

## Research Article

### Strategies on Accelerating Agricultural Modernization-taking Tongnan County as an Example

Yongyong Zhu

Department of Economics and Business Administration, Chongqing University of Education, Chongqing 400067, China

Civil and Commercial Law School, Southwest University of Political Science and Law, Chongqing 400031, China

**Abstract:** Agricultural modernization is organically integrated with the development of industrialization and urbanization. Agricultural modernization is the key and difficult point in the simultaneous development with Chinese characteristics industrialization, informatization and urbanization. This study takes Tongnan county as an example and analyzes the measures and strategies to step up agricultural modernization from perspectives of organizational leadership and assessment, spatial layout and base industries, creative demonstration and scientific popularization, information circulation system, policy support and incentive mechanism and innovation of Financial insurance cooperation organization, with aiming to accelerate agricultural modernization, enhance the fast increase in farmers' income, improve rural living condition and promote the synchronous development of industrialization, informationization, urbanization and agricultural modernization.

**Keywords:** Agricultural informatization, modern agriculture, rural circulation, urban and rural development, vegetable demonstration

## INTRODUCTION

Tongnan County locates in the northeast of Chongqing City, which is the crucial part of Sichuan-Chongqing region, with Hechuan to the east, Tongliang and Dazu to the south, Anyue to the west and Suining to the north. Tongnan is the intersection and regional geometric center of the natural and convenient transportation trend of Sichuan and Chongqing, the central region of Chengdu-Chongqing economic zone, the gateway which is the farthest one protruded from western Chongqing to Sichuan central region and the cutting-edged and most important one of the opening-ups with the most Sichuan-adjointed counties and cities, the leading edge of Chongqing one-hour economic circle and the central city of Chongqing physical geography and traffic fort in future Sichuan-Chongqing handshake area. Tongnan has an area of 1583 km<sup>2</sup>, scoping 2 streets, 20 counties, 283 administrative villages and 19 neighborhood committees, with a population of 950000. It locates in the basin of shallow hill, where the climate is pleasant and the seasons are distinctive, with the elevation of 300 to 450 m, the annual average temperature of 17.9°C and the annual average precipitation of 990 mm. The Fujiang and Qiongjiang River traverse the county and the reserve of natural gas is 30000 million m<sup>3</sup>.

Agricultural modernization is organically integrated with the development of industrialization and

urbanization. It is pointed out in the 2012 Tongnan government planning report that in 2017, Tongnan County will basically build up the national modern agricultural demonstration area, take the lead in the general realization of the agricultural modernization, make the agricultural modernization advanced in Chongqing, make total value of agricultural output exceed 10000 million Yuan, increase land comprehensive productivity by 50% and agricultural labor productivity by 20%, make agricultural comprehensive mechanization reach more than 52% and marketable farm products reach 80%, increase annual average rural per capita net income by 15%, reaching 16000 Yuan. Effectively reduce the rural population in Tongnan through the guidance of policies and improve the economic efficiency of agriculture in Tongnan through the appropriate scale of operation and intensive standardized production. Support the development of modern agriculture by combining industrialized technical and material production capacity and the advantages of information technology. The research in this study will promote the connection of industrialization and urbanization development in Tongnan and the sustainable development of agriculture and agricultural modernization process as well.

## MATERIALS AND METHODS

The guiding ideology of research on the progress route and strategy of advancing Tongnan agricultural

modernization is to speed up the construction of modern agricultural industry system, put forth effort to reinforce the science and technology support, practically enhance infrastructure construction and explore a characteristic and effective way of modern agriculture which conforms to the reality of Tongnan, with the premise of scientific outlook on development, enriching people and prospering Tongnan, the principal line of transforming agriculture development mode, the goal of increasing agricultural quality benefit, guaranteeing market supply and increasing farmers' income, the main attack direction of increasing overall agricultural productivity, anti-risk capability and market competition capability and the elementary path of increasing agricultural land output, resource utilization rate and labor productivity (Chongqing, 2011).

