

## Prospects for China's Agricultural Modernization by 2035\*

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**Abstract** An important task of China's agricultural development is to achieve modernization in all respects. The rural revitalization strategy was first introduced in the report to the 19th National Congress of the Communist Party of China. This strategy now stands as the general guiding principle and central task of China's agricultural initiatives in the new era and serves as a pivotal move toward advancing agricultural modernization. Taking into consideration the current situation of China's agricultural development, the authors analyze the factors driving agricultural modernization and project the trajectory of agricultural modernization by 2035. The findings indicate that China has created a conducive institutional and development environment in production, consumption, industry, science and technology, trade, etc., thereby laying a solid foundation for its agricultural modernization. Projections suggest that by 2035, China will establish itself as the world's preeminent nation in agricultural production and consumption, a powerhouse in agricultural industrialization and agricultural product trading, and a leading country in agricultural science and technology. However,

China still faces tremendous challenges in terms of consumption structures, quality requirements, industrial development, format innovation, production methods, service functions, scientific and technological levels, and personnel structure. Therefore, on the path to agricultural modernization, China still needs to advance the structural reforms on the agricultural supply side, shift its agricultural production and operation methods, elevate its level of opening up in agriculture, and foster a deeper integration between urban and rural areas.

**Keywords** agricultural modernization, prospect, challenge, strategy, environment

The rural revitalization strategy was first introduced in the report to the 19th National Congress of the Communist Party of China (CPC) in 2017. It is regarded as the general guiding principle and the new motto of agricultural and rural efforts in the

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new era (Liu, 2018; Wang, 2018). Throughout the history of China's agriculture and rural development, China has achieved fruitful achievements and carved a path tailored to its unique national landscape (Huang, 2018; Chen, 2016). However, China also confronts numerous challenges such as slowdown in economic growth, difficulty in increasing farmers' incomes, a structural imbalance between the supply and the demand of agricultural products, and weak international competitiveness (Hu et al., 2017; Jiang & Zhang, 2017). These challenges add pressure to China's ambition of realizing socialist modernization by 2035. Particularly, in the process of promoting the synchronized development of industrialization, informatization, urbanization, and agricultural modernization, the latter has always been a weak link (Hu, 2019; Ma, 2019). The *Strategic Plan for Rural Revitalization (2018–2022)* stipulates that by 2035, significant strides in rural revitalization and the majority of agricultural and rural modernization must be completed by 2035. Given this, the important issues that China needs to solve urgently are as follows. How solid is the realistic foundation for China to achieve agricultural modernization? What level can future agricultural development reach? What strategies and philosophies should be adopted to drive this progress (Wang, 2018; Ye, 2017)? Consequently, it is of great significance to study agricultural modernization based on China's objective of achieving socialist modernization by 2035. This offers a research background to probe into the general agricultural trends from a long-term and international standpoint. It is within this context that the development

goals, strategies, and paths up to 2035 were proposed, in harmony with China's overall plan to promote coordinated progress in the economic, political, cultural, social, and environmental fields, and its comprehensive blueprints to build a moderately prosperous society, deepen reform, implement the rule of law and strengthen CPC discipline. In addition, by analyzing China's agricultural status quo, this paper forecasts the development trends of China's agricultural modernization up to 2035, which puts forward corresponding suggestions for long-term sustainable development in the future. It is an invaluable reference for realizing China's comprehensive agricultural modernization.

## 1 Current Situation of China's Agricultural Development

Over the past two decades, the output of China's agricultural products has presented a continuous upward trend as a whole. Compared with other global agricultural powerhouses, China has always held its position at the top. From 1990 to 2017, the outputs of agricultural products such as wheat, rice, pork, and aquatic products in China ranked first. It maintained second place in the production of corn and beef, and its poultry production remained third worldwide for the long term. Beyond that, China's yield per unit for agricultural products has always been among the world's best. For example, in 2017, China's grain yield per hectare reached 6,029 kg, much higher than the global average of 4,074 kg per hectare.

China's agricultural product consumption is undergoing a structural transformation. As the population continues to grow and urbanization accelerates, the total agricultural product consumption volume and structure are seeing significant shifts. Compared with other countries in the world in terms of total consumption, China has remained unsurpassed in the consumption of wheat, rice, soybeans, pork, poultry meat, and aquatic products, ranked second in the consumption of corn and fresh dairy products, and ranked the third in the consumption of beef.

The development of agricultural industrialization is pivotal for enhancing farmers' incomes. It is not only an important measure for China to construct a modern agricultural industrial system, production system, and management system but also an inevitable requirement for China to seek the road of agricultural modernization with Chinese characteristics. At a macro level, there are three notable trends in China's agricultural industrialization. First, the proportion of agricultural value added to the GDP has dropped sharply. This proportion was 26.58% in 1990, which dropped to 7.57% by 2017, following the same trend as major agricultural producers in the world. Second, the share of China's agricultural value added in GDP remains high compared with the global average level. For instance, while global averages for this metric in 1995, 2000, 2005, 2010, and 2017 were 8.02%, 5.2%, 4.38%, 3.92%, and 3.42% respectively, China's figures have consistently been over double these rates. Third, the agricultural processing industry in China is flourishing, bringing forth a

wave of innovative industries, formats, and models. At present, the proportion of the output from the agricultural product processing industry to the total agricultural output has reached 2.2 : 1, with the processing rate being 65%. Moreover, agriculture-related e-commerce, the Internet of Things, and big data have further expanded new areas of the agricultural industry, which has effectively driven the overall development of China's agricultural industry.

