# How Could Higher Education Help in China-Africa South-South Cooperation?

## A Case of China Agricultural University

Prof. Li Li
CIDGA, China Agricultural University

Kyoyagala Linda
Masters Student, China Agricultural University

Ying Tang
Deputy Director of International Office, China Agricultural University

## Introduction

Poverty eradication and zero hunger are two challenging Sustainable Development Goals (SDGs) of the United Nations (UN) for the Global South to achieve. With China's experience of eradicating extreme poverty by 2020, development knowledge applicable to the Global South needs to be co-found, co-produced, and co-innovated, together with peers in Africa. The UN framework of South-South Cooperation (SSC) could provide platforms for such exchanges and mutual learning efforts to fill the gap between the global understanding and indigenous knowledge of specific localities in Africa, which needs to be studied, examined, and analyzed into applicable and useful know-how to be utilized for effective development cooperation. China-Africa educational cooperation could pursue that transformative or development institutional

leadership to construct such partnerships, especially in the post COVID-19 era.

## How Could Higher Education Have Transformative Institutional Leadership?

The word "transformative" means "making change". Transformative leadership indicates collective efforts taken by actors that could provide solutions and make a difference[1]. Within institutional aspects, governments play important roles in this process. However, public actors like governments are not the only important actors at the global level of governance. Non-Government Organizations (NGOs), enterprises, and universities could also make great changes.

Higher agricultural education institutions are not only sophisticated in new knowledge research and development (R&D), but also in training, nurturing, and equipping the young people to work toward the SDGs. For the global-local interactions for development effectiveness, higher education could co-create the world we live in. This form of leadership could be seen from China's ancient agricultural scientific achievements, its agricultural higher education reform, new agricultural disciplinary transformation, and potentials of China-Africa development cooperation.

## From the Past to Today: China's Agricultural Research and Development

As an agricultural country with rural population as the majority, China has been making great efforts to solve agricultural problems. In the 27 volumes of Science & Civilization in China written between 1954 to 1995, the British scientific historian Noel Joseph T. M. Needham (Li Yuese) named gun-power, compass, printing, and paper making as the Four Great Inventions of China. In his books, agricultural scientific achievements, which had been unknown to the world, these have been documented. Beside the Four Great Inventions, there have been Four Agricultural Books of China, namely, The Book of Fanshengzhi (about 1 century before Christ, late Han Dynasty), Qi People's Essentials by Jia Sixie (533-544 A.D., North Wei), Wangzhen's Agricultural Books (1313 A.D., Yuan Dynasty), and Comprehensive Treatise on Agricultural Administration by Xu Guangqi (1628 A.D., Ming Dynasty).

[1] Chris Roche, "What Is Transformative Leadership?" University World News, April 15, 2016, https://www.universityworldnews.com/post.php?story=20160412200253987, accessed on March 8, 2022.

In the human history, **there has been six innovative waves.[2] Accompanied with each wave, there was the agricultural knowledge innovation reformation.**

During the **1st Industrial Revolution from 1780 to 1848**, manual labors were substituted by machines due to the invention of **steam power**. It was also the early founding period for European agricultural colleges to upgrade agricultural technology and to apply it in their teaching.

During the **2nd Innovation Wave from 1848 to 1895**, railways enabled transportation to be faster and cheaper. The US land-grant agricultural universities were set up in sub-national States to sharpen the competitive edges in agricultural science, research, and management. Japan reformed itself during the Meiji Reform in 1860s to 1890s, and its agricultural education developed fast. The western transformation also witnessed the establishment of the earliest agricultural college of China, Tongwen Foreign Languages Academy (jingshi tongwenguan), in 1862.