Research on the progress route and strategy of advancing Tongnan agricultural modernization needs to follow the way of efficiency priority, farmer subjected and market oriented, insist urban and rural coordination, coordinately carry forward industrialization, urbanization and agricultural modernization, boost rural reform and institutional innovation and build the long-term mechanism of "promoting agriculture with industry and leading the country by the city", thus promote urban-rural interaction, resource sharing and mutual introducing of elements and form the new pattern of urban and rural integration development. To select construction mode of agricultural modernization scientifically, adjust measures to local conditions, give classification guidance, concentrate strengths and take the leading in the breakthrough (Zhang, 2011). People should boost market-oriented strategic adjustment of agricultural structures, energetically develop high-quality, efficient, ecological and safe agricultural products and make great efforts to promote the quality and benefit of agriculture. To fully apply market mechanism with arouse diverse subjects to participate in the activities of agricultural modernization construction (Zhen-Long, 2012). To transform the function of government positively, build favorable policy environment and offer efficient public service for agricultural modernization construction. To respect farmers' wills, give full play to farmers' dominant role and pioneering spirit, continually improve the organization degree of agricultural production and make concerted efforts to promote agricultural modernization. Therefore, we have researched deeply on the progress and strategies of advancing Tongnan agricultural modernization by means of actual visit, issuing questionnaires, etc.

## RESULTS AND DISCUSSION

**Advantages for the agricultural modernization in Tongnan:** Tongnan is the first batch of modern agricultural demonstration areas, Sichuan-Chongqing cooperative demonstration area and the important

vegetable supplying base of the main city of Chongqing. The landform of Tongnan is the basin of shallow hill, the Fujiang and Qiongyang River have sufficient water resource and there are many alluvial dams, so it can develop vegetables with particularly favorable natural conditions. We have fully promoted the construction of agricultural modernization with the goal of ensuring supply and increasing income and the tongs of constructing national modern agricultural demonstration area and the western green vegetable capital. From January to August 2012, Tongnan newly added 60000 mu of multiple cropping acreage, the total area reaches 850000 mu and the output is 1700000 ton which occupies 25% of the market shares of Chongqing. Tongnan make the vegetable industry as the leading industry of the construction of national modern agricultural demonstration zone. With the thinking of ensuring the supply of main city, beaming the western China and servicing the whole nation, Tongnan has constructed 260000 mu of standardized vegetable bases, which is based on the dam fields along Fujiang and Qiongyang River. Of which, 12 standardized vegetable bases belong to ten thousand-mu grade and the rate of land flow in the vegetable bases is 80%. By introducing and cultivating 11 leading enterprises of the city level, the vegetable base has realized large-scale and industrialized operation. Of which, Mingyu Company, Hanfei Company and Nonglong Company have become the masters of edible mushrooms, pig feeding and vegetable planting of Chongqing respectively. Tongnan has been honored with national venture base of agrotechny, with the vegetable processing capacity of 300000 ton and the production value of 2100 million Yuan. The promotion of productivity needs the cooperation of science, technology and marketing. With science and technology popularization and brand construction, Tongnan has enhanced the cooperation with domestic and international scientific research institutions, popularized more than 130 fine varieties such as Korean radishes, Japanese scallions, etc., authorized 103 nuisance free agricultural products, 69 high-quality agricultural products and 3 branded agricultural products, registered green trademarks of Tongnan, constructed the major county of green vegetables of the city and made the brand of green organics. With the opening of internet direct sales of vegetables, Tongnan has expanded marketing channels, built three-dimensional marketing network, activated the biggest vegetable wholesale market of western China and firstly constructed 100 community outlet stores of vegetables in the main city of Chongqing. The vegetables of Tongnan have commanded a ready market in more than 20 provinces and cities throughout the country.

To promote agricultural modernization, Tongnan plans to construct 2000 mu of mechanized high-yield rice demonstration field, 10685 mu of high-yield rice