As to agricultural product trade, the world's agricultural product trade has been growing at an average annual rate of 9.3% since the beginning of the 21st century (Zhang, 2015). With the rapid development of China's economy, China's agricultural product trade has undergone significant changes in recent years. China had maintained a trade surplus in agricultural products until 2003, but from 2004 onwards, it has experienced a deficit. According to the *Monthly Agricultural Product Import and Export Statistics for China* released by the Ministry of Commerce of China in 2018, the import and export value of China's agricultural products reached USD216.47 billion, of which the export value was USD79.32 billion and the import values stood at USD137.15 billion, showing a trade deficit of USD57.83 billion.

The advancement of science and technology stands as the fundamental driver propelling contemporary agricultural development. After years of development, China's agricultural science and technology has achieved significant progress. In 2017, a pattern of modern agricultural development backed by modern facilities and equipment and cutting-edge science and technology

was initially formed. This can be manifested by the fact that China's agricultural science and technology progress contributed 57.5% to the total agricultural output value, the comprehensive mechanization rate in major crop cultivation hit 67%, and the coverage rate of improved varieties was more than 96%. In addition, agricultural informatization in China's rural areas has seen remarkable growth in recent years. According to the *National Agriculture Sustainable Development Plan (2015–2030)* announced by the Ministry of Agriculture and Rural Affairs of China, 93.8% of China's administrative villages had broadband access in 2015, with rural households enjoying broadband service surpassing 63.984 million.

## 2 Environmental Analysis for Achieving China's Agricultural Modernization

### 2.1 | Environmental Analysis of Agricultural Production

With the continuous implementation and improvement of all kinds of regulations and measurements, China is poised to emerge as a global powerhouse in agricultural production by 2035.

First, the reform of the rural land system has supported China's world-leading position in agricultural output (Zhang, 2018). In 2016, the *Opinions of the General Office of the CPC Central Committee and the General Office of the State Council on Improving the Measures for Separating Rural Land Ownership*

*from Contracted Management Right* was issued by China, in which the institutional arrangement of "separating rural land ownership rights, contract rights, and management rights" was proposed. This arrangement has laid the institutional foundation for guiding the orderly transfer of land management rights, developing moderate-scale agricultural operations, and advancing the development of modern agriculture. The report to the 19th National Congress of the CPC in 2017 clearly proposed the viewpoint of maintaining a stable and long-term land contract relationship and extending the contract term for another 30 years after the second round of land contract. The never-ending reform and deepening of the rural land system not only provide a powerful institutional support for the enduring growth of China's agriculture but also underpin the continuous improvement of its agricultural output (Zhang et al., 2015).

Moreover, the ongoing innovation and improvement of the foundational management system in agriculture has greatly aroused the enthusiasm and initiative of farmers in agricultural production. This has laid the foundation for building China as a major agricultural producer. At present, there is a noticeable diversification in China's agricultural management entities. Beyond the small-scale farmers, there has a robust growth of diverse modern agricultural entities such as large-scale households, family farms, cooperatives, agricultural enterprises, and agricultural socialized service organizations (Ji, 2018). By the end of 2016, there were 3.98 million large-scale

farmers in China. This group is expected to continue its expansion for a long period in the future, playing a crucial role in ensuring national food security. Moreover, they are also regarded as emerging forces propelling agricultural modernization in China.

Furthermore, a rigorous system for protecting arable land has been established to ensure a consistent food supply. The *Land Administration Law, Regulations on the Protection of Basic Farmlands*, and other laws and regulations have established clear provisions for the arable land protection system. These regulations will effectively guarantee China's grain production capacity with the support of the existing arable land protection system.

## 2.2 | Environment Analysis on Agricultural Product Consumption

As China's population grows, income rises and urbanization progresses, the consumption of agricultural products will present a new trend in the future (Zhang, 2019).

First of all, against the backdrop of consistent population growth, China is poised to become the world's largest consumer of agricultural products by 2035. In 2015, China's total population stood at approximately 1.375 billion. It is expected to peak at around 1.45 billion by 2030. Overall, the population will remain above 1.3 billion by the middle of the 21st century, sustaining the pressure on the supply of agricultural products, especially grain supply.

Secondly, as incomes continue to rise, the consumption structure of China's agricultural products will undergo major

changes by 2035. Based on an annual GDP growth rate of 5.5%, China's per capita GDP will exceed USD20,000 by 2035. At that time, China will escape the middle-income trap and join the ranks of modernized countries. As a result, the purchasing power of Chinese will gradually increase with the continuous rise of their income levels, and the consumption of agricultural products will show a more diverse and personalized landscape.

## 2.3 | Environment Analysis of the Agricultural Industrialization Development

Promoted by various factors, China's agricultural industrialization is expected to reach a new level by 2035.

