

Promoting Food System Transformation for SDGs

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Abstract: End poverty in all its forms and zero hunger are priority of the UN Sustainable Development Goals (SDGs), but currently there are still 720–811 million people suffering from hunger. Unless the global community works together to transform food systems, the Goal 1 and the Goal 2 of the UN 2030 Sustainable Development Goals—end poverty in all its forms and zero hunger are likely to be further off track. The UN has launched a number of initiatives to achieve the goals of sustainable development, including the UN Decade of Action on Nutrition, the UN Decade of Action on Sustainable Development Goals, and the UN Decade of Family Farming. All of them aim to transform food systems. The international community has reached a consensus to advance food system transformation in parallel with five action tracks including: ensuring access to safe and nutritious food for all; shifting to sustainable consumption patterns; promoting production methods that have a positive impact on the natural environment; promoting equitable livelihoods; and strengthening resilience to vulnerability, shocks and stresses. China has made a remarkable contribution to the UN Sustainable Development Goals of end poverty in all its forms and zero hunger, which deserves to be thoroughly studied, summarized and learned by the international community. In the process of promoting the transformation and development of the food system, promoting digital technology and developing smart agriculture has become one of the main battlegrounds. This paper proposes four suggestions for the transformation of China's food system: take advantage of the Food Systems Summit to step up publicity and promote the shift of thought among all people to implement the concept of a sustainable food system from production to consumption; make use of the 14th Five-Year Plan for the development of digital agriculture to complete and improve the national agricultural database and build a solid foundation for the scientific promotion of the integration of smart agriculture and the rural revitalization strategy; take full advantage of China's extensive use of new technologies and encourage cooperation between research institutions and enterprises to jointly cultivate new varieties of good quality and adaptability to the local ecological environment; promote the combination of farmers + Internet + applications; and strengthen international cooperation to bridge the digital gap so that digital technology can bring the benefits of modern technology to more countries and people around the world.

Keywords: food systems; end poverty; zero hunger; sustainable development goals; digital technology

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1 Introduction

This paper is based on the keynote speech at the 2021 Annual Conference of Big Data Working Committee of Geographical Society of China, which was held on September 22–24, 2021 in Yanchi county, Ningxia autonomous region.

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2 Achieving the United Nations Sustainable Development Goals is a Big Test

In 2015, the United Nations adopted the 2030 Sustainable Development Goals, which set out 17 goals and 169 sub-goals¹. Among the 17 goals, End poverty in all its forms and zero hunger are the two priorities, which are the major targets of the global sustainable development action. However, six years later, despite of the tremendous efforts of many countries, we have not yet achieved a satisfactory phased answer to the big test of achieving the UN Sustainable Development Goals.

In 2020, we encountered a once-in-a-century COVID-19 pandemic, which is still raging in many parts of the world. Regional conflicts are escalating, and different parts of the world have been affected by record extreme weather, such as ultra-high temperatures, wildfires, droughts, storms, floods and other serious natural disasters caused by global climate change, resulting in a global recession, and the recovery will be difficult. People in many countries and regions are still struggling, and poverty and hunger are increasing around the world.

According to the latest statistics from the Food and Agriculture Organization of the United Nations, 720–811 million people are currently facing hunger, 161 million more than that in 2019². It is clear that, unless the global community works together, the first and the second goals of the UN 2030 Sustainable Development Goals—end poverty in all its forms and zero hunger—are likely to be further off track^[1]. The international community is still concerned about the global food crises of the past half century, especially the impact of the 2007 and 2008 global food crisis triggered by the US financial crisis. In a crisis that should never have happened, the number of hungry people around the world soared to a record high of more than one billion, and became a direct drive of social unrest in more than 30 countries and regions^[2]. The history and reality of the world show that when food issues arise, poor farmers, disadvantaged groups in rural areas and marginalized ethnic minorities bear the brunt. Furthermore, serious economic and social problems will inevitably affect basic human rights such as education and health, and even threaten social stability, regional peace and national security. It is now estimated that the UN sustainable development goals will not be achieved if the international community fails to strengthen cooperation and take concerted action. This is a morally and politically unacceptable hotspot issue.

