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## REVIEW ARTICLE

# THE COMPARATIVE ANALYSIS OF AGRICULTURAL INFORMATION SERVICES BETWEEN CHINA AND TANZANIA REVIEW

<sup>1</sup>Evance Mulashani Bonephace, <sup>2</sup>Xuewen Gui and <sup>3</sup>Junyan Li

<sup>1</sup>School of Information Management, Central China Normal University, Mwalimu Julius K. Nyerere University of Agriculture and Technology, Tanzania

<sup>2</sup>School of Information Management, Central China Normal University, Wuhan, Hubei-430079, China

<sup>3</sup>School of Information Management, Central China Normal University

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### ABSTRACT

Agriculture is a vital sector in both China and Tanzania, contributing significantly to their economies and supporting numerous livelihoods. However, it faces challenges like climate change, resource limitations, market access issues, and technological advancements. This interdisciplinary analysis combines economic factors, basic agricultural principles, information services, and policy analysis to comprehensively study agricultural information services in both countries. The results have the potential to guide future policy decisions. Effective agricultural information services have become crucial in addressing challenges, ensuring food security, and promoting rural development in both countries. China benefits from a strong agricultural workforce driven by urbanization and technology, while Tanzania's smallholder farming, influenced by a diverse population, and defines its landscape. China has shifted away from agriculture due to industrialization, whereas Tanzania remains heavily dependent on it. Both countries recognize the importance of agricultural information services, with China leveraging advanced digital infrastructure and data analytics. Tanzania should invest in digital capabilities and mobile applications for rural areas. Collaboration and knowledge sharing between the two nations can facilitate agricultural modernization and economic growth, with Tanzania learning from China's diversification, technological integration, and economic alignment strategies.

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## INTRODUCTION

Agriculture has long been the backbone of economies in both China and Tanzania, providing livelihoods to millions of people and contributing significantly to their national GDPs (World Bank, 2022). In the modern age, the agricultural sector faces a multitude of challenges ranging from climate change and resource constraints to market access and technological advancements. In response to these challenges, the provision of effective agricultural information services has emerged as a critical component in sustaining and enhancing agricultural productivity, food security, and rural development in both nations (Zhou and Zhu, 2010). China and Tanzania, despite their geographic and cultural differences, share common goals of achieving agricultural sustainability, increasing yields, and improving the overall well-being of their farming communities (World Development Indicators (2019). As such, both countries have invested in developing agricultural information systems and services to facilitate knowledge dissemination, technology adoption, and informed decision-making among farmers, extension workers, policymakers, and other stakeholders within the agricultural value chain.

This comparative study explores the agricultural information services in China and Tanzania, delving into their structures, methodologies, and impacts. The Ministry of Agriculture Food Security and Cooperatives. (April 2008) state that examining the approaches taken by these two countries, we aim to highlight the lessons learned, best practices, and potential areas for collaboration that can further strengthen agricultural information services on a global scale. In this introductory section, we provide an overview of the agricultural landscapes in China and Tanzania, the significance of agricultural information services (Figure 1).

## METHODOLOGY

The comparative study evaluated agricultural information services in China and Tanzania began with a literature review, secondary data collection from various sources, and the establishment of a comparative framework. Different case studies provided deeper insights into the status of agricultural information services. Agricultural information policy of China and Tanzania were explored in details including legal frameworks and government strategies for both countries. The interdisciplinary methodology, encompassing economics analysis, agriculture analysis, information systems analysis, and policy analysis, that provided a comprehensive understanding of agricultural information services in both countries.

Corresponding Author: Evance Mulashani Bonephace  
School of Information Management, Central China Normal University,  
Mwalimu Julius K. Nyerere University of Agriculture and Technology,  
Tanzania



Figure 1. Geographical Location of China and Tanzania

### Literature Review Discussions

**Population dimension in agriculture:** Demographic composition of any country has relation with agricultural production of the country (World Development Indicators, 2019). Studying similarities and differences, the analysis need to check the demographics effects of Tanzania, China, and their impact on agricultural production. While both countries heavily depend on agriculture, they have distinct demographic profiles. China, with its vast population of estimated around 1.4 billion people, presents a complex demographic landscape, while Tanzania, with its diverse ethnic groups and agricultural practices around 63million, has a unique demographic makeup. The population increase is influenced by factors such as age, gender, education, and occupation on agriculture, and identify demographic trends affecting agricultural practices and policies. The study intend reveal significant differences in diversity and similarities of countries. The differences found profound effects on agricultural practices, resource allocation, and technology adoption. Recognizing these disparities is essential for tailoring effective policies and interventions to sustain agricultural productivity and food security in both Tanzania and China. This underscores the importance of aligning agricultural strategies with the specific demographic realities of each country to ensure long-term success in the sector. The following figure showing the population size of china and Tanzania (Figure 2).