Firstly, the advanced progress of industrialization has laid the foundation for improving the level of agricultural industrialization. It facilitates the transfer of surplus rural labor from inefficient agricultural sectors, optimizing the agricultural production structure. Moreover, industrialization provides advanced production equipment and technology needed for the production and processing of agricultural products, thus enhancing agricultural labor productivity (Zhou & Kong, 2015).

Secondly, comprehensive informatization in agriculture, rural areas, and farmers creates an opportunity to drive forward the advancement of agricultural industrialization. As internet accessibility grows in rural areas, agriculture-related information resources will be further integrated. In addition, the information service system for agriculture, rural areas,

and farmers will see continuous refinement, gradually changing the mode of agricultural production in China.

Thirdly, the sustained elevation of urbanization levels will greatly boost China's agricultural industrialization by 2035. Urbanization progress will bring about continuous changes in consumption structure among residents, which not only stimulates the diversified consumption demand for agricultural products but also drives their diversified development, optimizing the agricultural production structure from the inside.

#### **2.4 | Analysis on the Agricultural Product Trade Environment**

China presently boasts a favorable trade environment on the whole and numerous trade policies are specifically promoting the trade of the country's agricultural products.

Firstly, the Belt and Road Initiative brings more opportunities for international trade of China's agricultural products by 2035. By relying on bilateral and multilateral mechanisms with other countries and with the help of regional cooperation platforms, this initiative will promote the cooperative development of agricultural trade. The export scale of China's agricultural products will gradually expand for some time to come. In particular, this initiative will offer a better solution for surplus agricultural products. Driven by the Belt and Road Initiative, China's agricultural structure will be optimized.

Secondly, stable channels for agricultural product trade have solidified China's status as a leading country in agricultural product trading. By 2035, China

will establish diversified and stable channels for agricultural product trade under the Belt and Road Initiative. The export market will become more diverse compared to the present. Supported by the stable markets surrounding China, its market share in other regions will gradually increase. In terms of the import market of agricultural products, as the initiative progresses, the sources of China's agricultural product imports will gradually expand from American and Southeast Asian countries to Central Asian and European countries. This evolving mastery over the global market reinforces China's status as a major country in agricultural product trading by 2035.

Thirdly, the nurturing of leading enterprises of agricultural products will significantly propel the development of China's agricultural product trade by 2035. As China's agricultural product processing advances and its prowess in scientific and technological innovation strengthens, the added value and export efficiency of China's agricultural products will be greatly improved by 2035. By then, the growth in agricultural product export will shift from being solely volume-driven to a balance of volume and efficiency.

#### **2.5 | Analysis on the Agricultural Technology Development Environment**

Various drivers of innovation in agricultural science and technology suggest that China is expected to become the world's leading power by 2035.

First, the ongoing improvements in scientific and technological systems

and mechanisms have created important conditions for the development of China's agricultural science and technology. The continuous enhancement of the agricultural research infrastructure will also incrementally elevate China's agricultural innovation capabilities. By 2035, China will establish a management system for agricultural science and technology projects. The investment mechanism for stable support and moderate competition in agricultural science and technology will be better by then, and the environment for agricultural innovation of science and technology and entrepreneurship will be progressively optimized.

Second, the cultivation of agricultural professionals will strongly support the improvement of China's agricultural science and technology levels. Currently, with the improvement of agricultural scientific research infrastructure, China has attracted and nurtured a lots of excellent talents in agricultural science and technology. The structure of China's agricultural talents will be continuously optimized in the future.

Third, the advanced informatization levels will solidify China's leading position in agricultural science and technology. Over the next decade, rapid advancements in China's information technology are anticipated. By 2035, China's agricultural production methods will be completely influenced by the internet, thus elevating the level of agricultural technology. With the application of the internet and, more importantly, the Internet of Things, the efficiency of agricultural production will be greatly improved.

## 3 Prospects of China's Agricultural Modernization

### 3.1 | Major Agricultural Power

With the support and guidance of a series of policies, China is poised to become a major agricultural power by 2035. According to the predict of the future output of agricultural products, in 2035, China's outputs for wheat, rice, pork, and aquatic products will likely be 159 million tons, 161 million tons, 71 million tons, and 102 million tons, respectively, maintaining a top global ranking. As the structural reform of the agricultural supply side is gradually implemented and advanced, the growth rate of China's corn output will slow down from the present to 2035. The output is expected to be approximately 231 million tons in 2035. The output of poultry meat is expected to be about 25 million tons in 2035. The production level of corn and poultry meat will rank second in the world by then. The production capacity of fresh dairy is expected to be about 81 million tons in 2035, and China will rank second in the world by then. Beef production is estimated at around 10 million tons in 2035, positioning China as the third-largest producer after the United States and Brazil. The production of soybeans is projected to reach approximately 38 million tons by 2035. Even though the projected production will trail behind the United States and Brazil, it will considerably surpass Canada, Australia, and India.

