

## Research Article

# The Ways and Strategies for Overall Development of the Modernization of Agriculture in Chongqing

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**Abstract:** This article studies the causes of the low-leveled conditions of agricultural production in Chongqing, the low-degreed organization, scale and standardization on production, the huge income gap between urban and rural residents and the indistinctive diversification and characteristics of agricultural modernization. It analyzes Chongqing made use of industry to nurture agriculture in the context of scientific development and enriching the people and developing the city, cities promote the development of rural areas, improve the quality and efficiency of agriculture and explore a suitable development path for modern agriculture based on Chongqing facts. This study researches the base of Chongqing in developing modern agriculture, determines the clear development goals and analyzes the issues of large-scale operation and transfer of rural labor that influence the development of featured agriculture in Chongqing. It is developed from five aspects: cultivate business entities of modern agriculture, accelerate the innovation in agricultural science and technology, optimize the agricultural public services, develop ecological agriculture and establish a system of modern agricultural industry, in order to speed up the construction of agricultural modernization, promote the sustained and rapid growth of farmers' income and seek for proper ways and strategies to promote the development of agricultural modernization in Chongqing.

**Keywords:** Agricultural infrastructures, agricultural modernization, agricultural public services, ecological agriculture

## INTRODUCTION

Agriculture is the foundation of national economy. The leading party pointed out that promoting the agricultural modernization during the development of industrialization and urbanization not only is a reform of economic development mode and the important content of building a well-off society, but also the requirement for improve the overall agricultural production capacity, increasing farmers' income and building a new socialist countryside (Zhang, 2011). At this stage the agricultural modernization in Chongqing lags behind the industrialization and urbanization, agriculture is a weak industry, its foundation is weak, the degree of aggregation is not high and the industrial chain and benefit distribution mechanisms are inadequate. In order to promote agricultural modernization, resolve the problems during the agricultural development, ensure food security and achieve the rapid development in economy and society, we must focus on developing efficient and ecological agriculture, deepen adjustment of agricultural structure, promote the recombination of agricultural productive factors, relying on technological innovation and progress, cultivation modern agricultural

management entities, innovating mechanisms for agricultural operation and accelerating the transformation of developing mode (Costanza *et al.*, 1997).

Chongqing has a large population, but rare resources. It has more mountainous, but less flat lands. Its foundation is weak and still stays in the developing stage. The vast majority of poor people in rural areas are farmers, dual structure between urban and rural areas is evident and the income gap between urban rural residents is large. The acceleration of industrialization and urbanization, the orderly transfer of rural population and the increase of per capita of agricultural resources has prepared for promoting specialized, large-scale and intensive agriculture. Through intensively using of resources, promoting scientific and technological innovations, increasing outputs, accelerating the development of modern agriculture and solving the rural issues effectively, promote the agricultural modernization during the development of industrialization and urbanization and create a new pattern for coordinated development of urban and rural areas. This study researches the base of Chongqing in developing modern agriculture, determines the clear

development goals and analyzes the issues of large-scale operation and transfer of rural labor that influence the development of featured agriculture in Chongqing. It is developed from five aspects: cultivate business entities of modern agriculture, accelerate the innovation in agricultural science and technology, optimize the agricultural public services, develop ecological agriculture and establish a system of modern agricultural industry, in order to speed up the construction of agricultural modernization, promote the sustained and rapid growth of farmers' income and seek for proper ways and strategies to promote the development of agricultural modernization in Chongqing.

## **MATERIALS AND METHODS**

On the bases of the scientific development and enrichment of rural population, in order to promote the process of agricultural modernization, Chongqing must insist on nurturing agriculture with industry and developing the rural areas by cities and stick to the goal of scientific development, the main line of changing the development mode in agriculture, the objects of improving the quality and efficiency of agriculture, protecting market supply and increasing farmers' income, the orientation of improving agricultural production capacity, anti-risk capability and market competitiveness and the path of increasing agricultural outputs, resource utilization and labor productivity. Establish a modern agriculture industrial system, strengthen the scientific and technological support, strengthen infrastructure construction and explore the development path for modern agriculture in Chongqing.