3 Food Systems Summit is an Opportunity

It is heartening that the international community has recognized that food security is fundamental to addressing all of the UN sustainable development goals. In recent years, the United Nations, relevant international agencies and the governments of its member states have done a great deal of work and launched a series of actions to achieve the goals of sustainable development. This includes key events such as the UN Decade of Action on Nutrition³, the UN Decade of Action on Sustainable Development Goals⁴ and the UN Decade of Family Farming⁵, all aimed at mobilizing the international community to promote food production and promote diverse, nutritionally balanced and healthy diets and lifestyles towards the Goal 1 and 2 of the UN Sustainable Development Goals.

In order to actively respond to the combined impact of COVID-19 and climate change, and to further organize and mobilize the international community to face the challenges of global agriculture and food security, the UN and its Member States have decided to convene Food Systems Summit in New York this year⁶, which aims to mobilize the global community to fundamentally change its mindset towards Agri-food systems—systematic and coordinated action in all aspects of food production, processing, transport, storage and consumption. To this end, the international community has also reached a consensus and decided to promote the transformation of food systems on five parallel “action tracks”,

¹ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

² <https://www.gfar.net/node/216057>.

³ <https://www.un.org/nutrition/zh>.

⁴ <https://www.un.org/sustainabledevelopment/zh/decade-of-action/>.

⁵ <https://undocs.org/zh/A/RES/72/239>.

⁶ <https://www.un.org/zh/food-systems-summit/>.

including:

- (1) ensuring access to safe and nutritious food for all;
- (2) shifting to sustainable consumption patterns;
- (3) promoting production methods that have a positive impact on the natural environment;
- (4) promoting equitable livelihoods;
- (5) strengthening resilience against vulnerability, impact and pressure.

The summit is expected to achieve the following four outcomes:

(1) develop programs of significant action and measurable progress to advance the 2030 Agenda for Sustainable Development;

(2) raise awareness and promote public debate on food system reform;

(3) develop principles to guide governments and stakeholders in leveraging their food systems to support the SDGs;

(4) establish the follow-up action and necessary review systems.

It is worth noting that the summit will be held during the 76th session of the United Nations General Assembly (September 23rd), which is undoubtedly the highest level global conference dedicated to food and agriculture after the 2009 World Summit on Food Security⁷, and its significance and impact are obvious. The international community should draw on the summit to learn from each other. Based on the summary of the successful experience of countries and regions, the international community should discuss and plan the blueprint for further action, jointly turn decisions into actions to ensure the implementation of all proposed suggestions, and promote the construction of more efficient, inclusive, resilient, and sustainable agricultural food systems.

China has made remarkable contributions to the UN Sustainable Development Goals. In particular, Goal 1 and Goal 2—end poverty in all its forms and zero hunger—deserve thorough study, summary and reference by the international community⁸. A country is based on its people, and food is the most important thing for the people. Chinese government has always upheld that food security is the most basic human right and regarded food security as a fundamental issue concerning social stability, national security, international politics and human development. Adhering to the people-centered governance philosophy, Chinese government has always attached great importance to agriculture, farmers and rural development. Over the past 40 years, China has adhered to reform and opening up, formulated a series of policies to stimulate farmers' enthusiasm, promoted the development of enterprises in towns, cultivated farmers' entrepreneurs, eradicated poverty, developed agriculture with science and technology, and revitalized rural areas⁹. At the same time, relying on the advantages of the system, with strong organizational mobilization and the administrative coordination, China achieved the targets from strategic visions to policy making, resource allocation, which fully embodies the organic combination of the integrated design of agriculture, farmers and rural development and implementation of systemetic mechanism. It promotes the integration of the primary, secondary, and tertiary industries, effectively raising agricultural productivity and realizing continuous increase of farmers' income. In 2020, China declared that it would eliminate poverty by current standards, realizing the most massive elimination of poverty in human history¹⁰. With less than 9% of the world's farm land area and 6% of the world's fresh water resources, China has successfully solved the problem of feeding 19% of the world's population and become the first country in the world to eradicate poverty and hunger 10 years ahead of schedule¹¹.

China's food security has become a ballast stone for world food security, which is a great contribution to the 2030 Sustainable Development Goals and a miracle of human development. There is no doubt that the experience China has accumulated in the process of sustainable development, including policy measures, practical experience and scientific and technological application, is an important public good. China has contributed to the

⁷ <https://www.fao.org/wsfs/world-summit/zh/>.