**Between 1895 and 1940, the 3rd Innovation Wave** featured **electrification and chemical** innovation, which reconstructed agricultural higher education into innovative systems for practical services. In 1898, the 1st Agricultural School in Wuhan, Hubei Province, was started, learning from the advanced experience from Japan. In 1902, Tongwen Foreign Languages Academy merged into the Metropolitan University (jingshi daxuetang), which later became the Foreign Languages College of Peking University. The Qing Dynasty launched a 3-level agricultural education system in 1904, which still follow Japan's suit. In 1905, Agricultural College of the Metropolitan University was built. However, after the Xinhai Revolution in 1911 and the May 4th Movement in 1919, a Renxu Higher Learning System was built by 1922, setting up 48 Western-style agricultural colleges, learning from the experience of European and the US universities.

**The 4th Innovation Wave was about automobile, petrochemicals, and bio-engineering between 1940 and 1979.** Environmentalists realized the negative results from chemical pollution,[3] and found the necessity of international cooperation toward sustainability.[4] After the establishment of People's Republic of China in 1949, China has been carrying out the "Five-Year Plans". In 1949,

[2] James Bradfield Moody, Bianca Nogrady, *The Sixth Wave: How to Succeed in a Resource-Limited World*, Sydney: Random House Australia, 2010.

[3] Rachel Carson, *Silent Spring*, Boston, New York: Houghton Mifflin Company, 1962, 1990, 2002.

[4] Donella H. Meadows, *Limit to Growth*, Vermont: Chelsea Green Publishing, 2012.

Agricultural Colleges of Peking University, Tsinghua University, and North China University merged into Beijing Agricultural University (BAU). During that time, the newly established People's Republic of China started to learn from Soviet Union, building specialized agricultural and forestry colleges and universities by 1952. During the first Five-Year Plan (1953-1957), 229 higher learning universities and colleges were established. After the 10-year Cultural Revolution (1966-1976), the College Entrance Examination (gāokǎo) was instituted in 1977. Within two months' time, 273,000 undergraduates were enrolled. In 1978, that number increased to 402,000. Also in that year, China announced its reform and opening-up policies, and 52 students were sent abroad, which number has risen to about 7 million in 2019.

**The 5th Innovation Wave brought in information communication technology (ICT) between 1980 and 2009.** Since 1993, China's National "Project 211"[5], and "May 1998 Program" ("985")[6] were put in place to raise the scientific research level and comprehensive strength of universities. In 1995, BAU and Beijing University of Agricultural Engineering (BUAE) merged into China Agricultural University (CAU) under the "211 Project". In 2004, CAU was included in "Project 985".

**The 6th Innovation Wave which we are experiencing, is also called Green Revolution, on renewable energy, and gene technology, like hybrid seeds.** It started and focusses on from 2010, and might last for quite a long time. Under such circumstances, universities needs to launch strategic transformation. In 2015, the "Double-First Class" initiative was initiated to build world-class universities and disciplines by 2050 in China. In 2017, CAU was selected as one of the world-class universities.

Since 2018, **New Agricultural Disciplines (NAD)** were proposed by colleges or universities of agriculture or forestry. It includes characteristics such as:

(1) **Mono-disciplinary to multidisciplinary research transformation.** The disciplinary transcendence aims to nurture competent talents with knowledge constituted by artificial intelligence, unmanned control, quantum information, virtual reality, biotechnology, etc.

(2) **Cross-disciplinary courses combining natural or engineering contents with social sciences.** Due to the high complexity of agricultural civilizations, green and environmental

[5] "Project 211" indicates the project of building 100 or so key higher educational institutions and a number of key disciplines for the 21st century.

[6] "Project 985" means the Action Plan for Education Rejuvenation for the 21st Century carried out by the Ministry of Education (MOE) of China. By 2011, there were altogether 39 universities of "Project 985" nationwide.

protection, food-security nexus, capabilities for tackling real-life challenges are encouraged.

(3) **Orientation from knowledge learning to humanitarian values.** NAD talents emphasize that the learners should not only grasp the basic theories of agricultural knowledge, but make the determination to help the poorest, to promote South-South cooperation, and to be competent globally.

