

FOOD SYSTEMS TRANSFORMATION: CONCEPTS, MECHANISMS AND PRACTICES

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The global food systems face significant interrelated and complex challenges, including climate change, extreme weather events, natural resource depletion, biodiversity loss, emerging plant and animal diseases, conflict and trade shocks. The number of global populations that lacked access to adequate food sharply increased during the COVID-19 pandemic. It is estimated that in 2021, about 702 million to 828 million people around the world suffer from hunger, with an increase of 150 million people alone due to the outbreak of the global COVID-19 pandemic^[1]. Reduced incomes, food price inflations and continued supply chain disruptions will lead to even more severe and widespread increases in global food insecurity if urgent action is not taken, affecting vulnerable households in almost every country.

Food systems encompass agriculture, forestry, animal husbandry, fishery, food processing and service industries. It also includes all actors and their interconnected roles in the whole process of technology innovation, inputs, production, storage, transportation, processing, sales, consumption and disposal, as well as the broader economic, social and natural environment^[2]. Addressing these challenges will require a transformation toward more efficient, healthy, sustainable, resilient and inclusive food systems.

To highlight advances in research on food systems transformation, we have organized this special issue for *Frontiers of Agricultural Sciences and Engineering (FASE)*, primarily focusing on transforming food systems to achieve the goals of food security and environmental sustainability. There

are 10 articles in this special issue, including review and research articles with contributors worldwide. The contributors are all highly-regarded scientists devoted to studies on mechanisms and instruments of food systems transformation.

The topics include (1) a system perspective, which discussed challenges, responses, pathways and outlooks of food systems; (2) innovation and adoption of sustainable agricultural technologies and management; (3) consumer attitudes and behaviors regarding their dietary patterns, food waste and food labeling; and (4) supporting environment via guiding investment and financial supports.

FOOD AND AGRICULTURE: A SYSTEM PERSPECTIVE

Ting Meng and Shenggen Fan (DOI: [10.15302/J-FASE-2023493](https://doi.org/10.15302/J-FASE-2023493)) explored the transformation of China's food and agriculture through a system perspective. This paper defined the concept and scope of food systems and reviewed China's past experience and provided policy recommendations to transform the Chinese food systems for achieving the national development goals, including optimizing subsidies/supports, promoting multiple-win technologies, reorienting investment and financing, guiding behavior changes, and strengthening global cooperation.

East and South-east Asia food systems are on the frontline interacting with planetary boundaries and are adversely

affected by extreme climate- and weather-related events. Yunyi Zhou and coauthors (DOI: [10.15302/J-FASE-2023492](https://doi.org/10.15302/J-FASE-2023492)) presented a policy-based literature review, contributing to discerning the vulnerabilities and critical tools for a climate-resilient food system. They found that agriculture-specific goals in greenhouse gas emissions, climate-smart agriculture and market integration were effective approaches for building food system resilience in East and South-east Asia.

ENHANCING SUSTAINABLE PRODUCTION

Haoyue Yang and coauthors (DOI: [10.15302/J-FASE-2023482](https://doi.org/10.15302/J-FASE-2023482)) found that the technology environment, such as technical training and ease of access to new technologies, have a significant positive effect on farmers' adoption of organic fertilizers and biopesticides. Specifically, technical information obtained through an exchange with families and friends effectively promotes the adoption of organic fertilizers and biopesticides among small-scale farmers. In contrast, technical training is vital in influencing relatively large-scale farmers' use of organic fertilizers.

Donghao Xu and coauthors (DOI: [10.15302/J-FASE-2022475](https://doi.org/10.15302/J-FASE-2022475)) explored large-scale farming benefits of soil acidification alleviation through improved field management in banana plantations. They found that larger farms deliver dual benefits of higher, less variable banana yield and mitigation of soil acidification by substituting organic N for mineral N fertilizers, supporting sustainable soil management and food production.

Edi Dwi Cahyono and coauthors (DOI: [10.15302/J-FASE-2022476](https://doi.org/10.15302/J-FASE-2022476)) examined the perceived advantages of the forest farming technique of coffee branch bending to overcome the light limitations under the shade of a pine forest. Their results suggested that the local technique has high perceived relative advantages, which is also superior to reducing production costs and is perceived as more environmentally friendly.

GUIDING CONSUMER BEHAVIORS

Maoran Zhu and Jian Zong (DOI: [10.15302/J-FASE-2023489](https://doi.org/10.15302/J-FASE-2023489)) showed that the shift of three existing dietary patterns (quasi-southern, quasi-northern and quasi-western patterns) to two alternative recommended dietary patterns (Chinese dietary and planet health patterns) could promote the sustainable development of the environment and health.

Hao Fan and coauthors (DOI: [10.15302/J-FASE-2022472](https://doi.org/10.15302/J-FASE-2022472)) investigated factors influencing food-waste behavior in

university canteens. The study found that perceived behavior control, gender, monthly living expenses, BMI, mealtime, meal expectations and food portions are significantly correlated with student food-waste behavior. Therefore, they argued that it is necessary to promote publicity and education on reducing food waste on campus, reinforce the administration of the department of support service and optimize the food portion in the canteen.

Yingchen Xu and Patrick S. Ward (DOI: [10.15302/J-FASE-2022478](https://doi.org/10.15302/J-FASE-2022478)) found that urban Chinese consumers are willing to pay a premium for plastic beverage bottles that are made of post-consumer recycled material (rPET), and providing environmental information and attaching green identity labels increase consumer valuations of rPET bottles, with their joint use exerting the most considerable effect.

ORIENTATING FINANCIAL SUPPORTS

Eugenio Díaz-Bonilla (DOI: [10.15302/J-FASE-2023483](https://doi.org/10.15302/J-FASE-2023483)) examined different aspects related to financing food systems transformation. The paper analyzed different approaches to manage, reorient and expand finance for the activities needed to achieve the desired transformation of food systems. To optimize the returns from existing funding considerable improvement need to be made, starting with an adequate macroeconomic and overall incentive framework to guide consumption and production decisions (internal flows). Different options to mobilize, reorient and expand financial flows related to international development funds, public budgets, banking systems and capital markets also need to be explored.

Given the considerable evidence that agricultural R&D and innovation are key drivers of agricultural productivity growth and poverty reduction, a critical opportunity has not been taken to achieve both health and sustainability goals of food systems due to the continued underinvestment in agrifood R&D. Gert-Jan Stads and coauthors (DOI: [10.15302/J-FASE-2023484](https://doi.org/10.15302/J-FASE-2023484)) noted that productivity growth was not the only goal of agricultural R&D; setting and achieving social, economic, nutritional and environmental goals are increasingly important to address global food system challenges. The paper reviewed how research and innovation have shaped food systems over the past 50 years and how they would continue to play a critical role to improving agricultural productivity, resource use efficiency and resilience for food systems transformation in the decades ahead.

As guest editors, we thank all authors and reviewers for their

contributions to this special issue. We are also grateful to the FASE editorial team for providing this platform to discuss how

to promote the transformation of food systems in China and worldwide.

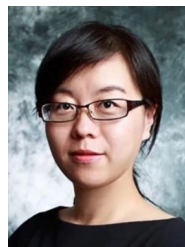
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