demonstration field of ten thousand-mu grade, 2 high-yield wheat demonstration field of ten thousand-mu grade with the area of 20657 mu, 3 high-yield rape demonstration field of ten thousand-mu grade with the area of 33006 mu, vegetable demonstration bases of science and technology of Guanba, Taian and Shuangba, Guilin with the area of more than 500 mu, 1000 mu of facility cultivation and production base, pig breeding farm with specialized strain of Yurong-1, progenitor pig breeding farm of Wings Group, 5 pig farms of standardized scale with annual fattened stock of 5000, 60 ecological farms with annual fattened stock of 1000, 10 standardized cage-culture laying hen farms with breeding stock of 10000 and 15 perch shelf cultured, multilayer net rack cultured, or free-ranging laying hen farms with breeding stock of 5000. With the support of leading enterprises such as Keguang, etc. and vegetable science and technology demonstration of Guanba, Taian, Tongnan has activated 2 vegetable grow seedling centers, introduced, experimented, demonstrated and screened 30 fine varieties, popularized 20 new varieties, developed 3000 mu of steel-frame greenhouse and 1000 mu of water-saving irrigation such as micro-injection irrigation, micro-drop irrigation, etc., popularized 150 machines such as plantation machines, farming machines, harvesting machines, etc., built 50000 mu of extension base, transformed 50000 mu of old base, made 20 specialty villages of vegetables and 10 standardized vegetable gardens, completed production of winter and spring vegetables such as tuber mustard, potato, etc. with winter vacant fields, made annual area of vegetable cultivation reach 900000 mu and annual volume of production reach 1800000 ton, completed experiment and demonstration of soilless culture of connected greenhouse, constructed 5000 mu of circular agricultural base, etc. By promoting the brand image of vegetables, Tongnan has carried out standardized production, exerted the function of ministerial quality monitoring station of agricultural products, strengthened the quality supervision systems of agricultural products of the four levels of county, town, street and village and enhanced integrated supervision. By promoting packing, classified and branding systems of vegetables. Tongnan has carried out labeling marketing and constructed system of quality safety traceability, completed the trademark authentication of agricultural products, authorized 5 nuisance free agricultural products, 20 green agricultural products and 3 green vegetable bases and declared 1 register of Tongnan geographical indication of Chinese cabbage.

**Strategies on agricultural modernization in Tongnan area:** Development of the route and strategy research of the promotion of Tongnan agricultural modernization process needs to keep a foothold in the situation of Chongqing, balance regional coordinated development of the urban and rural, promote and

balance the construction of urban and rural comprehensive reform pilot area, structure the system and mechanism of regional integration of the urban and rural and promote the “city supporting village and industry regurgitation-feeding agriculture”. The urban economic region, with the core of the main city and the radius of one-hour commuting distance, needs to drive and construct the town cluster of three gorges reservoir region with the center of Wanzhou in the northeastern Chongqing and the town cluster in the southeastern Chongqing with the center of Qianjiang River and form the new pattern of regional coordinated development of the urban and rural. It is also needed to accelerate industrialization, urbanization and agricultural modernization, change the mode of economic development with the engine of industrialization, the support of urbanization and the foundation of agricultural modernization, promote the quality and benefit of development, innovate social management by the transformation of government functions, form new power of scientific development and boost the progress of Tongnan agricultural modernization (Ross *et al.*, 2005).

In order to build itself into a national modern agriculture demonstration area, Tongnan County should strive to strengthen its organizational leadership, establish evaluating and examining system and upgrade infrastructure and scientific and technological level. The leading group with county party secretary acting as the team leader, country government leaders as vice team leader and leaders from related departments as the team members should be established to launch the agricultural modernization and the County Agriculture Commission must play a leading role in implementing all preparations of agricultural modernization while being coordinated by related departments with different functions; meanwhile, great importance should be paid by leaders in all towns and responsibility system with secretary of party committee as the top leader should be set up to appoint talents from agricultural department as the deputy town chief for directing the construction of featured industries. Assessment methods and mechanism should be established to specifically access items concerning agricultural modernization and it should be listed as one of the key items of agriculture, farmer and rural area by county party committee and county government to assess the performance of the related departments and all towns, so that they are able to assign the working index of agricultural modernization and the key construction tasks to related departments, all towns and specific persons. For Tongnan County, great efforts should be put in building Lianghe district, North Tongnan district and South Tongnan district and developing supporting industries, supply chain, leading industries and farmer training so as to achieve the double growth in the total agricultural output value, agricultural added value, processing value

of agricultural and sideline products, agricultural scientific and technological contribution rate and rural per capita net income; furthermore, all departments should strive to accelerate agricultural development by specifying their tasks, such as developing 10 leading products, 1000 leading enterprises and the training of agricultural technicians and new farmers.