### 3.2 | Large Consumption of Agricultural Products

From now to 2035, the consumption of agricultural products in China will exhibit the following trends. Firstly, there will be a sustained increase in the total consumption of major agricultural products. In terms of specific categories, in 2035, the total consumption of several agricultural products in China, including wheat, soybeans, pork, poultry meat, and aquatic products, is expected to reach approximately 142 million tons, 169 million tons, 64 million tons, 23 million tons, and 94 million tons, respectively. This will place China at the forefront globally for these categories. The total consumption of corn, beef, and fresh dairy products is projected to reach approximately 240 million tons, 10 million tons, and 79 million tons, respectively, in 2035. This will rank China as the second-largest consumer in the world for these commodities. Moreover, within the per capita total consumption of agricultural products, the proportion of grain consumption has decreased, while that of meat, eggs, dairy products, and aquatic products consumption has increased. In 2035, it is projected that the per capita consumption of wheat, corn, and rice in China will reach 57 kg/year, 6 kg/year, and 76 kg/year, respectively. The estimated per capita consumption of pork, beef, and poultry is expected to reach 35 kg/year, 8 kg/year, and 17 kg/year, respectively. Additionally, the projected per capita consumption of soybean, aquatic products, and fresh dairy products is anticipated to reach 11 kg/year, 61 kg/year, and 29 kg/year, respectively. By 2035, the combined

consumption share of meat, soybean, aquatic products, and fresh dairy products consumption in China's per capita total consumption of agricultural products is expected to reach around 55%.

### 3.3 | Agricultural Industrialization Power

By 2035, China's agricultural industrialization will take on a new look, the development of the primary, secondary, and tertiary industries in rural areas will take on a new situation, and the agricultural product processing industry and the agricultural producer service industry will become the leading forces for driving agricultural development (Liu & Li, 2019). The ongoing urbanization in China will present much opportunities for the convergence and development of rural secondary and tertiary industries in urban areas. The personalized, experiential, and high-end products demands of China's agricultural product market will show an explosive growth. With the advancement of industrialization, by 2035, China is expected to achieve breakthroughs in key agricultural product processing and transformation technologies, allowing the development level of the agricultural product processing industry to gradually approach that of developed countries. Innovative agricultural product processing technology and intensive processing will drive the development of China's entire agricultural industry. It is estimated that the processing rate of China's agricultural products will exceed 80% by 2035, and its proportion to the total agricultural output value will surpass 3 : 1, gradually closer to

the level of developed countries.

The emerging agricultural management entities will become a major force in the development of China's agricultural industry. As urbanization continuously progresses, an increasing number of the labor force will migrate to cities and towns. The surplus land resources in rural areas will be effectively used for production, leading to the emergence of new types of agricultural businesses. Thanks to the continuous improvement of the mechanisms that connect the interests of emerging agricultural management entities and small farmers, these entities will become the main force for driving agricultural development.

### **3.4 | Major Country in Agricultural Product Trading**

From now to 2035, China's agricultural product trade will show the following trends. First, China's effective exploitation of international and domestic markets will facilitate its development into a leading country in global agricultural product trading by 2035. From the present to 2035, the growth rate of China's total import and export of agricultural products will continue to increase, and agricultural product trading will see a steady and continuous rise. By 2035, China will become the world's second-largest agricultural trader in terms of import and export of agricultural products, only following the United States.

Second, while agricultural product trading has been in a deficit, the balance between imports and exports is expected to stabilize. From now until 2035, China's agricultural product trading will remain in

a deficit state. It is estimated that the total value of agricultural product imports will reach USD157.5 billion in 2035, and the total export will be USD109.3 billion. It is predicted that China's agricultural product deficit will largely be maintained at USD45 to USD48 billion in 2035.

Third, the categories of imported and exported agricultural products will undergo major changes. China's reliance on imports for major grains will gradually decrease. As China's agricultural production capacity is gradually improved, it will better meet domestically demands. The supply level of the three major grains, including wheat, corn, and rice, will continue to increase, and the reliance on imports for major food crops will gradually diminish. There still exists a significant gap in the demand for some agricultural products, such as oilseeds, cotton, sugar, pork, beef, mutton, poultry, and dairy products. As income levels continuously rise, there will also be a growing demand for diversified, personalized, and high-quality agricultural imports. Agricultural products such as vegetables, fruits, and aquatic products will continue to be the main agricultural exports, based on their industry advantages. Benefiting from regional advantages and production capabilities, vegetables, fruits, and aquatic products will continue to take the lead in agricultural exports. Moreover, as agricultural processing advances, there will be an increase in the added value of exported agricultural products.

### **3.5 | Leading Country in Agricultural Science and Technology**

With the gradual implementation of

agricultural technology support policies and continuous improvement of incentive mechanisms, China's agricultural sector will witness an environment conducive to mass innovation in agricultural science and technology by 2035. Firstly, China's agricultural technology will be at the forefront of global agricultural trends by 2035. Various agricultural science and technology innovation resources will be gradually integrated. By 2035, China's agricultural science and technology innovation system and modern agricultural industrial technology system will be well established. A number of modern agricultural technology innovation centers and alliances will emerge. In addition, agricultural innovation resources will be made public and shared, and agricultural technology service platforms will be relatively mature, which will strongly promote the continuous development of agriculture in China. Moreover, the current agricultural policy highlights China's inclination for and emphasis on cutting-edge research on the basics of agricultural science and technology. Undoubtedly, by 2035, China's capacity for pioneering innovation in agriculture will reach new heights. By then, basic research such as functional genomics of rice, research on major technologies such as super rice, phytase transgenic corn, and bird flu vaccine will be at the leading level in the world. China will become a leader in the development of global agricultural science and technology.