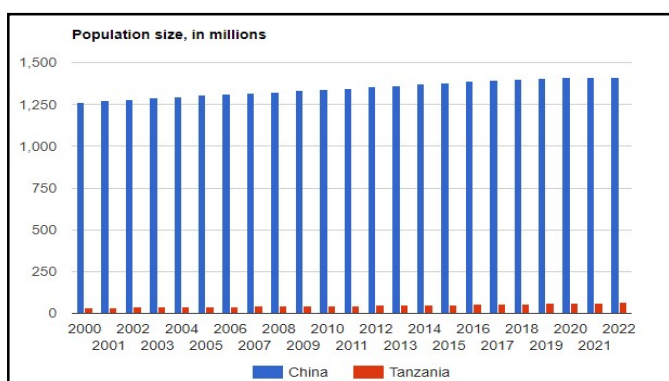


Figure 2. China and Tanzania Population

The role of population in agriculture varies significantly between China and Tanzania due to their unique demographic characteristics. China, with its vast population, benefits from a substantial agricultural labor force, leading to extensive cultivation and production. Rapid urbanization has shifted demographics in China, affecting agricultural labor availability, while its large domestic market and technological advancements drive agricultural growth (Lang, 2012). In contrast, Tanzania's diverse population influences agricultural practices, and a significant portion engages in smallholder farming with limited resources (Lwoga, 2010). Rapid population growth presents both opportunities and challenges, and a sizable

youth population offers potential for agricultural development, contingent on investments in education and infrastructure. Recognizing these demographic distinctions is crucial for tailoring effective agricultural policies and development strategies in each country.

**China and Tanzania Economic development:** China and Tanzania have followed distinct paths in their economic development, with agriculture playing a significant role in both nations (United State, 2018). China has experienced remarkable economic growth and diversification, with a declining share of agriculture in its GDP due to industrialization and urbanization (Gui, 2023). China's investment in agricultural modernization, export-oriented strategies, land reforms, and the impact of rural-urban migration have transformed its agricultural sector. In contrast, Tanzania relies heavily on agriculture, particularly smallholder farming, which poses challenges related to productivity and income. Tanzania's rapidly growing population offers potential for a larger labor force in agriculture but also necessitates sustainable practices. Ensuring food security and addressing investment needs in infrastructure and technology are key priorities for Tanzania's agricultural development. These differences reflect their unique economic trajectories and development priorities (Figure 3).

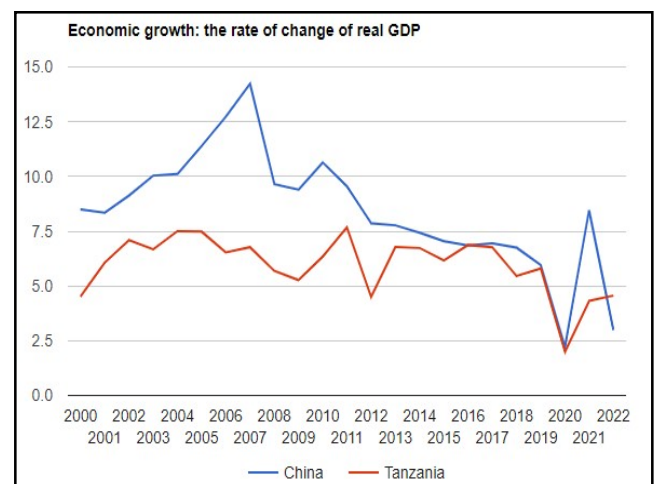


Figure 1. Economic development

**Agricultural information services in China and Tanzania:** Certainly, let us delve into a detailed comparison of agricultural information services in China and Tanzania. Zhang, Wang, Hao (2012); Lang (2012), indicated that regional differences in China farmers' information receiving behavior, services thrive on advanced digital infrastructure and widespread internet and smartphone access, offering online platforms and mobile apps dedicated to agriculture. Government initiatives involve substantial investments in comprehensive agricultural information systems, providing real-time updates on weather, crop prices, and pest control (World, 2000). China employs big data analytics and artificial intelligence for data-driven decision-making and utilizes AI tools for crop monitoring and precision agriculture (Gui, 2023).

