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Analysis on Relationship between Adjustment of Agricultural Structure and Urbanization Development

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Abstract As a part of certain region, agricultural development has inevitable connection with regional urbanization, and they are highly heterogeneous and complementary in space. Their internal relationship is manifested as agricultural structure suits demand of urbanization development through adjustment in the process of urbanization, while urbanization is based on development of regional agriculture. From history of world agriculture and urbanization development, agriculture firstly provides primitive accumulation for urbanization development, and drives regional urbanization through promoting agricultural development. When urbanization develops to certain stage, urbanization accumulation increases and reaches the goal of "boosting urbanization through agriculture". If urbanization develops slowly, agricultural adjustment will lack motive force. On the contrary, weak agricultural development will lead to stagnation of urbanization. Therefore, adjustment of agricultural structure and urbanization development are interconnected, mutually promoted and restricted, and interdependent.

Key words Adjustment of agricultural structure, Urbanization Development, Mutual relationship

1 General understanding of adjustment of agricultural structure

Agriculture is an industrial sector of national economy, and its structure is the quantity structure and organizational relationship of agricultural sectors in a certain region. Agricultural structure includes structure of regional sectors, structure of agricultural sectors, internal structure of crop cultivation, forestry, animal husbandry and fishery, internal structure of grain crops and cash crops, and structure of crop varieties. Adjustment of agricultural structure refers to optimization and upgrade of agricultural sectors. It contains two meanings: (1) structure of agricultural sectors becomes reasonable, to reach the state of optimal distribution of resource and space; (2) agricultural sectors reach upgrade and high degree of industrial structure in accordance with general laws of industrial evolution. Adjustment of agricultural structure includes adjustment of agricultural production structure, regional structure, employment structure, operating structure, and trade structure. In this paper, we mainly study ratio of output value of agricultural sectors and internal sectors, planting ratio grain crops, cash crops and other crops, breeding composition, space structure, and structure of resources (labor and land) input to agricultural sectors. It should be noted that direction and mode of agricultural structural adjustment are varied in different countries and regions due to resource endowment, agricultural development stages (Table 1) and influence of corresponding development policies^[1]. Combining previous literature, there are three ideas about division of stages of agricultural development^[2].

a) John Mellor (1966) put forward the theory of three stages

of agricultural development according to realities and characteristics of agricultural development in developing countries: the first stage is traditional agriculture stage characterized by technological stagnation and increasing agricultural productivity through increasing traditional inputs; the second stage is low capital technology agriculture stage characterized by stable development and application of technologies and little capital investment; the third stage is high capital technology agriculture stage characterized by highly development and application of technologies and intensive application of capital.

b) Raanan Weitz (1971) divided agricultural development into four stages: (1) the subsistence farm unit stage characterized by self-sufficiency; (2) the mixed farm unit stage characterized by diversified operation and increasing income; (3) the high specialization stage characterized by specialized production; (4) modern automation stage characterized by automation production and management.

c) Yujiro Hayami and Vernon W. Ruttan (1988) divided agricultural development into three stages according to practice of agricultural development in Japan: the first stage is characterized by increasing production and market grain supply, and the main policy is to increase yield of agricultural products; the second stage is characterized by solving rural poverty and the main policy is to increase farmers' income through price; the third stage is characterized by adjustment and optimization of structure, and main policy is to adjust agricultural structure.

At present, China's agricultural development is, in general, being transformed from traditional agriculture to modern agriculture and from extensive to intensive agriculture. Scholars have put forward many beneficial ideas. From the perspective of historic development, agricultural development is divided into primitive agriculture, traditional agriculture, and modern agriculture. From production and operation mode, agricultural development is divid-

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ed into extensive and intensive agriculture; from input production factors, it can be divided into labor intensive, capital intensive and technology intensive; from process of constant change of re-

gional spatial structure, it is divided into agricultural region, suburban and urban agriculture.

Table 1 Characteristics of stages of agricultural development (Unit: USD)

Characteristics	Development stages			
	Subsistence agriculture	Diversified agriculture	Specialized agriculture	Automation agriculture
Per capita income	135 – 450	650 – 2 800	3 000 – 5 000	High than 6 500
Structure of farm sector	Major grain crops	Many field crops and animal husbandry	A main sector and some auxiliary sector	A sector
Production purpose	Family consumption	Direct sales, some processing, supply to families	Direct sales and processing	Main processing
Output value	300 – 1 000	2 000 – 6 000	10 000 – 50 000	High than 50 000
Added value /output value//%	90 – 60	50 – 40	35 – 25	<20
Investment per workday	2 – 6	15 – 35	50 – 85	350 – 500
Technical level	Traditional, stagnation	Medium, diversified	Highly specialized	Automation
Annual work schedule	Seasonal (internal incomplete employment)	Balanced	Depending on farm types	Mainly seasonal (the rest is leisure)
Dependence on social organizations	Insignificant	Complete	Partial	Insignificant
Dependent on auxiliary system	Insignificant	Partial	Complete	Insignificant

Data source: R. Wcliz, 1971.