Secondly, the level of agricultural mechanization will see significant enhancements, and the overall power of agricultural machinery will double.

Agricultural mechanization serves as an important symbol and material, and technical basis of modern agriculture. With China's strong support for agricultural mechanization, the use of machines in agricultural production will increase year by year from now until 2035. Agriculture in China will be steered toward large-scale, standardized, specialized, organized, and socialized production. By 2035, China will make significant progress in the research and development of efficient, precise, and energy-saving agricultural machinery and equipment. It is expected that by then the overall mechanization rate in crop cultivation and harvesting will exceed 70%, with the mechanization rate in the three major grain crops expected to exceed 80%. The total power of agricultural machinery will surpass 4 billion kilowatts.

Thirdly, information technology will coordinate all industries and fields in agriculture, and it will be integrated throughout the entire process of China's agricultural modernization construction. Currently, China's "Internet +" initiative in modern agriculture is gradually advancing. In this case, by 2035, information technology will run through and integrate into multiple levels of agricultural production, operation, management, and service. Informatization will become the leading force for innovation to drive the development of agricultural modernization. By 2035, it is estimated that the proportion of administrative villages that will have access to broadband services and the coverage of information service stations at the village level will reach 100%. By then, online retailing of agricultural products will dominate sales, contributing

to over 50% of the total agricultural output value.

## 4 Challenges in Realizing Agricultural Modernization by 2035

### 4.1 | Rapid Updating of Consumption Structure and Gradual Elevation of Quality Requirements

Firstly, there will be a major change in the consumption structure of agricultural products. China's population will continue to increase, and residents' income will grow rapidly. Consequently, residents' capacity to consume agricultural products will markedly increase, leading to a rapid expansion in overall agricultural consumption. In addition, the consumption structure of agricultural products is also undergoing a swift transformation. In the future, personalized, experience-driven, and high-end options will be central to driving consumer demand for agricultural products. Therefore, it remains crucial to continuously segment and stratify the agricultural product market to meet the increasingly functional, diverse, and differentiated trends in the market. However, at present, China's development of high-quality, diversified, and specialized agricultural products lags behind, and the problem of structural imbalance between the supply and demand of some agricultural products has become increasingly obvious (Gao & Jiang, 2016).

Secondly, there is a rising demand for standardized quality in agricultural

products. With the rise in income level, the public has required higher quality of agricultural products. Under such circumstances, a major problem facing the quality and safety of agricultural products in China by 2035 is how to comprehensively improve the quality of agricultural products in terms of source control, standardized production, risk prevention and control, and quality supervision. China's agricultural product supply is vast in quantity but often lacks in quality, and the shortage of premium, specialized, high-end products is more prominent. To align with the evolving trend of upgrading of domestic food consumption structure, China urgently needs to prioritize the increase in the supply of green and high-quality agricultural products and improve the supply of high-quality agricultural products. By providing high-quality agricultural products that better meet consumers' needs, China can achieve a new balance in the agricultural supply and demand at a higher level (Han, 2017).

### 4.2 | Separated Industrial Development, and a Lack of New Business Formats

First of all, indepth integration of the primary, secondary, and tertiary industries in rural areas is needed. China's bulk agricultural products are less competitive in the international market for the time being because it faces many challenges in the development of the agricultural industry, such as short industrial chains, low integration, and weak value-added capabilities of agricultural products. In the future, China needs to speed up the

improvement of its agricultural industrial system. Strengthening the primary industry, optimizing the secondary industry, and invigorating the tertiary industry are essential for fostering a cohesive relationship among the three major industries in rural areas. In addition, this move will also strengthen the links between pre-production, production, and post-production of agriculture. Ultimately, this will help fully realize the value addition of agricultural products and promote the integrated development of the primary, secondary, and tertiary industries in rural areas.

Secondly, new industries and new formats in rural areas have yet to reach their full potential. The residents' increasing appetite for green ecological services is gradually becoming apparent. As such, China's eco-tourism sector faces significant challenges in bridging agriculture with various other domains, including culture, tourism, education, service for the aged, and health care (Chen et al., 2018; Du et al., 2018). By 2035, the development of new industries and business models in rural areas will become a new highlight in driving farmers' income growth and prosperity. Therefore, figuring out how to cultivate new rural industries and business formats at this juncture, and how to form emerging entities, are pressing concerns for China.

#### **4.3 | Raised Demand for Service Functions Due to Improved Production Mode**

Firstly, there have been significant changes in the mode of agricultural production

and operation. In the future, emerging agricultural management entities such as large-scale households, family farms, cooperatives, and leading enterprises will become the main force of China's agricultural production. Consequently, an issue China currently faces is how to nurture these new agricultural management entities and develop different forms of moderate-scale operations. China's per capita arable land area is only about 0.08 hm<sup>2</sup> at present, far below the world level of 0.2 hm<sup>2</sup>. Undeniably, China has lagged behind globally in this aspect for quite some time. As a result, there is still a big gap between China and other countries in terms of resource conditions for achieving agricultural modernization. In the future, the scarcity of resources will undoubtedly place even greater pressure on China's journey toward agricultural modernization (Yu, 2017).