Market information is readily available through digital platforms, and well-established weather forecasting aids planning. In Tanzania, challenges include limited digital infrastructure, but mobile phone usage remains widespread. The United Nations: Statistical Division (2020) indicates that traditional agricultural extension services are vital, despite resource constraints, and NGOs collaborate with authorities to promote sustainable practices. Weather information services, often supported by international partners, aid planting and pest management decisions (Alston, 2010). Both countries recognize the importance of timely and relevant information for agricultural productivity and sustainability, adapting approaches based on their development contexts and technological access (Figure 4).

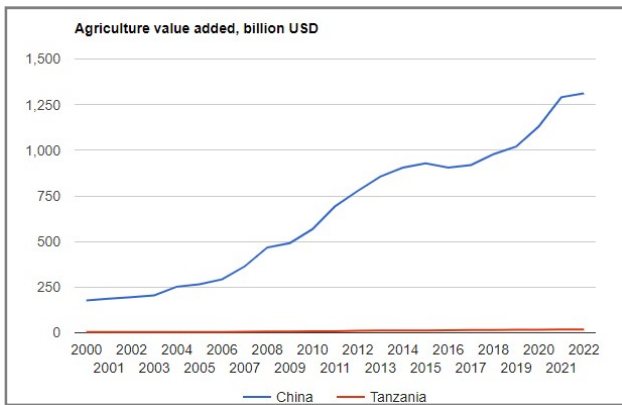


Figure 4. Agricultural information services

**Application of fertilizers Services:** The comparative analysis of fertilizer application services in China and Tanzania, emphasizing substantial distinctions between the two nations. This comparison centers on measuring the quantity of plant nutrients applied per unit of arable land, aiming to discern the extent of fertilizer usage and contrasting approaches in agriculture. The World Bank indicated that China emerges as a high fertilizer user, utilizing around 350kg of industrial fertilizers per hectare, indicating a reliance on synthetic and commercial fertilizers, suggestive of modern and intensive farming techniques (Figure, 5). In contrast, Tanzania employs significantly less fertilizer, averaging less than 100kg per hectare, implying a reduced dependence on synthetic options, possibly due to economic constraints, limited access to advanced agricultural technologies, and the persistence of traditional farming practices. Tanzania's preference for traditional nutrients derived from animal and plant sources, such as manure and compost, is linked to limited technology adoption and a reliance on customary agricultural methods. These disparities may be attributed to China's advanced technology and modern farming practices driving synthetic fertilizer use, while Tanzania's lower usage is influenced by technological constraints and traditional farming practices. These divergent fertilizer application practices have profound implications for agricultural productivity, soil health, and food security in both countries.

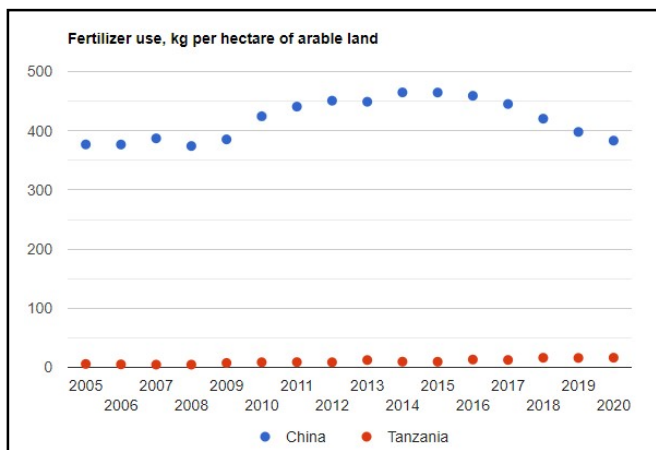


Figure 2. Difference in fertilizers Services between China and Tanzania

**Weather information service:** Weather information services in China and Tanzania differ significantly in various aspects. In China, the infrastructure and technology for meteorological services are highly advanced, with the China Meteorological Administration (CMA) overseeing a vast network of weather stations, radar systems, and satellites, ensuring accurate and timely weather forecasts, particularly for severe weather events. Accessibility is widespread through various mediums, including television, radio, websites, mobile apps, and SMS alerts, emphasizing public safety. China's coverage extends to rural areas and regional collaborations. In contrast, Tanzania's