2 General understanding of urbanization development

Urbanization is the product of economy developing to certain stage. Evolution of industrial structure and constant accumulation of industry in space promote regional urbanization. At present, there is no uniform standard for definition of urbanization, and different disciplines have different understanding^[3]. Sociology scholars believe that urbanization refers to increasing number of people live in urban areas, and rural lifestyle and thinking are gradually replaced by urban culture. Economics scholars define urbanization as transformation of economic activities from agricultural production to non-agricultural activities, and capital, labor and land flowing to urban areas. Geography scholars take urbanization as population flowing to urban areas, production activities transforming from agriculture to non-agricultural production, constant strengthening of urban lifestyle, urban land constantly advancing towards rural areas, and constant evolution of urban internal functions. Summing up the above opinions, we contend that urbanization refers to the process of rural population transforming from primary industry to secondary and tertiary industries, and residence moving from rural areas to urban areas. Its connotation includes: (1) rural people constantly moving to urban areas; (2) agricultural industry and production mode transforming and gathering to urban industry and production mode, *i. e.* agricultural modernization and industrial non-agricultural process; (3) rural lifestyle transforming to urban lifestyle, *i. e.* urbanization of lifestyle; (4) constant expansion of urban land, and the process of constant transformation of regional space structure. Indicators for measuring urbanization include land urbanization, population urbanization, industrial urbanization, resident living urbanization, and landscape urbanization^[4]. Standards for measuring level of population urbanization include (i) the ratio of urban population to total re-

gional population and (ii) the ratio of non-agricultural population to total regional population. Each standard has its merits, but is varied due to different regional situations.

Promoting regional urbanization is not merely to develop urban areas and operate urban areas, but should take urban areas as growth pole of entire regional economy, improve radiation function of urban areas, drive development of surrounding areas, narrow urban-rural income gap, and weaken dual structure, to realize coordinated development of urban and rural areas. For this, it is required to speed up transformation and upgrade of industrial structure, realize optimal distribution of production factors in space and industries, and establish excellent pattern of driving by central cities, division of labor and cooperation with surrounding towns, and common development of urban and rural areas. Besides, it is required to orient towards improving livelihood, integrate resource allocation, realize equal basic public service facilities, and make people flow, material flow and information flow smoother between urban and rural areas. Thus, urbanization is not merely urbanization of economy and population, but also manifested in social service and ecological living. In the end of the 1970s, Ray M. Northam introduced "urbanization process curve theory" through studying urbanization trace in all countries. In other words, for a certain region or country, urbanization process is generally includes primary stage of low level and slow development speed of urbanization, medium stage of accelerated development of urbanization, and late stage of high level but slow development of urbanization. This can be described as following figure.

3 Dialectical relationship between adjustment of agricultural structure and urbanization development

In system theory, sub-systems are not isolated, but an open entirety connected through elements, information and field. As a part of

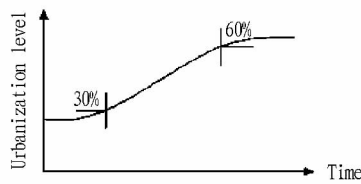


Fig. 1 Schematic drawing for stages of urbanization development

a certain region, agricultural development has inevitable connection with regional urbanization. Such connection involves all basic links of urbanization. In space, they are highly heterogeneous and complementary. In theory, their internal relationship is manifested as agricultural structure suits demand of urbanization development through adjustment in the process of urbanization, while urbanization is based on development of regional agriculture. From history of world agriculture and urbanization development, agriculture firstly provides primitive accumulation for urbanization development, and drives regional urbanization through promoting agricultural development. When urbanization develops to certain stage, urbanization accumulation increases and reaches the goal of "boosting urbanization through agriculture". If urbanization develops slowly, agricultural adjustment will lack motive force. On the contrary, weak agricultural development will lead to stagnation of urbanization. Therefore, adjustment of agricultural structure and urbanization development are interconnected, mutually promoted and restricted, and interdependent.

