.
[2] China Railway 20 Bureau Group Corporation.

8.2.2 Project Overview

Being put into construction in July 2011, Wanbao Mozambique rice farm is currently China's largest program on growing rice in Africa, as well as one of the 13 priority projects in production capacity cooperation between China and Mozambique.

Located in the city of Xai-Xai in Gaza Province, Mozambique, Wanbao Mozambique rice farm covers an area of 20,000 hectares with a plan to cultivate crops on 13,000 hectares of farmland. It is a comprehensive agricultural-industrial facility that integrates farmland development, grain production, warehousing, processing and sales with a focus on rice cultivation supplemented by the cultivation of various grain crops and cash crops. Wanbao Mozambique rice farm has advanced rice cultivation technologies introduced from China to Mozambique without increasing Mozambique's debt, thus making tremendous contributions to the improvement of local people's livelihoods and economic development.

8.2.3 Actions

In 2011, Wanbao Grains and Oils Company, a private business from China, cooperated with the Mozambique government to initiate the planting of rice, develop farmland water conservancy facilities and built an industrial base for crop production and processing. In 2012, China-Africa Development Fund became a shareholder as a commercial equity investment fund to provide financial support for Wanbao Mozambique rice farm. China-Africa Development Fund is initiated by the Chinese government at the Beijing Summit of the Forum on China-Africa Cooperation in 2006. It is China's first equity investment fund that focused on investment in Africa. The fund prioritizes investment in infrastructure, basic industries, agriculture, manufacturing, and other areas with an important impact on the economic and social development of African countries and those that could help African countries to realize independent economic development. In 2017, China Railway 20 Bureau Group Corporation signed a cooperation agreement with China-Africa Development Fund and began to manage the Wanbao Mozambique rice farm.

The project is operated and managed by an "enterprise + small farm" partnership under which cooperative agreements were signed with local farmers. According to the agreement, part of the cultivated land would be transferred to local farmers with capital, instruments, agricultural machinery and technologies being provided. The rice produced would be purchased for further processing. Harvested rice will be processed in the Wanbao farm. Inside the factories, a full-set of equipment on rice processing imported from China was operating. After cleaning, shelling, milling, screening, and color-selecting, the rice was processed into commodities for thousands of households, the "Born Guston"—this kind of grainy and sweet-smelling rice was named by Armando Gueuza, Mozambique's president at the time and has become a famous brand in Mozambique.

8.2.4 Outcomes

Through years of construction, by now, the site of Wanbao rice farm has been transformed from grassland and shrubs to a 10,000-acre farmland. In the planting season for 2018–2019, Wanbao rice farm grew 2,400 hectares of rice in cooperation with 500 farmers. The rice output was increased from 1.5 to 7 tons/ha, hitting historical records in planting area, average yield per unit, and number of farmers benefited.

Wanbao rice farm also helped Mozambique to realize localized production of important agricultural products. By now, operators of Wanbao rice farm has basically completed the construction of supportive facilities related with agricultural production, including ditch, culvert, pumping station and warehouse. Seed resources under this project were updated and planting technologies on machine-transplanted seedling, ratoon rice and seed soaking were perfected, which improved agricultural productivity. In addition, based on local plans for development, Wanbao rice farm helped farmers to learn about agricultural production technologies. Since 2012, it has provided training for 1,500 households in planting rice. Farmers who used to depend solely on nature for harvest, are now cooperative farmers with expertise in agricultural machinery and techniques as well as promising income.

The partnership model of “enterprise + small farm” was adopted by Wanbao rice farm, which hired over 900 local employees at its busiest season, bringing benefits to 500 households, effectively improving local income, improving people’s life and gaining trust from local residents (Fig. 8.4).

The achievements of Wanbao rice farm were highly received by the leadership from Department of Agriculture and Food Security in Gaza Province. It is conceived

Fig. 8.4 Thumb-upping the first training on agricultural technologies by China Railway 20 Bureau Group Corporation (Source: ThePaper.cn)

that the project outcomes of Wanbao rice farm helped to address the shortage in food supply in Mozambique and improve the efficiency of agricultural production. The Mozambique government appreciated China and Chinese businesses for their help. This project also signified fruits of mutual benefits and friendly development harvested in the cooperation between China and African countries.

Wanbao rice farm stood up to its CSRs. In the past years, it sponsored the construction of 2 schools and 1 police station, providing vehicle service for local governments, organizations and communities, helping to improve local security and education, and donating rice in support of activities carried out by local organizations and associations for youth, the disabled and women.

In March 2019, Cyclone Idai landed in north-central Mozambique, causing casualties and huge damage to property. China-Africa Development Fund, Fundo de Cooperação e Desenvolvimento China-Países de Língua Portuguesa and Wanbao Mozambique rice farm donated 100 tons of rice at the first time to disaster-stricken area in Mozambique, and worked with the United Nations Food Agency and Chinese merchants' association in Mozambique to offer full support to disaster relief efforts.

8.2.5 *Experience and Insights*

- Green finance aids technological transfer related with people's livelihood. Green finance aids technological transfer related with people's livelihood. Green finance aids technological transfer related with people's livelihood.

While introducing the advanced technologies of China, Wanbao Mozambique rice farm actively promoted the localization of technologies. As a financial investor, China-Africa Development Fund provides funding support for Wanbao rice farm by means of equity investment. As an industrial investor, China Railway 20 Bureau Group Corporation operated and developed the rice farm with capital and facilitated to address its funding issues. Without increasing the debt of local governments, Wanbao rice farm introduced China's advanced technologies into Mozambique, motivated the involvement of local farmers, and taught planting technologies to help them get rid of poverty, creating both economic profits and social benefits. The project model is "replicable, easy to manage, and effective", which can be quickly promoted in Africa with favorable rice-planting conditions.

- Catalyzing multilateral cooperation in a larger scale

On June 27, 2019, China International Center for Economic and Technical Exchanges, China National Hybrid Rice R&D Center, African Union, United Nations Office for South-South Cooperation, United Nations World Food Programme, Bill & Melinda Gates Foundation, and Alliance for a Green Revolution in Africa (AGRA) signed the Initiative on Strengthening South-South and Tripartite Cooperation on Rice between China and Africa in Changsha, Hunan

Province of China. All parties advocated to adhere to the UN principles of south-south cooperation and tripartite cooperation, actively explore the comparative advantages of each partner and strengthen cooperation on rice between China and Africa.

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