meteorological infrastructure, managed by the Tanzania Meteorological Authority (TMA), is less developed, with limited radar and station coverage, leading to less accurate short-term forecasts, especially for severe weather. Accessibility can be constrained in rural areas, despite services being available through radio, TV, websites, and apps. Uneven coverage affects remote regions, affecting agricultural and safety needs. Both nations acknowledge the significance of weather information, but while China's service is well established, technologically advanced, and comprehensive, Tanzania's service is evolving with ongoing improvements needed to match China's sophistication and coverage levels (Figure 6).

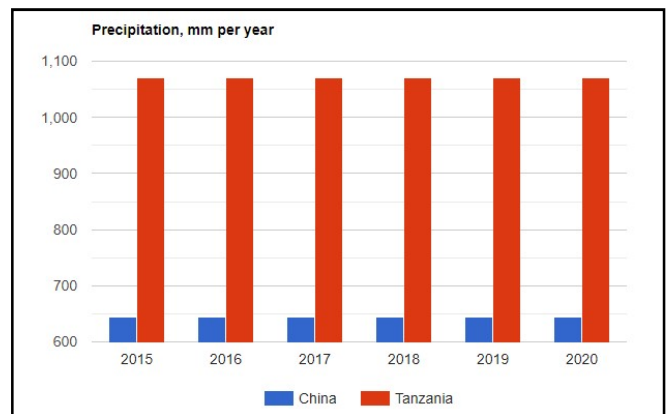


Figure 3. Weather information service

**Internet and mobile use in access agricultural services:** The analysis presented in the figure below illustrates the trends in internet service utilization for accessing agricultural information over a seven-year period. China stands out with a notably high percentage of its population utilizing internet services for this purpose compared to Tanzania. In China, the accessibility of a variety of digital devices such as computers, mobile phones, personal digital assistants, and digital TVs plays a pivotal role in facilitating easy access to agricultural information. This contrast in access and usage patterns between the two countries underscores the digital divide and the importance of information technology infrastructure in enabling efficient dissemination of agricultural knowledge and resources (Figure 7).

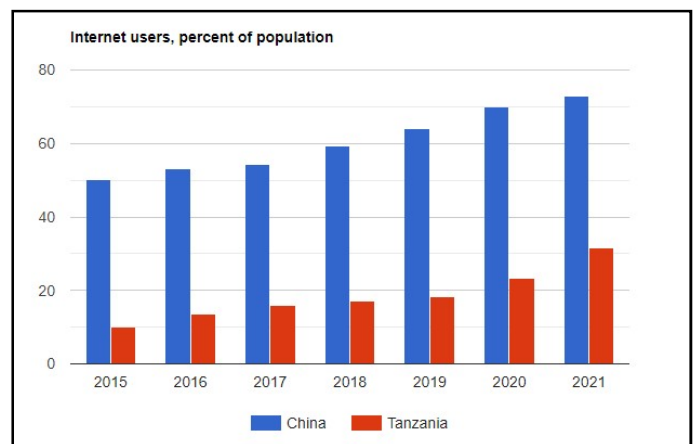


Figure 4. Internet and mobile use in access agricultural services

## DISCUSSIONS

The discussion and analysis presented here offer valuable insights into the agricultural landscapes and information services of both China and Tanzania. It is evident that there are valuable lessons that Tanzania can learn from China's agricultural development journey.