At the present stage, the agricultural production condition of Chongqing is still relatively backward, the systematization level, scale level and standardization level of production are lesser, rural productive forces lag, widening the development gap between urban and rural areas, the agricultural modernization development, diversification and characteristics are not significant, as well as the farmers' per capita income is not higher, these problems are still very prominent, which has not yet formed the true meaning of agricultural modernization (Sun *et al.*, 2008). How to implement the development strategy of cities to promote rural areas, pushing forward Chongqing's overall planning of the coordinated development of urban and rural areas, how to develop modern agriculture with characteristic and high efficiency through the strategy of scientific development, enriching people and thriving Chongqing, from policies and measures to optimize the agricultural layout, strengthen agricultural science and technology, run through the agricultural vegetables circulation channels, deepen agricultural technology reform and consolidate the agriculture hardware base, on the premise of high yield and good grain quality, marked by high degree of green ecological security, intensification, standardization, organization and industrialization,

infrastructure, machinery and equipment, service system, science and technology and the quality of farmers to support agricultural modernization strongly, promoting the development of modern agriculture in Chongqing. To this end, we actually visited, issuing questionnaires, etc., to carry out the in-depth investigation of Chongqing to promote the processes and strategies of agricultural modernization development.

## **DISCUSSION**

Chongqing is located by the upper reaches of Yangtze River in the southwest China. It belongs to the transitional zone between Tibetan plateau and the middle and lower reaches of Yangtze River, crosses 470 km from east to west and 450 km from north to south and it covers an area of 82,400 km<sup>2</sup>. It is rich in plant resources, it has more than 6000 kinds of various plants and the forest coverage rate reaches 39%. Chongqing is one of the most important producing areas for herbal medicines in China and it is extremely rich in resources of medicinal plants. Wild and artificially propagated herbal medicines are more than 2,000 kinds and the production of coptis in Shizhu County ranks first in our country. It has cultivated more than 560 kinds of plants, mainly are rice, maize, wheat, sweet potato, etc. In addition to grain, oil, vegetables and other crops, there are still high-quality economic crops such as canola, peanut, tung trees, tallow, tea, mulberry, jute and ambery hemp, tobacco, etc. Qianjiang District is known as the hometown of flue-cured tobacco; while Fuling is a famous origin of preserved Vegetable. There are also fruit crops, such as citrus, pear, plum, peach, loquat, longan and other fruits. It enjoys a reputation of the origin of citrus. It has more than 600 species of animal resources and there are nearly 100 kinds of cherish and protect animals, such as golden monkey, South China tiger, slow loris, black stork, etc. Among 40 kinds of poultry, Rongchang pig ranks one of the three top pig breeds and the largest production base of wool rabbit is in Shizhu autonomous County.

The development objectives of Chongqing agricultural modernization are primarily composed by overall agricultural productivity, regional distribution and industry structure, rural development vitality and living standards of farmers (Chongqing, 2011). The basic principles of Chongqing agricultural modernization are to insist urban and rural areas, ensure supply, efficiency priority and reform and innovation. Realize the enhancement of the overall agricultural productivity through increasing the agricultural output value to 200 billion Yuan, the amount of cultivated lands to 32,560,000 acres, the effective irrigation area to 12 million acres, the rate of raising livestock and poultry to 60% and coverage of fine breeds to 95%; realize the development of regional agricultures and significant

enhance of the quality and efficiency through increasing the output quality of agricultural products to 73% and commodity rate to 67% and the productivity of agricultural lands by 40%; realize diversified rural financing system and specialized, standardized, large-scaled and intensive agricultural management system through increasing the mortgage financing and agricultural credit guarantee capacity to 100 billion Yuan, the property income of farmers' income to 5% and sales of agricultural products to 100 billion Yuan; achieve complete social security, narrowed gap between rural urban areas and improved living standards through increasing the rural per capita net income to the national average and the average annual increase more than urban residents (Xie *et al.*, 2008).