To stabilize basic industry, optimize spatial arrangement, develop garden economy, build hundreds of villages and gardens and promote the value of agricultural products. Boost the progress of agricultural modernization, Tongnan needs to keep a foothold in the original foundation, highlight the regional characteristics, implement the project of newly increasing one hundred billion catties of grain on the basis of stabilizing the grain acreage, focus to support a batch of large households who grow more than 100 mu of grains, reach the seeded area of oil grain to more than 1000000 mu, the production capacity to 400000 ton and the rate of coverage of the improved varieties to more than 98% and make the annual fattened stock of high-quality pigs reach 1000000 and annual fattened stock of laying hens reach 30000000. Construct standardized planting base of green organic vegetable around the dam field along the river banks, develop planting base of mountain and aquatic vegetables, development green organic vegetables, activate 100 standardized gardens of oils, vegetables, fruits, aquatic products, etc., in 2017, activate 20 high-standardized vegetable planting bases of ten thousand-mu grade, form 400000 mu of standardized vegetable planting base, realize annual vegetable multiple cropping acreage of 1000000 mu and production volume of 2000000 ton and activate the green vegetable capital in western China. Develop garden economy industries of tourism and relaxation with the subject of the farmers and focus to develop ecological tourism in the regions such as the way sides of the artificial channel, Taian modern agricultural demonstration zone, Dongsheng tea mountain, Maanshan forest park, etc. With the innovate business model, develop farm villages of towns and suburbs, villages of folk culture and agricultural science park, complete 5 national, 10 city level and 50 county level demonstration sites of leisure agriculture and rural tourism and 300 sites of leisure agriculture and rural tourism. Attract various investors to initiate projects of agricultural products processing, increase additional value of agricultural products, cultivate and expand agricultural leading enterprises of the integration of producing, processing and circulating, increase the conversion rate of agricultural products processing by 5% per year and make the production value of agricultural products exceed 10000 million Yuan, with the development of farming industries such as oils, vegetables, livestock, poultry, aquatic products, etc. Realize the cultivation of 1 national leading enterprise, 20 leading enterprises of city level, 120 leading

enterprises of county level, 1 leading enterprise of agricultural modernization with the annual sales revenue of 1000 million Yuan and 10 leading enterprises with the annual sales revenue of more than 100 million Yuan in 2017. To track the route of green brand benefit, cultivate nuisance free agricultural products and green organic food and construct high-quality supplying bases of oils, vegetables, livestock, poultry and aquatic products, by boosting six high-quality agricultural production areas of the 50 km<sup>2</sup> of modern agricultural demonstration zone and core area along Qiongliang River, 200000 mu of standardized green vegetable producing belt along Fujiang River, 50000 mu of characteristic economic forest and fruit belt along the artificial channel, 50000 mu of agricultural demonstration field of rice field benefit along Linjiang Village and Baisha Village, Chongkan County, 10000 mu of pond and dam of ecological aquaculture demonstration field and Taian stereoscopic planting demonstration field of edible mushrooms.

Strengthen innovative demonstration, enhance popularization of agricultural machinery, cultivate farmers' accomplishment of agricultural modernization and promote the quality of agricultural science by proposing the integration of technology (Jian-Guo *et al.*, 2007). Implement the project of innovation and promotion of agricultural science and technology, reinforce the integration, assortment and popularization of technology and implement the techniques of the assortment of improved varieties and methods of crops, the combination of agricultural machinery, agriculture and production mechanization, the standardization of aquaculture of livestock and poultry, the technique of agricultural energy conservation, agricultural circulating techniques with the main techniques of the circulation of planting and breeding and the circulation of biologic chains, the technique of prevention and control of major agricultural disasters, agricultural ecological security, (Bang-Cheng *et al.*, 2006). Complete the four-level promotion network of the county, the town, the village and the household, accomplish the construction of the conditions of the extension agencies of the county, the town, the village levels, boost the village and household entering of the scientific and technological information. Implement the project of the promotion of agricultural mechanization and lead the agricultural modernization with agricultural mechanization. Boost the whole mechanization of rice production and the agricultural machinery and implements popularization of the production of vegetables and rapes, breeding industry, forest and fruit industry and the processing and transport links of agricultural products. Establish 1 to 3 city-level promotion and demonstration zones of agricultural mechanization of new techniques, machinery and implements, construct 20 demonstrated specialized cooperatives of agricultural machinery and implements, develop 100 specialized households of agricultural