According to the World Bank's report in (2022), in the face of ongoing climate change, which presents persistent threats through natural disasters and extreme weather events impacting various sectors such as agriculture and infrastructure, nations should collaborate to exchange their experiences. Primarily, China's successful diversification away from agriculture and its industrialization-led economic growth provide a valuable model for Tanzania to consider. Tanzania, with its heavy reliance on smallholder farming, can look to China's experience as a blueprint for transitioning to a more diversified economy while still ensuring food security. China's approach of investing in agricultural modernization, technology adoption, and market-oriented strategies has enabled it to maintain agricultural productivity while allowing its economy to grow in other sectors. Tanzania can similarly focus on modernizing its agricultural practices, investing in technology, and exploring opportunities for value addition to its agricultural products (United Nations, 2008)). China's emphasis on advanced digital infrastructure and the integration of AI into its agricultural information services is another area where Tanzania can draw inspiration. Tanzania, despite facing challenges related to limited digital infrastructure, can gradually invest in expanding its digital capabilities, as demonstrated by its successful utilization of mobile phones. Developing platforms and mobile applications tailored to the needs of farmers and rural communities can improve the dissemination of agricultural information and enhance the adoption of best practices. Furthermore, China's experience with addressing population dynamics in agriculture is instructive for Tanzania. Understanding and aligning agricultural strategies with demographic realities is crucial for optimizing resource allocation and technology adoption (Alston, 2010). Tanzania's burgeoning youth population offers an opportunity for revitalizing its agricultural sector through education and skills development, a strategy that China has effectively employed to engage its workforce in modernized agriculture.

***Sustainable agricultural information services for Tanzania and China:*** To enhance the effectiveness of agricultural information services in both China and Tanzania, several key areas require attention. Firstly, improving reach and accessibility through expanded internet access and digital infrastructure in remote areas is vital (Lang, 2012). In China, investing in affordable and reliable internet connectivity is necessary, while Tanzania should focus on digital infrastructure development and promote mobile phone usage for information dissemination. Secondly, tailoring information to local contexts and recognizing regional agricultural variations is essential in both countries. Thirdly, investing in farmer education and training programs, including modern techniques and technology usage, is critical. Leveraging innovative technologies like AI and low-bandwidth solutions is equally important for improving information services. Implementing robust monitoring and evaluation mechanisms to assess the impact and collecting feedback from farmers and extension workers is key. Collaboration and knowledge sharing at both national and international levels can facilitate learning from best practices and experiences. Finally, fostering a culture of farmer participation and feedback while developing sustainable funding models for these services is crucial. These efforts, when tailored to each country's unique needs and challenges, can significantly enhance agricultural productivity, sustainability, and food security in both China and Tanzania.

The comparative analysis of agricultural development and information services in China and Tanzania provides valuable insights into the challenges and opportunities that both nations face in sustaining and enhancing their agricultural sectors. China's successful diversification away from agriculture while ensuring food security serves as a compelling model for Tanzania, which heavily relies on smallholder farming. Tanzania can learn from China's experiences by focusing on agricultural modernization, technology adoption, and market-oriented strategies to achieve economic diversification without compromising food security. The World Bank (2022) indicated the Chinese's advanced digital infrastructure and AI integration in agricultural information services present a pathway for

Tanzania to improve knowledge dissemination and technology adoption, even in the face of limited digital resources. Developing tailored mobile applications and platforms for rural communities can bridge the digital divide and enhance the adoption of best agricultural practices. Moreover, China's approach to addressing population dynamics in agriculture, particularly engaging the youth through education and skills development, offers a valuable lesson for Tanzania. The burgeoning youth population in Tanzania presents an opportunity to revitalize the agricultural sector and ensure its long-term sustainability.

## CONCLUSION

In conclusion, this analysis not only underlines the importance of agricultural information services but also highlights the potential areas where Tanzania can learn from China's agricultural development and what China can develop more. By leveraging China's successful strategies in diversification, technological integration, and demographic alignment, Tanzania can embark on a path toward modernizing its agricultural sector, ensuring availability of services, and contributing to overall economic growth and development. To further enhance this comparative study, it would be beneficial for Tanzania to engage in knowledge sharing and collaboration with China to harness the experiences and best practices that have made China a global agricultural powerhouse.

## CONTRIBUTOR INFORMATION

Evance Mulashani Bonephace is currently pursuing a Ph. D program at Central China Normal University (CCNU), China. Additionally, he serves as an Assistant Librarian at Mwalimu Julius K. Nyerere University of Agriculture and Technology. Junyan Li, Student in Information Science, She has contributed in writing this work. Xuewen Gui (Professor), Supervisor and holds a position as a lecturer in Information Science at Central China Normal University (CCNU), China.

***Conflict of interest:*** There is no personal or financial biases that could affect the objectivity and integrity of this work, promoting transparency and trust of this research.

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