Chongqing is in underdeveloped stage and area and its industrialization and urbanization calls for deep promotion. The effective transfer of rural labor force takes long time. Land is the basic guarantee of the farmers' living (Zhu, 2013). The scale operation is the requirement and result of modern agricultural development, which directly influence the development of modern agriculture in Chongqing. At this stage, the contradiction of more people with less lands becomes more and serious in Chongqing and mostly are small-scaled operations, these has led to land fragmentation and complex agronomic system, so we cannot make use of the scale benefits of modern agriculture. The per household arable lands is less than five acres, lower than the average of other provinces, less than 20% of Japan, only 1/50 of EU and 1/500 of USA. If we disregard the situation in Chongqing and land security function, just blindly promote agricultural modernization, a large number of landless and jobless farmers will swarm into cities. However, cities cannot solve the employment and social security issues for farmers in a short period, which will further intensify the contradictions. Therefore, the land management requires effective use of the modern production factors. If the scale of land in agricultural production units is below the critical size, the agricultural modernization cannot be promoted effectively: if the scale of land in agricultural production units is above the critical size, the scale effect will decline. Promoting agricultural modernization with Chongqing characteristics not only requires promoting land-scale operation, but also to prevent excessive scale. The government should adopt policies to guide and inspire more agricultural production units to keep the modern production factors of their land operation scale between the minimum critical size and the optimum size. The minimum critical size and the optimum size have great differences under different conditions. According to surveys of FAO: the minimum area of farm is 70 acres if you want it to have scale effect. If the agricultural products are competitive in the international market, the area of commercial crops should not be less than 170 acres and the grain crops no less than 300 acres. Chongqing should refer to experience of foreign

countries and determine its suitable scale operation standards.

Agriculture is practiced mainly natural-based home management system. The family agricultural production and management units stick to family operation, which does not mean fix currently scattered, small-scale land operation, but to reduce the number of farmers through the transfer of rural labors. In the United States, nine farms in ten are family farms and 85% of the cooperated farms are family companies. Under the condition of stable agricultural production resource, farmers gradually reduced, single agricultural production and management units share more resources, agricultural producers increased their initiative to use modern production elements and the endogenous motivation of the modern agriculture has been enhanced. The transfer of rural labor is inevitable phenomenon in the process of modernization. At present, farmers are directly or indirectly tied to a small fraction of lands, too many agricultural labors share too little added value of agriculture. Currently, the transfer of rural labor pays more attention to the transfer of living space and changes of jobs, the transfer of identity of rural migrant workers lags behind the profession shift and the movement of peasant families lags behind the transfer of rural labors. Such labor transfer mode is out of line with industrialization and urbanization, which generated a large group of migrant workers who are drifting between urban and rural areas. The development tendency of agricultural modernization in many countries is to reduce the number of farmers gradually and increase the average arable land. Such as in France and West Germany, the number of farmers has been sharply reduced in the process of agricultural modernization, while in China the total area of arable lands was decreased, but the total number of farmers has been increased. Chongqing has no exception. From 1990 to 2010, the arable land area in Chongqing was declined at the rate of about 1% per year, while the number of farmers was increased from 6,860,000 to 7,270,000. This directly resulted in smaller farmers operating scale, fragmented agricultural production factors, a large number of part-time farmers and increased income of part-time farmers, decreased operational income, lower enthusiasm in management of land and a short-term and extensive management of land. In order to promoting the agricultural modernization with Chongqing characteristics, the government must broaden employment channels, speed up the transfer of rural labor force, establish the policy objective of reducing the number of farmers, guide farmers to shift the whole family, improve the agricultural production resource exit mechanisms and ensure the equal treatment of the entire transferred families and the residents of the city.