Secondly, the service functions need to be improved. The rapid urbanization progress poses challenges to the specialization of agricultural production and the diversification of service functions. Various new agricultural management entities will drive the advancement of small-scale farmers. An important issue China will face in the future is how to make use of the advantages of natural resources or economic resources in the region through institutional arrangements to foster a specialized division of labor (Du, 2018). The establishment of China's agricultural socialized service system will face severe challenges. Another important issue to be expected is how to build a diversified and socialized service system for agricultural

pre-production, production, and post-production to improve the efficiency of agricultural production and operation (Huang, 2016).

#### **4.4 | Insufficient Science and Technology Capacity and Poor Talent Structure**

Firstly, China's utilization of agricultural technology urgently needs to be strengthened. With the rapid development of science and technology in China over the next decade, agricultural science and technology will be deeply integrated into every facet of China's agricultural industry. Notably, advances in information technology have drastically transformed both production and consumption patterns in agriculture in China. Compared with traditional agricultural industrialization, the development of information technology will change the phenomenon of information closure and asymmetry in traditional agricultural production. Internet technology will effectively link buyers and sellers of agricultural products, establishing a consumption-oriented modern agricultural production mode. Additionally, with the widespread adoption of the internet and, in particular, Internet of Things technology, integrating big data information technology into agricultural production is an inescapable trend. Therefore, a crucial challenge for China's agricultural development by 2035 is how to combine modern science and technology with agricultural development.

Secondly, China urgently needs to expand its agricultural talent pool. To promote the leapfrog development of

agricultural science and technology and to enhance the integration of agricultural technologies in agricultural production, China should prioritize cultivating top-tier agricultural talents and fostering innovative teams. Furthermore, China should enhance the agricultural technology dissemination system and promotion teams. In particular, a paramount focus should be placed on nurturing and building teams of experts in fundamental agricultural science and emerging technologies, necessitating additional support from the nation (Huang et al., 2016).

## **5 | China's Agricultural Modernization Strategy toward 2035**

China is historically confronted with the challenge of how to realize agricultural modernization and what kind of modernization development path to take. In this new era, China's fast-growing economy has laid a solid material foundation for the realization of agricultural modernization. In the future, China's agricultural modernization is bound to succeed under the leadership of the CPC and by virtue of the advantages of the socialist system.

### **5.1 | Promoting Agricultural Supply-Side Reform and Prioritizing Quality for Agricultural Prosperity**

In the coming period, China should, on the basis of ensuring national food security, orderly and deeply advance the structural reform of the agricultural supply side around changes in the market demand for

agricultural products (Wang, 2015; Yang, 2015). Some pivotal aspects of this reform include: China should build an agricultural product variety structure system that meets market demand, actively promote high-quality and unique agricultural products, and ensure a balance between the total supply and demand of agricultural products. While optimizing the structure of the agricultural industry, China should speed up the development of the agricultural product processing industry, build a group of specialized, large-scale, and standardized raw material production bases that are used for actively developing primary processing of agricultural products, and boost the development of intensive processing of agricultural products. Furthermore, China should continue to improve the safety and quality of agricultural products, focusing on ensuring the quality and safety of agricultural products through source control, standardized production, risk prevention and control, and supervision of the whole process.

### **5.2 | Transforming Agricultural Operation Mode and Developing an Industry-Driven Approach**

China should promote the reform of production and management modes for rural areas in a comprehensive manner, in a bid to build a modern agricultural production and management mode. It should fully leverage the opportunities presented by the modern internet technology revolution to build an agricultural production mode that is dominated by the consumption of agricultural products and integrates production and consumption.

Besides, China should positively promote e-commerce in rural areas to establish a standard system for China's agricultural products to succeed through e-commerce. There should be all-round collaboration among emerging agricultural management entities, processing and distribution enterprises, and e-commerce enterprises. It is also essential to support the establishment of e-commerce platforms and service centers for agricultural products in rural areas. China should make efforts to integrate big data information technology into China's agricultural production, with a view to realizing the automation, intelligence, and precision of agricultural production. It should also manage the production process in a scientific way to improve the efficiency of China's agricultural production and realize the orderly and efficient development of agriculture (Zhang, 2017). Furthermore, China should enhance the rural logistics system, improve major national distribution channels of agricultural products, fully implement the project of information access to villages and households, encourage local governments to regulate the development of e-commerce industrial parks, and promote the "Internet +" initiative in modern agricultural actions.

### **5.3 | Enhancing the Level of Opening Up and Pursuing a Global Development Way**

China should fully utilize the resources in the domestic and international markets to enhance the level of agricultural opening up to the outside world. Proactively, China needs to strengthen its international

collaboration in agricultural science and technology and introduce enterprises, institutes, and management teams with advanced technical equipment and global agricultural technology to upgrade the international competitiveness of its agriculture. Additionally, China needs to improve the service system for foreign agricultural cooperation, further coordinate the funding channels for such cooperation, and invest more efforts in establishing public information service platforms for such cooperation (Han et al., 2017). Furthermore, China should refine its layout of foreign agricultural cooperation, analyze and grasp the supply and demand patterns on agricultural products and the investment policy environment, coordinate and utilize global agricultural resources, strengthen the regulation of the imports of agricultural products, improve regulation policies, strengthen the monitoring and early warning of the imports of agricultural products, and enhance the monitoring on inspection and quarantine of imported agricultural products. Finally, China should promote the export of advantageous agricultural products by providing policy support, and consolidate the industrial advantages of agricultural products with Chinese characteristics (Cheng, 2015).