According to the US News, CAU ranks the 4th as "Best Global University for Agricultural Sciences". Till 2020, the growth rate of overseas students has been as high as 48.1%. Chinese agricultural higher education has formed its own style, integrating teaching, research, and practical problems-solving for rural development in the past four decades, creating the miracle of using 1/10 of the world land to feed 1/5 of the world population.

CAU has been a leading actor in achieving the NAD goals. The disciplines of Agricultural Science and Plants & Animal Science have been in top 1‰ in the Essential Science Indicators (ESI), with frequent publications in *Science, Cell, Nature, Nutrients, World Development*, etc. Since 2011, CAU has been providing agricultural poverty reduction assistance in Morogoro Region of Tanzania. Under the project of "Small Technology, Big Harvest" Maize Enhancement Program, not only "objectified" modern agricultural technologies were introduced, but also "soft" agronomic technologies like thick planting, weeding, thinning, inter-tillage, and inter-cropping were introduced. Besides, innovative agricultural management mechanisms were also effected in encouraging innovative enthusiasm of local farmers. In June 2018, BRI/SSC Agricultural Education, S&T Innovation League (BRSSCAL) was organized by CAU with 70 agricultural universities in the world. In 2019, CAU proposed the "Top Five Agricultural Universities League (A5)" with Wageningen University and Research (WUR), University of California, Davis, Cornell University, and University of Sao Paulo, Brazil. In 2020, the "1+1" Hainan Program for China-Africa Cooperation was carried out for sustainable capacity building in the Global South.

## Potentials of China-Africa Agricultural Development Cooperation

The development of Agriculture in Africa has great potential, especially with agriculture contributing greatly to the majority of gross domestic products (GDP). By making good use of the arable land, modernizing water conservancy and irrigation, improving the fertilization rate effectively, raising the adoption rate of high-quality seeds, and investing sustainably in agricultural mechanization, great progress could be made in the vast continent of Africa. China-Africa agricultural cooperation could be oriented in the aspects of investing in agricultural parks for "farm-to-fork" whole industrial chains, exploring modes of "E-commerce+firms+farmers", extending agronomic technologies and management know-hows, and creating ICT4D methods

of talent nurturing in post-COVID-19 era.

## Conclusion

Higher education, together with governments, industries, media, and international organizations, like the United Nations Office for South-South Cooperation (UNOSSC) could obviously carry out transformative institutional leadership, to help the Global South to achieve Sustainable Development Goals (SDGs) of the United Nations effectively. Domestically, China eliminated extreme poverty 10 years ahead of the set time of the UN 2030 Agenda. Colleges and universities have played essential roles in that process, providing assistance to the poor, and upholding justice for the weak. The world needs leadership to allocate global public goods in a fair way, which may not automatically be realized without coordination of multiple stakeholders. Therefore, higher education, as a "helping leadership", is the key for facilitating benign competition of global public goods needed in achieving SDGs, to instill inner motivations for balancing the Global South with the Global North, so as to obtain equality and equity gradually.

***About the Authors:***

[1]***Li Li*** *is an Associate Professor at the College of International Development and Global Agriculture (CIDGA), China Agricultural University (CAU). She got Ph.D. and M.A. in International Relations and Second B.A. in Diplomacy at China Foreign Affairs University (CFAU). She is a non-resident Research Fellow of Center for China & Globalization (CCG), and China-US Fulbright PhD Scholar at University of Connecticut (UConn) (2011-2012).*

[2]***Linda Kyoyagala*** *is a Masters student from Uganda at China Agricultural University, currently undertaking a Master's degree in Public Management majoring in International Development Policies and Governance. She also has a Master's degree in Management Science from the University of Science and Technology Beijing, and Bachelor's Degree in Procurement and Supply Chain Management from Makerere University in Uganda.*

[3]***Ying Tang*** *is a China Democratic League member, is the Deputy Director of International Office of China Agricultural University (CAU) in charge of international cooperation and exchanges. She graduated from Beijing Normal University majoring in Russian.*

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