⁸ <https://www.un.org/sustainabledevelopment/zh/sustainable-development-goals/>.

⁹ http://www.moa.gov.cn/nybgf/2005/derq/201806/t20180617_6152394.htm.

¹⁰ http://www.xinhuanet.com/2020-12/03/c_1126818856.htm.

¹¹ http://www.gov.cn/zhengce/2021-04/06/content_5597952.htm.

international community and can be used for reference in the global action to eradicate poverty and achieve zero hunger.

At a time when the world is facing an unprecedented change in a century, when the COVID-19 pandemic is still raging globally, and when climate change is overlapping, we must also see that China's food security is also facing serious challenges—mainly due to its land resource, the impact of climate change, ecological and environmental pressures and an ageing population. China imports more than 100 million tonnes of food every year¹², while food waste and losses are very serious, amounting to 17–18 million tonnes per year for food and drink alone¹³. At the same time, there is also a certain risk of “bottleneck” in the field of cultivation. In addition, rural revitalization is essentially a major project concerning China's revitalization. The implementation of this project involves various departments and sectors, making it extremely difficult to coordinate. As one can imagine, in China, a large agricultural country with a complex ecological environment, promoting the concept of food systems, building a resilient food system, promoting agricultural transformation and high-quality development, and achieving sustainable agriculture with the goals of better production, better living, better nutrition and better environment is bound to be a daunting, complex and long-term task. We must take full account of the challenges and pressures and seek more scientific and effective ways to develop. What is the way ahead? The answer can only lie in relying on the leadership of the Central Committee of the CPC, further deepening reforms and strengthening technological innovation. The key option is to promote the modernization of agriculture—informatization, digitization, networking and intelligence—with the help of digital technology and modern information technology.

4 Promoting Digital Technology to Help Transformation of Agricultural Food Systems

Globally, accelerating the transformation of agricultural food systems is an important path to sustainable agricultural development and food security. The digital gap in global agriculture is widening as the information infrastructure and human resource shortcomings of developing countries become more serious. In many developing countries, there is a shortage of data and tools for accurate monitoring and scientific decision-making throughout the science and technology, industry and consumption chain, from plantation development and crop habitat and production, harvest, storage, trade and distribution to sustainable consumption. Of the 17 UN Sustainable Development Goals, 169 sub-goals and over 230 indicators, nearly 40% are short of data and methods. Clearly, the lack of data and methods has become a significant bottleneck in the scientific implementation, monitoring and measurement of progress towards the 2030 Agenda for Sustainable Development. Inadequate or missing human capacity to measure and value the planet's ecologically critical factors, implement environmental-economic accounting instruments and policy evaluation has become a major obstacle to the transformation of agricultural food systems. As one of the developing countries with more advanced digital technology, China is stepping up its efforts to bridge the digital gap. In the 19th National People's Congress, Chinese government has made strategic plans for building a strong network, a digital China and a smart society, and has made comprehensive plans for the construction of a digital China with five coordinated approaches to digital government, digital society, digital economy, digital culture and digital ecology¹³.

In as early as the period of the 13th Five-Year Plan, China has formulated a plan to systematically promote the development and application of digital technology. In terms of digital government construction, notable progress has been made: a nationwide integrated online service platform has gone live, and many places have realized the most convenient services; health codes were used more than 10 billion times during the COVID-19 pandemic, contributing to the resumption of production including farming. The evaluation of the UN e-Government Comprehensive Index was raised to the first tier and ranked the top 65 in the world; the e-Government Development Index (EGDI) was raised from 65th place in 2018 to

¹² http://www.ce.cn/cysc/sp/info/201907/15/t20190715_32613778.shtml.

¹³ http://www.gov.cn/xinwen/2018-03/22/content_5276511.htm#1.