## RESULTS

**Cultivate business entities for modern agriculture:**  
Guide the agricultural leading enterprises to reorganize

through brand grafting, capital operation and industry extension, cultivate excellent and strong enterprises, support the qualified agricultural enterprises to seek financing by listing on the stock market, issue bonds and stocks (Ross *et al.*, 2005). Improve the industrial management of agriculture mechanism, encourage production, operation and service bodies to establish farmer cooperatives together, develop rural share cooperatives and encourage farmers to share the stocks on terms of contractual management, land attachments, technology, capital and other factors, encourage enterprises and farmers professional cooperatives and farmers cooperation, establish the interests binding mechanism based on orders, contracts, shares, etc. and lead industry and commerce capital, private capital and foreign capital to found agricultural business service enterprises. Promote standardized construction of farmers professional cooperatives with standardized production, branding operation, standardized management, skilled staff and securitized products, promote credit construction of farmers professional cooperatives, improve processing and distribution services, expand docking of production and marketing, improve production and management, market development and organizational and driving abilities and increase farmers' property income through agro-processing, distribution and other diversified ways. Encourage farmers to transfer lands to develop appropriate scale of operations and guide farmers to develop land stock cooperation by taking lands as shares, establish family farms and land cooperative farms through the business registration, achieve the transition from natural agriculture to corporative agriculture, make use of new varieties, new technologies and new equipments, develop large-scale, standardized and specialized production, realize win-win cooperation among agricultural enterprises, farmers cooperatives and family farms and promote the modernization construction of agriculture through cultivating the management entities for modern agriculture.

**Accelerate the technological innovation of agricultural science and technology:** Integrate the innovation resources of agricultural science and technology, strengthen the construction of scientific and technological innovation platform, introduce and train talents and improve the cooperative system of scientific and technological innovation. Encourage agriculture-related research institutions, universities and scientific and technical personnel to research and develop technologies and participate in the construction of modern agriculture. Encourage agricultural leading enterprises, farmers' professional cooperatives to tackle technical problems, explore agricultural technology promotion mechanism of agriculture, science and education together with production, study and research and promote the connection of agricultural supply and

demand in science and technology and achieve conversion. Oriented by industry needs, promote the combination of original innovation, integrated innovation and the innovation based on introduction, digestion and absorption. Develop the key technologies that can promote industrial upgrading and secure the quality. Promote the application of modern biotechnology, information technology and precision operation technology in agriculture. Build a modern agricultural technology system. Strengthen the protection of intellectual property in agriculture, encourage agricultural researchers to declare the patent, improve the liability system of agricultural extension, strengthen the extension services in experiments and demonstrations of agricultural science and technology, advice farmers to make use of fine breeds, advanced practical technology and new farming systems and promote agricultural science and technology in villages. Strengthen the basic research on agricultural standardization, focusing on the quality and safety of agricultural products, build agriculture standard system according to the actual conditions of Chongqing, expand the application of standardized technologies and promote the production, sales and circulation of agricultural products according to standards. Development pollution-free agricultural products, green foods, forest foods, organic products and geographical agricultural products, create brands of agricultural products and promote the branding management. Increase the breeding inputs and seed subsidies, carry out the breeding of new varieties, strengthen the protection and development of local genetic resources and the introduction of improved varieties, build dynamic evaluation platform for genetic resources and modern breeding center, strength the building of standardized breeding base and indemnificatory nursery, develop industrialized breeding center, build the platform for seed exchange and online trading and accelerate the promotion of fine varieties. Improve the inspection system for quality and safety of agricultural products, improve the risk assessment of the quality and safety of agricultural products and systems of origin access, market access, quality traceability and destruction of withdrawal according to the principles of combining the technical measures and management measures, the governance of sources and the supervision of process, improvement and long-term prevention and control. Promote the construction of modern agriculture through accelerating the innovation of agricultural science and technology.

**Optimize the agricultural public services:** Based on the features of Chongqing Agricultural regions, we build grass-roots agricultural public service center with fixed location, well-equipped facilities and standardized management according to the method of comprehensive setting and respective construction by linking social

service resources. Promote services of agricultural technologies, prevention and control of animal and plant epidemic diseases and control of agricultural products to farmers. Set up professional service organization as a leadership, encourage basic supply and marketing cooperatives, agricultural enterprises, farmers' specialized cooperatives extend to the field of agricultural services, develop social services like supplying agricultural materials, operating agricultural machines, drying grains, distributing biogas slurry and other services and promote agricultural assignments. Encourage farmers' specialized cooperatives to increase experimental units of mutual cooperative, implement preferential tax policies to agriculture-related loans and promote the construction of rural credit system through developing village banks and small loan companies. Encourage financing guarantee institutions to carry out rural credit guaranty through expanding the coverage of Forest Right Mortgage Loan and developing land contracted management rights, rural housing and other mortgage loan businesses. Support the healthy development of fishery Mutual Insurance and strengthen the stability of agricultural production and management through developing policy-oriented agricultural insurance, building Rural Fraternal benefit society and expanding the coverage and variety of agricultural insurances. Strengthen agricultural marketing and market monitoring, establish improved forecasting platform of supply and demand information. Encourage and support leading enterprises, farmers' specialized cooperatives to use modern information technology. Construct four-grade agricultural information network system of cities, counties, towns and villages, improve informationalized services of agricultural production and management, build agricultural marketing platform, provide agricultural technologies, policies, market and other integrated information services to farmers through information technology and promote the construction of modern agriculture.