3.1 Primary drive of agricultural structure and urbanization development

3.1.1 Agriculture provides guarantee of necessary agricultural products for urban people. Apart from trade practice, the quantity of agricultural products supplied by a certain region is one of the essential factors determining capacity of regional urban population and also a stabilizer of regional urban economy and society. Agricultural products required by urban people are mainly foods for living consumption, mainly including plant type foods (grains, vegetables, and fruits) and animal type foods (meats, dairy products, and eggs). With urbanization of population, increase in urban population, and income of citizens' income, citizens' food consumption level is also increasing and takes on diversified and nutrition-oriented trend. These agricultural products have to be provided by agriculture. In addition, rich agricultural products are favorable for prosperity of urban market. Therefore, more agricultural products will bring faster industrialization and promote faster development of urbanization; otherwise, it will slow down development of urbanization.

With the constant improvement of urbanization, agricultural functions are gradually being explored. Apart from providing famous, excellent, new and special diverse agricultural products for urban residents, agriculture also provides comfortable living environment and landscape products. Through developing facility agriculture, picking agricultural garden, and opening various agricul-

tural sightseeing and cultural beauty spots, agriculture also can enrich recreational life of citizens, improve living quality of urban residents, and enhance living functions of urban areas. Therefore, the more rich agricultural ecological products, the more urban residents, the more developed urban tertiary industry, the higher urbanization power, and then it will promote sustainable development of urbanization. Otherwise, ecological environment will be deteriorated and it will weaken power for sustainable development of urbanization.

3.1.2 Agriculture provides ecological guarantee for sustainable urbanization. Agriculture not merely provides rich and colorful agricultural products for urban residents, and adjusts climate, cleans air, beautifies landscape, and improves environment of urban areas, guides healthy development of urban ecological environment, and turns tropical island effect to green island effect. In addition, agriculture sets up ecological barrier for disordered expansion of urban areas, guides coordinated development of urbanization, farmland, green land, and water system, and builds the garden cities in the eye of Ebenezer Howard. Thus, agriculture not only can improve urban environment and control disordered expansion of urban areas, but also can improve intensive use of urban land, provide space for urban development, and save development cost.

3.1.3 Agriculture provides guarantee of materials for urbanization development. History of industrialized countries indicates that industry of most countries starts from light and textile industries, while cotton, flax, cow leather, wool, silk, leaf tobacco, and wood come from agricultural production. Without agricultural production, industrial development becomes a tree without roots and water without a source. Thus, agriculture becomes providers of raw materials for agricultural product processing, and then sets up economic connection with urbanization. In other words, quantity and type of raw material type agricultural products supplied by agriculture generally determine scale and survival of rural industrial processing industries, while scale and survival of rural industries determine speed of urbanization process. Therefore, the effect of agriculture on urbanization should not be neglected.

3.1.4 Agriculture provides manpower guarantee for urbanization. Urban non-agricultural economic activities must be undertaken by labor. Labor resource of urban areas is partially solved by its natural growth and mainly comes from agricultural surplus labor, the quantity of which depends on agricultural productivity. As a matter of fact, urban population comes from agricultural population separated from improvement of agricultural productivity. In general, the higher agricultural productivity, the higher agricultural mechanization, the higher agricultural labor productivity, and the less agricultural labor, the more labor liberated from agriculture. Then, it is able to provide sufficient labor for urban economic development, alleviate labor problem due to expansion of rural industries, while the expansion of rural industries also promotes urbanization development^[6]. However, due to less developed urban economy and large population base, there is certain degree of unemployment in urban areas, so the function of agriculture in pro-

moting urbanization in restricting labor is not prominent.

3.1.5 Agriculture provides primitive fund accumulation for urbanization. Urbanization is marked by industrialization of large-scale machine production, while capital at early stage of industrialization comes from agriculture. It is mainly obtained from following methods. Firstly, it obtained more capitals through movement of enclosures and depriving land rights of farmers. In the early of the 18th century to the middle of the 19th century, after British bourgeois won the revolution, urban industries developed rapidly and urban population increased sharply. Landlords and aristocrats increased investment to respond to huge demand of agricultural products, accelerated the movement of enclosures, while farmers were incapable of paying enclosure cost and had to sell their land. As a result, those farmers losing their land had to go to cities for survival, and go to manual factories and become cheap labor of capitalist. Secondly, farmers buy houses in cities for better life quality, promoting development of urban real estate, or buy property or build urban infrastructure in cities for obtaining more capital gains. Thirdly, the state provides fund accumulation for construction of urbanization through taxation, price scissors of industrial and agricultural products, and land price scissors (the difference between the income from transferring out agricultural land and the income from turning agricultural land to construction land). In 1953 – 1978, China deprived agricultural funds up to 801.97 billion yuan through bringing down price of agricultural products, and deprived agricultural funds up to 147.524 billion yuan through higher price of industrial products. In total, it deprived rural funds up to 949.494 billion yuan. Through the policy of building cities with the aid of agriculture, urban areas developed rapidly^[7-9].