45th place¹⁴. The benefits of digital society construction continued to expand: the digital transformation and upgrading of society accelerated, digital cities developed rapidly, and the level of social governance intelligence and professionalism continued to improve. Digital culture has boosted smart travel, digital cultural tourism, a mobile phone tour of China and other businesses; Belt and Road information hub for humanities exchanges, digital cultural resources sharing, digital education, online meetings, classes and student tutoring played an important role during the epidemic. The construction of digital ecological civilization has been effective: integrated monitoring of the sky and land, mountains, water, forests, fields, lakes, grass and seas, intelligent environmental protection, disaster mitigation, coasts, rivers, corporate emissions and other issues involving green development, providing scientific means and solutions. In recent years, the digital economy has become a major growth engine: the digitization of industries has driven the transformation and upgrading of traditional industries, with China's digital economy reaching 39.2 trillion yuan in 2020, accounting for about 38.6% of GDP¹⁴.

On top of this, the 14th Five-Year Plan further emphasizes the key development of digital technology. The Outline of the 14th Five-Year Plan for economic and social development and long-range objectives through the year 2035¹⁵ sets "Accelerate digital development, build digital China" as an independent chapter, emphasizing the following key areas:

(1) activate the potential of data elements, accelerate the construction of digital economy, digital society and digital government, and advance the transformation of mode of production, way of life and governance through digital transformation;

(2) widely apply digital technology to government services, promote government governance process and model optimization, and constantly improve scientific decision-making and service efficiency. In the new era, the construction of digital government not only determines the level of governance of government, but also is a key variable affecting the development of digital economy and digital society.

(3) focus on core technologies and applications, and promote the deep integration of industries such as the internet, big data and artificial intelligence; we will promote the sound development of the platform economy and sharing economy. Promote the development and utilization of data resources, expand the orderly release of basic public information data, and build a unified and open platform for national data sharing. Ensure national data security, and strengthen personal information protection, etc.

Based on the priority on food security, smart agriculture has become one of the main battlefields in the construction of digital China. Smart agriculture relies on sky and ground data collection methods, big data, cloud computing, internet +, internet of things and artificial intelligence technologies to promote the integrated development of primary, secondary and tertiary industries. In order to follow up the decision of the UN Food System Summit and accelerate the transformation of agricultural and food system, I believe that the construction of smart agriculture in China should focus on the deployment of three major functions of agriculture, namely: ensuring food security, providing employment for farmers, and ensuring the ecological and natural well-being. Specifically, we will strengthen the capacity building of agricultural research and farmers, and promote extensive partnership and cooperation among governments, enterprises, research institutes and social groups. At the same time, strengthen the training of young farmers' scientific and technological ability and the promotion and application of new technologies, especially to help farmers understand and master the application of satellite monitoring, geographic information system and earth big data technology in the following aspects: ecological red line monitoring (one quarter of the country is divided into ecological red line, which requires the integration of sky and earth monitoring); reducing agricultural carbon emissions and supporting the realization of dual carbon targets (e.g., reducing fertilizer use, energy conservation and emission reduction); developing green industries (such as vertical agriculture, characteristic industries, geographical indication products, digital cultural tourism); building environmentally friendly agriculture (e.g., conservation agriculture, precision agriculture, reducing the use of water, fertilizer, pesticides,

¹⁴ http://www.cac.gov.cn/2020-07/11/c_1596030138020827.htm.

¹⁵ http://www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

antibiotics, etc.); establishing modern standardized agriculture to ensure food safety (laser technology, quantum technology, blockchain application...); reducing food loss and waste (digital multimedia applications, scientific management, internet applications, changing consumption patterns, etc.); strengthening innovative application of biotechnology and information technology (seed industry autonomy, especially vegetables, fruits, breeding animals, etc.) and the promotion and application of new technologies (sky and ground integrated crop monitoring, agricultural insurance, etc.).

In recent years, the United States^[5], Western Europe^[6], Australia^[7], Japan^[8], South Korea^[9] and other developed countries are speeding up the formulation and implementation of corresponding smart agriculture development strategic planning, and many countries have achieved obvious results. It is obvious that the digital gap between most developing countries and developed countries is widening further due to the limitations of socioeconomic and technological development levels. This has drawn great attention from the international community. The efforts of the scientific and technological circles and the market, over the past 30 years, China has explored and established a remote and ground sensing system, including remote satellite sensing system, satellite positioning system, geographic information system, and remote UAV sensing and ground monitoring system. Multi-platform, large-scale and multi-sensor earth observation and global coverage have been realized, and a huge multi-source large number word set has been accumulated. With the development of the Internet, 5G, artificial intelligence and cloud computing technology, China has set up the multi-level information infrastructure. On the one hand, China has greatly reduced the digital gap between the different parts of country, providing scientific decision-making tool for the application of the smart city, the urban ecological monitoring, the sustainable development of agricultural insurance and space planning; on the other hand, it has created an important foundation for providing global public goods to the world and helping to bridge the global digital gap.