machinery and implements, make enterprises of agricultural machinery and implements bigger and stronger and promote the industrial manufacturing level and production quality of agricultural machinery and implements. Cultivate foregoers who become rich by science and technology, experts of planting and breeding, country brokers, leaders of specialized cooperatives, farmer entrepreneurs and country high-skilled talents, focusing on the promotion of the farmers' science and technology quality, occupational skills and business capacity. Build the educational training system of the farmers of the three levels of the county, the town and the village; to construct farmers' field school, go deep to the characteristic villages to carry out counterpart industrial technology training and instruction, strengthen the training of new type of professional farmers and cultivate new professional farmers of agricultural modernization who are well-educated, understand technology, good at operation and know cooperation.

Construct circulation system, complete service system and promote agricultural informatization and active the market circulation of agricultural products. Support a batch of circulation markets of agricultural products such as Tongnan vegetable wholesale market, etc, reach the circulation subjects to 500 such as agricultural enterprises, marketing specialized cooperative organizations of the farmers, specialized circulation associations of agricultural products, big marketing households, brokers of agricultural products, etc and brokers of agricultural products to 10000. Form market systems with the cock of large-scale wholesale markets, the link of regional agricultural product markets and distribution centers and the terminal of large-scale supermarkets and urban and rural vegetable markets; to develop 300 butt joints of agriculture and supermarkets, agriculture and schools, agriculture and restaurants and agriculture and enterprises, by modern circulation methods such as agricultural product online transactions, direct selling, distributions, chain-store operations, etc. Form agriculture standardized system which focuses on national standard, assort with industrial standard, local standard and enterprise standard and satisfies the needs of the links of agricultural product production, processing, circulation, etc. Construct and complete the management system, the system of production record files and the system of traceability of product quality safety of agricultural and animal products of the bases and realize optimization of the environment of producing places, the standardization of productive process and optimization of product quality (Jing-Jing and Xue-Hua, 2007). Work hard for to realize 20 authentications of nuisance free agricultural product, 50 authentications of green food, 10 authentications of organic food and 10 authentications of geographical indications of agricultural products; to reach registered trademarks of agricultural products to 100 and build more than 20 branding agricultural products over the city level, by guiding and supporting

certificate of quality system of agricultural products. Structure the platform of integrated information service and exchange of agricultural modernization, construct country information service network which uses county agricultural information center as the hinge, links the upper ministries and cities and links the lower agricultural information stations in the towns and streets, country information service sites, leading enterprises of agricultural industrialization, wholesale markets of agricultural products, specialized cooperatives, big households of planting and breeding and the farmers' households.

Cultivate cooperative organizations, explore insurance systems, promote country reforms, push mechanism and activate the vigor of rural development. Guide the farmers to initiate specialized cooperative organizations around the pillar industries and featured products, increase the organized degree of agriculture and the socialized service level, form the pattern of agricultural production and management of small production and large market and small base and large group (Sun *et al.*, 2008). Reach farmers' specialized cooperative organizations to 800, of which there are 50 new types of joint-stock cooperatives. Support policies which develop farmers' specialized cooperative organizations, guide and standardize specialized cooperative organizations such as farmers' specialized cooperatives, specialized associations, etc. and support farmers' specialized cooperative organizations to launch services such as information, techniques, trainings, quality standard and authorization, marketing management, etc. Make agricultural comprehensive development, poverty relief development and construction projects of agriculture industrialization incline to farmers' specialized cooperatives. Strive for project funding of the country and the city with multiple channel, expand financing channels, comprehensively apply methods of loans with discounted interest, shares, guarantees and substituting rewards for assistance, etc., guide financial fund and social fund into the development of the modern agricultural industry. Accelerate developments of new-type rural cooperatives of mutual assistance of fund and cultivation of small loan companies, guide social capital investment, establish various new-type financial organizations which adapt to the needs of the development of modern agricultural industries, encourage the venture capital institutions to supply guarantee business for enterprises, rural economic organizations and farmers' households, explore financial contribution of various ways, establish risk fund and increase the resistance capacity against risks.