#### 5.4 | Promoting Urban-Rural Integration and Embarking on a Path to Shared Prosperity

Against the backdrop of rapid urbanization, the urgent need for China's agricultural modernization lies in how to promote the bilateral interaction between urban and rural areas in terms of population mobility, public services, resource development, and environmental sharing (Li & Kong, 2016). In the future, China should prioritize the construction of urban-rural integration development system, emphasizing both mechanism and policy systems, to propel agricultural modernization through modernized urban-rural relations (Wang & Su, 2017). Additionally, China should make every effort to cultivate a working team proficient in agriculture, passionate about rural life, and committed to farmers. Such a team will ignite farmers' enthusiasm to actively participate in the modernization progress, steering China's agricultural modernization to a higher level.

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## References

- Chen, C., Chen, J., Gong, J., & Sun, S. (2018). Stage characteristics and suggestions for the current new agricultural pattern. *Research of Agricultural Modernization*, (1), 48–56 (陈慈, 陈俊红, 龚晶, 孙素芬 (2018). 当前农业新业态发展的阶段特征与对策建议. *农业现代化研究*, (1), 48–56).
- Chen, X. (2016). Adhering to the path of agricultural modernization with Chinese characteristics: Some understandings about learning general secretary of the CPC Xi Jinping's philosophy. *Chinese Rural*

- Economy*, (10), 4–6 (陈锡文 (2016). 坚持走中国特色农业现代化道路——学习习近平总书记相关论述的几点认识. *中国农村经济*, (10), 4–6).
- Cheng, G. (2015). Building “One Belt and One Road” together: Connotation, significance and mission of think tanks. *China Development Observation*, (4), 8–11 (程国强 (2015). 共建“一带一路”: 内涵、意义与智库使命. *中国发展观察*, (4), 8–11).
- Du, Y. (2018). Production by smallholders and agricultural modernization. *Chinese Rural Economy*, (10), 2–6 (杜鹰 (2018). 小农生产与农业现代化. *中国农村经济*, (10), 2–6).
- Du, Y., Pan, C., & Song, S. (2018). Evaluation of the development degree of China's agricultural modernization—Based on the calculation and grading of agricultural statistics in different regions at the provincial level. *Journal of Agrotechnical Economics*, (3), 79–89 (杜宇能, 潘驰宇, 宋淑芳 (2018). 中国分地区农业现代化发展程度评价——基于各省份农业统计数据. *农业技术经济*, (3), 79–89).
- Gao, Y., & Jiang, H. (2016). Review on the evaluation of the development of China's agricultural modernization. *Research of Agricultural Modernization*, (3), 409–415 (高芸, 蒋和平 (2016). 我国农业现代化发展水平评价研究综述. *农业现代化研究*, (3), 409–415).
- Han, J. (2017). The change of major social contradictions and the improvement of development strategies and policies in China. *Economic Research Journal*, (12), 7–9 (韩俊 (2017). 我国社会主要矛盾变化与发展战略和政策完善. *经济研究*, (12), 7–9).
- Han, Y., Jiang, N., & Han, T. (2017). “Go global” strategy of China's agricultural products processing industry in the “Belt and Road” region. *Agricultural Outlook*, (8), 100–106 (韩一军, 姜楠, 韩亭辉 (2017). “一带一路”区域中国农产品加工业“走出去”. *农业展望*, (8), 100–106).
- Hu, A. (2019). 70 years of new China: The road of modernization. *Economic Herald*, (7), 12–26 (胡鞍钢 (2019). 新中国 70 年: 现代化发展道路. *经济导刊*, (7), 12–26).
- Hu, A., Tang, X., Yan, Y., & Liu, S. (2017). China in 2035: Basic realization of socialist modernization. *Journal of the Central Institute of Socialism*, (6), 24–30 (胡鞍钢, 唐啸, 鄢一龙, 刘生龙 (2017). 2035 中国: 基本实现社会主义现代化. *中央社会主义学院学报*, (6), 24–30).
- Huang, J. (2018). Forty years of China's agricultural development and reform and the way forward in the future. *Journal of Agrotechnical Economics*, (3), 4–15 (黄季焜 (2018). 四十年中国农业发展改革和未来政策选择. *农业技术经济*, (3), 4–15).
- Huang, Q., Jiang, S., & Cao, Z. (2016). Empirical analysis about the influence and dynamic transformation of human capital on agricultural modernization. *China Population, Resources and Environment*, (2), 93–101 (黄庆华, 姜松, 曹峰林 (2016). 人力资本对农业现代化的影响及动态转换实证. *中国人口·资源与环境*, (2), 93–101).
- Ji, M. (2018). Agricultural productive service industry: The third momentum in Chinese agricultural modernization history. *Rural Management and Administration*, (2), 35–37 (冀名峰 (2018). 农业生产性服务业: 我国农业现代化历史上的第三次动能. *农村经营管理*, (2), 35–37).
- Jiang, Y., & Zhang, X. (2017). Analysis of the driving force for the development of agricultural modernization with Chinese characteristics. *Rural Economy*, (4), 86–92 (蒋永穆, 张晓磊 (2017). 中国特色农业现代化道路的演进动力探析. *农村经济*, (4), 86–92).
- Li, B., & Kong, X. (2016). A study on the pulling effects of industrialization and urbanization on agricultural modernization. *Economist*, (8), 55–64 (李宾, 孔祥智 (2016). 工业化、城镇化对农业现代化的拉动作用研究. *经济学家*, (8), 55–64).
- Liu, G., & Li, B. (2019). The integration of the three agricultural industries and the development of modern agriculture. *Research of Agricultural Modernization*, (4), 621–628 (刘国斌, 李博 (2019). 农村三产融合与现代农业发展分析. *农业现代化研究*, (4), 621–628).
- Liu, Q. (2018). The essence of rural revitalization is the revitalization of small farmers. *China Development Observation*, (Z2), 84–85 (刘奇 (2018). 乡村振兴的本质是小农户的振兴. *中国发展观察*, (Z2), 84–85).
- Ma, X. (2019). Rural revitalization should focus on the “four shortcomings”. *China Rural*