**Develop ecological agriculture:** Implement forest ecological engineering, strengthen the management of ecological forest, improve compensation system of forest ecological benefits, promote the construction of farmland and forests and greening projects, strengthen the construction of protection forests around lakes and rivers, take forest improving actions, promote forest tending, transformation of wood quality and cultivation of precious timber forest, optimize the forest structure and improve the forest quality. Develop carbon forestry, explore the carbon market, make use of the store function of carbon, absorb and settle carbon dioxide in atmosphere through forest planting, strengthening forest management, reducing deforestation, protecting and recovering forest vegetation and other actions. Strengthen the protection

of woodlands, wetlands, water areas, islands and beaches, enhance the construction of nature protection areas and protection of rare and endangered animal and plants, protect and develop wildlife resources in accordance with the laws, carry out the proliferation and releasing of aquatic organisms, maintain the biological diversity and improve agricultural ecological conditions. Promote the construction of ecological agricultural programs, advocate saving land, water, fertilizer and energy and develop circulative agriculture, encourage agricultural businesses to develop new breeding modes such as combining planting and breeding, cyclic utilization and so on (Singh *et al.*, 2004). Arrange the layout of agricultural industry and supporting facilities and realize the regional circulation of agricultural resources. Develop ecological animal husbandry, improve the feeding methods of livestock and poultry, promote the utilization of livestock's excrement and take advantage of forest lands and ecological advantages. Rely on forest resources and ecological environment; develop farming, breeding, gathering and forest tourism and develop compound management model which is appropriate for the development of modern agriculture in Chongqing. Based on food chain and cycle technology, connect farming, breeding and processing industry together by methane, combine the traditional single farming with efficient feeding and excrement and develop this new kind of developing model through the increase of raising livestock and poultry and the anaerobic fermentation of biogas digester. Make use of the biological characteristics in natural ecosystems and allow different biological groups to express their respective roles in order to gain economic and ecological benefits. Reuse agricultural organics after processing, achieve the benefits of fertilizer, animal feeding, raw materials and energies and develop the recycling mode that can eliminate the environmental pollution and ecological damage. Take advantage of the resources of courtyard environment in rural areas and develop farming and breeding industries with the assistance of processing industry (Qiu, 2009). Form the developing model of rural courtyard without wastes through stereo operated farming industry, ecological breeding industry and technology-intensive processing industry. Promote the construction of modern agriculture by developing the ecological agriculture.

**Strengthen the construction of agricultural infrastructures and upgrade of equipments:** Through the standardized construction of irrigation and water conservancy, develop a long-term effective system of irrigation and water conservancy. Strengthen the construction of irrigation and drainage facilities, flood control installations and tractor roads in farmland, forests and state-owned forestry fields through the comprehensive development of agriculture,

management of lands, irrigation and water conservancy, forest roads and other projects. Implement promotion programs to enhance the quality of standard farmlands, improve the low-yielding fields and forests by increasing the organic fertilizer, improving agricultural technology, combing farming and breeding, connecting farming and fishing, managing farmlands and other measures. Implement the promoting programs of agricultural mechanization, improve subsidies for the purchase of agricultural machines, enlarge the applications of agricultural equipments and promote the coordinated regional development of agricultural mechanization. Strengthen the development and applications of important crops and key agricultural mechanization technology, optimize the structure of agricultural machines and equipments, establishing the mechanized production technology system of integrating agricultural machines and technologies and promote the extension of agricultural machines from crops to the leading agricultural industries and post-harvest processing industries. Accelerate the cultivation of agricultural services, build centers raising rice seedlings, drying grain and maintaining agricultural machines and encourage cross-regional operation of agricultural machines. Improve the policies for dropping and upgrading agricultural machinery, accelerate energy conservation of agricultural machines and abandon farming machines and equipments which consume more energy or provide low performance. Support the development of competitive industries, like combine harvesters, tractors, plant protection equipments, forestry machinery, fishing machinery, micro-irrigation facilities, water pumps and processing machineries of tea, bamboo, tea oil. Strengthen the application of information technology in the field of agriculture; promote intelligent greenhouse facilities, pest diagnosis and construction of information technology for agricultural production and management and improve the intelligent and visual level of agricultural production. Promote the construction of agricultural information platform, expand their functions, establish a modern agricultural geographic information system covering the province, cities and countries and extending to villages and promote the management of production factors, allocation of agricultural resources and information of controlling production processes.