Tongnan County should establish an incentive mechanism, provide supporting policies and complete infrastructure facilities and supporting facilities, with purpose of improving peoples' living standard and constructing new countryside (Zong-Ming *et al.*, 2004). On the basis of an orderly channel, invariable use,

comprehensive arrangement and complementary advantages, it should integrate funds used for agriculture, vegetables, husbandry, water conservancy, overall agricultural development and rural road construction to support the development of agricultural modernization. All projects involved should be carried out under overall planning, uniform arrangement and specific responsibilities: planning's are made based on industries, projects are integrated based on planning, departments take on their responsibilities based on projects and projects are reported based on departments (Mingwei *et al.*, 2008). Tongnan should intensify the management of funds, improve the effect in using funds and mobilize and guide all kinds of subjects to increase their investment in agricultural modernization. It should integrate funds used for water conservancy, overall agricultural development, territorial management and traffic to upgrade existing water conservancy facilities and build new water storage, division and irrigation, rainwater harvesting and drainage projects, including ten village-level farmland water conservancy demonstration project, middle-scale water reservoir of Dashiqiao, small-scale water reservoirs of Laowashan, Jixingsi and Dacungou, 10,000 mu of water-saving irrigation demonstration area and technological transformation of eight middle-scale irrigation areas; furthermore, it should carry forward land reclamation and construction of 25,000 mu of farmlands, boost rural road construction and accelerate the construction and protection of farmland shelterbelt network and water conservation forest to improve rural ecological environment. Policies should be given to support vegetable industry. County Agricultural Committee, Vegetable Industry Bureau, Forest Bureau and Finance Bureau should provide incentive policies to support the development of five featured industries, namely grain and oil industry, livestock and poultry industry, fishery, fruit industry and edible mushroom industry and allocate five million Yuan of agricultural industrialized funds to support the development of the leading enterprises. It should encourage enterprises to strive for famous brands and offer rewards for those which newly obtain national well-known trademarks, city-level well-known trademarks, national famous brand products, city-level famous brand products, environment-friendly product certification, green food certification and organic food certification and products with geographical indications. Efforts should be made in improving culture, environment and grass-roots democratic management in rural areas. One to three concentrated residential areas should be built in each village that has a water-supply station of supplying water to each household. Garbage and sewage treatment mode, under which garbage and sewage is collected at village levels, transported at township and disposed at county, should be established, it should be encouraged to establish one garbage treatment station and one to three biogas digesters in each village to develop rural-energy ecological mode in accordance with the development of agricultural modernization. Tongnan should complete its rural social

security system, improve its security level in rural medical care and elderly care and build supporting facilities for public service center through overall planning and resource integration, so as to provide high-quality, convenient and cheap public health and basic medical care service.

## CONCLUSION

Strategies on how to launch the modernization of agriculture should be made from the basic conditions for agricultural production in Tongnan. At present, the real agricultural modernization is still not realized due to such a few outstanding problems as poor production facilities, lowly organized, scaled and standardized agriculture, lagging rural productivity, large development gap between rural areas and urban areas, lack of diversification and specialization and low benefits brought to farmers. In order to accelerate agricultural modernization, enhance the fast increase in farmers' income, improve rural living condition and promote the synchronous development of industrialization, informationization, urbanization and agricultural modernization, we conclude the strategy of the process of agricultural modernization in Tongnan County:

- Strengthen its organizational leadership, establish evaluating and examining system and upgrade infrastructure and scientific and technological level.
- Consolidate basic industries, optimize spatial layout, develop courtyard economy to every household and improve the value of agricultural products.
- Emphasize creative demonstration, strengthen the popularization of agricultural machine, cultivate farmers' scientific literacy under agricultural modernization and improve the scientific level of agriculture with intensified technologies; construct circulation system, complete service system and promote agricultural informatization to activate the circulation of agricultural products in market; establish incentive mechanism, enlarge policy support and complete infrastructure facilities and supporting facilities so as to improve farmers' living standard and build new countryside. Only by all of these, Tongnan County can push its agricultural modernization to a new level.

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