3.1.6 Agriculture provides land demand for urbanization development. Urbanization will inevitably occupy land. Without support of land, urbanization construction is difficult to move on. For expansion of land, the first is agricultural land, because urban areas are generally built in flat areas with suitable climate and good water source, which are also favorable conditions for agricultural development. Nevertheless, expansion of land depends on productivity of agricultural land. Generally, the higher the land productivity, the more agricultural land it will release, the larger space of urban expansion, but it should ensure that sufficient supply of agricultural products for urban areas and no deterioration of ecological environment.

3.1.7 Agriculture provides broad market for urbanization development. Agriculture not only provides food type, raw material type and ecological agricultural products for urban areas, but also provides broad market for industrial development of urban areas. Agricultural materials (such as agricultural machinery, oil, chemical fertilizer, pesticide and plastic film for agricultural production) and daily consumer products and durable goods (such as refrigerators, air conditioners, and motorcycles) come from urban industries. Without rural market, development space of these industries will become very narrow and it is difficult to promote urbanization.

3.2 Urbanization development is a booster of adjustment of agricultural structure

3.2.1 Urbanization provides market for agricultural products and boosts adjustment and upgrade of agricultural structure. Firstly, urbanization process brings large population and provides broad market for consumption of agricultural products. With advance of urbanization, different people have different demands for agricultural products in quantity and structure, which provides motive force for agricultural development and structural upgrade. Secondly, urban processing industries with agricultural products as raw materials, such as textile, drink and food, chemical and pharmaceutical industries, not only enlarge market of agricultural products, enrich varieties of agricultural products, improve quality of agricultural products, but also increase agricultural income, raise risk-resisting ability of agriculture, and promote adjustment of agricultural structure. Thirdly, rapid urbanization process speeds up life and work pace of citizens. It is urgent to alleviate such tense nerve in proper ways. Agricultural tourism just can satisfy such demand. The development of agricultural tourism increases income of farmers and promotes integrated urban and rural development. In this sense, without promotion of urbanization, there will be no advanced development of agricultural production structure^[8-10].

3.2.2 Urbanization promotes increase in agricultural productivity, speeds up surplus and transfer of agricultural labor, boosts concentration of land, and pulls large-scale development of agricultural production. Firstly, increase in agricultural productivity depends on agricultural machinery, water conservancy facilities, and chemical fertilizers provided by urban industries, while farmers will obtain these products at lower cost only when regional urbanization develops to certain degree. Secondly, the increase in agricultural productivity greatly promotes concentration of agricultural land, which is favorable for large-scale agricultural production. From the perspective of economics, large-scale operation of agricultural production is a major approach of farmers reducing cost and increasing benefit and income, and also the direction of agricultural development. Thirdly, the increase in agricultural productivity intensifies surplus of agricultural labor, and the surplus of agricultural labor restricts large-scale agricultural development. Urbanization development can absorb huge surplus agricultural labor to go to cities, thus alleviate employment pressure of agricultural labor and clear obstacle for large scale operation of agriculture. In developed countries, with constantly increase in urbanization level, jobs are mainly provided by secondary and tertiary industries, while the development of secondary and tertiary industries must rely on cities, thus the urbanization is a fundamental approach for transferring and absorbing rural surplus labor. In other words, without regional, particularly rural urbanization, it is difficult to realize large-scale agricultural operation^[8-12].