- Science & Technology*, (3), 7 (马晓河 (2019). 乡村振兴要围绕“四短”展开. *中国农村科技*, (3), 7).
- Wang, F. (2015). Institutional change and realization of agricultural modernization in China. *Economist*, (7), 65–71 (王锋 (2015). 制度变迁与我国农业现代化的实现. *经济学家*, (7), 65–71).
- Wang, F. (2018). Logical inevitability and practical model of the second leap of agricultural modernization with Chinese characteristics in the new era. *Economist*, (3), 82–88 (王丰 (2018). 新时代中国特色农业现代化“第二次飞跃”的逻辑必然及实践模式. *经济学家*, (3), 82–88).
- Wang, Y. (2018). How to implement the “three steps” strategy of rural revitalization. *People's Tribune*, (10), 72–74 (王亚华 (2018). 乡村振兴“三步走”战略如何实施. *人民论坛*, (10), 72–74).
- Wang, Y., & Su, Y. (2017). Rural revitalization: A new strategy of China's development. *Journal of the Central Institute of Socialism*, (6), 49–55 (王亚华, 苏毅清 (2017). 乡村振兴——中国农村发展新战略. *中央社会主义学院学报*, (6), 49–55).
- Yang, S. (2015). The historical process of exploring the road of agricultural modernization with Chinese characteristics. *Rural Economy*, (10), 78–83 (杨少垒 (2015). 中国特色农业现代化道路探索的历史进程. *农村经济*, (10), 78–83).
- Ye, X. (2017). Transition and policy trend of agricultural development in China. *Rural Work Communication*, (18), 22–24 (叶兴庆 (2017). 中国农业发展的转折性变化和 policy 走向. *农村工作通讯*, (18), 22–24).
- Yu, X. (2017). New challenges behind grain yield increase. *Review of Economic Research*, (12), 25–26 (余欣荣 (2017). 粮食增产背后的新挑战. *经济研究参考*, (12), 25–26).
- Zhang, H. (2018). Institutional features and development direction of China's modern agricultural management. *Chinese Rural Economy*, (1), 23–33 (张红宇 (2018). 中国现代农业经营体系的制度特征与发展取向. *中国农村经济*, (1), 23–33).
- Zhang, H. (2019). Taking advantage of regional advantages and cultivating diversified agricultural industry. *China Rural Science & Technology*, (5), 6 (张红宇 (2019). 发挥区域优势培育多元化农业产业. *中国农村科技*, (5), 6).
- Zhang, X. (2015). Trend and forecast on world agricultural products trade structure. *Agricultural Outlook*, (1), 64–69 (张小瑜 (2015). 世界农产品贸易结构变化与发展趋势. *农业展望*, (1), 64–69).
- Zhang, X. (2017). Exploring the path of accurate poverty elimination with Chinese characteristics. *People's Tribune*, (30), 50–53 (张晓山 (2017). 探索具有中国特色的精准脱贫之路. *人民论坛*, (30), 50–53).
- Zhang, Z., Xu, P., & Duan, Z. (2015). Food security should be the ultimate goal of agricultural modernization in China. *Chinese Journal of Eco-Agriculture*, (10), 1215–1219 (张正斌, 徐萍, 段子渊 (2015). 粮食安全应成为中国农业现代化发展的终极目标. *中国生态农业学报*, (10), 1215–1219).
- Zhou, Z., & Kong, X. (2015). Pattern and influencing factors of coordinated implementation of “Four Modernizations” in China: Perspective of agricultural modernization. *China Soft Science*, (10), 9–26 (周振, 孔祥智 (2015). 中国“四化”协调发展格局及其影响因素研究——基于农业现代化视角. *中国软科学*, (10), 9–26).