**Establish a system of modern agricultural industry:**

The modern agriculture is oriented by market, supported and guided by government, managed by modern agricultural bodies and will benefit farmers. Lead the competitive enterprises to gather in superior regions and build 100 municipal modern agricultural parks, which have reasonable layout, concentrated producing factors, advanced technologies and facilities, flexible operation mechanism and relatively complete

industry chains in agricultural leading areas. Improve the operation mechanism of modern agricultural park, encourage them to establish specialized management organizations, strengthen the operation and management, investment, facilities management and protection and public services and transform the modern agriculture comprehensive areas into agricultural industry gathering areas. Deepen the agricultural structure, adjust regional distribution, highlight the regional characteristics and build mountain agricultural bases, the modern agricultural demonstration zone in the west part of Chongqing and the agricultural demonstration regions. Optimize the structures of industry, variety and quality, develop grain, vegetables, livestock, citrus, fisheries, fruits, herbs, flowers, tea, mulberry and tobacco industries, support the construction of industrial zones of advantageous agricultural products and focus on cultivating green and ecological pollution-free agricultural products and organic foods. Segment the agricultural leading industries and confirm competitive industries and the main direction. Expand the agricultural functions in the main city and suburbs; develop competitive, facility and leisure agriculture and build high quality bases of grain, vegetables, livestock and poultry and aquatic in western area of Chongqing. According to the developing method of overall industry chains, promote the connection of agricultural upstream and downstream industries, enhance the standardized construction of the key link, extend the agricultural industrial chains, promote the connection of all chains in agricultural production and sales, develop deep processing of agricultural products, encourage enterprises engaged in processing agricultural products to bring in new equipments and advanced technologies and improve their processing level (Yu and Zhao, 2009). Strengthen the construction of agricultural market system and logistics system, enhance the facilities and functions of the wholesale market for agricultural products, introduce electronic trading, improve the price mechanism of agricultural products, build a modern agricultural industry system and promote the construction of modern agriculture.

**CONCLUSION**

Agricultural modernization refers to modernization of means of agricultural production, the scientization of technology, industrialization of operation, socialization of services, regionalization of industrial layout, modernization of infrastructures, modernization of the ecological environment, modernization of workers and modernization of farmers' living. Agriculture, rural areas and farmers are the major issues related to the reform and opening up and the overall situation of modernization construction. Agricultural modernization is the basis of a comprehensive modernization, the power of the sustained and healthy development in

China and the source of long-term social stability. In order to develop the new agricultural modernization in Chongqing, we need to improve the infrastructures, equipments, service system, science and technology and the quality of farmers based on developing high-yielding and good quality grains and focus on green ecological security, intensification, standardization, organization and industrialization. Promote agricultural socialized production, improve agricultural productivity, resource utilization and land outputs, provide raw materials and labor forces to the new industrialization and expand the space of urbanization; reduce rural population through the development of urbanization, promote the appropriate scale of operation and intensive production, improve agricultural efficiency; take advantage of technologies, production capacity and information to support the modernization of agriculture. This study discusses the developing process and strategies of Chongqing agricultural modernization from five aspects: cultivate modern agriculture bodies, accelerate the innovation of agricultural science and technology, optimize the agricultural public services, develop the ecological agriculture and establish a modern agricultural system. This study aims at accelerating the development of modern agriculture in Chongqing and promoting the simultaneous development of industrialization, informatization, urbanization and agricultural modernization.

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