3.2.3 Urbanization development accumulates huge funds for agricultural development and provides powerful fund support for constant development of agriculture. At the early stage of urbanization development, when the agriculture is the major contribution to re-

gional economic growth, it promotes urban development mainly through price scissors. When the contribution of agriculture and urban areas to regional economic growth rises to certain degree, agriculture is coordinated with urban areas. When the contribution of urban areas to regional economic growth exceeds agriculture, or when urban areas complete primitive accumulation of funds, expansion of urban non-agricultural industries will feed agriculture and promote agricultural development, to suit constant advance of regional economy. In the early period of foundation of new China, both urban construction and industrial development needed huge funds. In 2005, the cancellation of agricultural tax marked the opportunity of "industry promoting agriculture, and urban supporting rural areas". According to introduction of *Guideline on Declaration of State Finance Agricultural Support Fund Project* (2009–2010), the expenditure of central finance on agriculture, farmers and rural areas increased from 339.7 billion yuan in 2006 to 391.7 billion yuan in 2007, 562.5 billion yuan in 2008, 716.1 billion yuan in 2009, and 857.97 billion yuan in 2010, showing an increasing growth trend. The total amount increased from 14.5 billion yuan to 134.5 billion yuan in 2010 in direct subsidies for grain producers, general subsidies for purchasing agricultural supplies and subsidies for purchasing superior crop varieties and agricultural machinery and tools.

3.2.4 Urbanization promotes transformation of large rural population to urban population, which is favorable for consolidation and arrangement of rural residential areas and provides source for urban construction land, especially farmland. With rapid advance in urbanization, urban land scale becomes large and large, immovability of regional land space and red line limitation of agricultural land, especially farmland, makes expansion of urban areas limited. Farmers' migration to cities leads to many rural resident areas and rural construction land left idle. It is possible to solve problem of urban construction land through connecting those idle lands with increase and decrease of urban and rural construction land, to realize balance in requisition and compensation of regional land. In addition, according to statistics, per capita rural living area is more than 200 m², more than 10 times than urban rural living area. Through urbanization, it is expected to control disordered rural residential areas and release more lands. Therefore, through control of rural residential areas, it is able to explore more potential, not only satisfy demand for urban construction, but also make up for agricultural land occupied for urban construction. After World War II, the urbanization rate of Germany rose from 69% to 89%, while the scale of urban construction land did not increase. The major way of their urbanization of rural areas is land consolidation and village renewal. On the prerequisite of no change of surrounding agricultural production, it transforms traditional agricultural villages in urban areas into non-agricultural industrial towns, jointly promoting growth of suburban economy^[5,7–12].

3.2.5 Urbanization provides powerful technical support for agricultural development. Urban area is the source of origin of agricultural technological innovation. Agricultural sci-tech is the first mo-

tive force of agricultural development and also the essential means for accelerating transformation of agricultural growth modes. Improvement of quality of agricultural products, cultivation and extension of fine varieties, application of agricultural machinery, and field management methods, are all based on training and extension of agricultural technologies. Besides, with constantly innovation of world technologies, many advanced technologies are applied into various fields of agricultural production. For example, using modern information technology, it is able to carry out data analysis and processing for growth trend and plant diseases and insets of crops, take pertinent fertilizer application and controlling measures, to increase yield and efficiency, reduce use of chemical fertilizer and pesticide, so as to effectively protect agricultural ecological environment. For another example, accompanied with transformation of agricultural material circulation system from planning to market, including application of Internet, multimedia technologies, and 3G communication technology, it is able to rapidly know demand and price of agricultural products, make timely adjustment of production structure, and evade market risks^[8–13].

In sum, regional urbanization complements each other with adjustment of agricultural structure. Certainly, if urbanization rate exceeds agricultural carrying capacity, if the speed of agricultural product demands exceeds agricultural production capacity, or urban land expands excessively, it will seriously influence agricultural development. Obstruction of agricultural development also affects urbanization process. Thus, out of step of their development will influence development and stability of the whole regional economy and society. It is required to bring into full play their coordinated functions and avoid disturbance of disharmonious factors, to ensure healthy operation of national economy.

4 Conclusions

Coordinated development of adjustment of agricultural structure and urbanization is put forward in view of unbalance in dynamic development of agriculture and urbanization. Their coordination depends on urban-rural system and undertakes different functions in urban-rural system. Through free and reasonable flow of people, material and information, it is expected to establish a new type urban-rural relationship with mutual penetration and integration of economy, society and culture. Therefore, adjustment of agricultural structure and urbanization aim at promoting optimal distribution of resources and increase of farmers' income, gradually changing urban-rural dual economic structure, eliminating urban-rural divide, and building long-term mechanism for coordinated development of agriculture and urbanization through free flow of urban-rural production factors, so as to realize coordinated development of agriculture with urban non-agriculture, and reach the objective of integrated urban-rural development.

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enhance the internal growth momentum for rural public service efficiency according to its type.

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