Based on these capabilities, President XI Jinping announced in a major speech to inject new impetus to the implementation of the 2030 Agenda for Sustainable Development¹⁶, China will set up two international centers: first, the UN Global Geographic Information Knowledge and Innovation Center; second, the International Research Center on Big Data for Sustainable Development. The establishment of these two centers will help promote practical international cooperation and data sharing, and help member states strengthen capacity building in the digital field, providing Chinese solutions to fill the international digital gap.

5 Suggestions

In recent years, some regions of the world have faced serious food crises for a variety of reasons. In many regions, the situation is still deteriorating due to the combined impact of COVID-19. In accordance with the principle of Food Systems Summit, it is urgent to promote the transformation of Agri-food systems. For China, this is an important opportunity to give full play to the advantages of its super-large market and the potential of domestic demand, and build a new development pattern in which both domestic and international development promote each other. The key is to continue doing our own work and plant our own land well. At the same time, we should take the initiative to participate in the global dialogue on food security and strengthen the right to speak in global food security governance and the formulation of relevant regulations and standards. I would like to share the following specific suggestions:

(1) take the opportunity of Food Systems Summit 2021 to increase publicity, promote the shift of people's thinking, and implement the concept of sustainable food system from production to consumption. We need to unite scientific research circles, the education community, the private sector and market forces, especially the younger generation, to participate in promoting cooperation between industry, universities, research institutes, government and business, establish effective alliances, adhere to the ecological red line, maintain self-sufficiency in staple food, and ensure food security for 1.41 billion people. We should fully realize that running our own agricultural affairs well is the biggest contribution to global food security.

¹⁶ http://www.gov.cn/xinwen/2020-09/22/content_5546168.htm.

(2) implement the 14th Five-Year Plan for the development of digital agriculture, complete and improve the national agricultural database, and lay a solid foundation for the integration of science and technology in promoting smart agriculture and rural revitalization strategy. National Geographic Big Data has an indispensable role in scientific research and field applications for smart agriculture and sustainable development. We should actively promote the use of big data in the transformation of agricultural food systems, especially in the demonstration research on territorial spatial planning and smart agriculture for sustainable development of agricultural resources and the construction of high-standard farmland, such as scientific research and regular reports on big data supporting the screening, selection, protection and use of high-quality geographical product habitats across the country.

(3) make full use of China's advantages in digitalization, Internet and 5G technology, encourage cooperation between research institutions and enterprises, and jointly cultivate excellent, high-quality new varieties adapted to the local ecological environment; encourage e-commerce in rural areas, and encourage farmers, internet and applications to achieve the final integration, expand the industrial chain and upgrade the value chain, and promote the development of commerce and trade of characteristic agricultural products. According to the comprehensive requirements of the local resources endowment characteristics and transformation, relatively backward western region government should seize the opportunities of digital development, adjust measures to local conditions, formulate corresponding policies, attract the capital, science and technology, and talents to the countryside, and foster a favorable ecology for the "three creations" (innovation, entrepreneurship and creativity) of small and medium-sized agribusiness enterprises in the transformation of the agricultural food system.

(4) big data is a fundamental element to support the bridging of the digital gap and is currently China's comparative advantage. The science and technology sector needs to work with the government and enterprises to truly leverage the newly established UN Global Geo-Information Knowledge and Innovation Center and the International Research Center on Big Data for Sustainable Development through the establishment of alliances. The Center will achieve concrete results in the application of big data technology in the whole chain of the agricultural food system and in the extensive scope, for example, in agricultural emission reduction adaptation, global food production forecasting and agro-ecological monitoring, and summarize and promote its experience in time to realize China's solemn commitment to the international community. At the same time, we should strive to strengthen cooperation in agriculture and food security in countries and regions along the Belt and Road through the South-South cooperation mechanism, so that digital technology can bring the benefits of modern technologies to more countries and people around the world.

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