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Research on Chinese Agricultural Industrialization Based on SCP Mode

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Abstract Taking the SCP mode of industrial organization theory as the starting point, the paper analyzes Chinese agricultural market structure, market conduct and conduct performance and draws lessons from foreign experiences in developing agriculture. In the process of agricultural industrialization, Chinese agricultural development exists the problems of low intensive degree, low degree of differential products, surplus labor forces, low agricultural profit rate and low industrial contribution rate and farmers' difficultly in adapting to market competition. The paper puts forward suggestions for addressing the problems, which include underpinning the cooperation of operation main bodies and developing rural cooperative organizations; promoting land transfer and clarifying land property; accelerating rural surplus labors transfer and abating trade barriers; increasing technology input and improving the contribution rate of technologies; improving circulation channels and intensifying agricultural competitiveness.

Key words SCP mode, Market structure, Market conduct, Market performance, Policy suggestion, China

1 Introduction

Research on the agricultural industrialization is the problem mutually confronted by each agriculture-based industry in the process of development. The problem is similar to the common features of general industrial organization, tallies with the general rules of industrial development, so it is feasible to analyze agricultural industrialization by using industrial organization and method of industrial structure. The industrial organization theory provides theoretical basis for market structure, market conduct and market performance of agricultural industrialization. The traditional research fields of western in-industrial organization theory lie in the relatively mature industry and the tertiary industry, so when using the research results, their particularities should be fully considered. At present, Chinese agricultural industrialization is in the growth stage and has many particularities, so the research on Chinese agricultural industrialization can not completely copy the western in-industrial organization theory. The western theories should not be used as the framework to study the agricultural industrialization with Chinese characteristics.

The "Marshall Conflict" reveals the core problems-how to integrate the competitiveness and scale economy of an enterprise's, of in-industrial organization theory. In the 20th century, the industrial organization theory established by the Harvard schools was the mainstream theory of western industrial economics. The SCP pattern was the representative of the industrial organization theory of the Harvard school. SCP pattern was put forward by Bain, the disciple of Mason, a professor of Harvard University. S stands for market structure, C stands for market conduct and P stands for market performance. Bain thought that the market structure of an industry determines the market conduct of the industry, and under a certain market structure, the price conduct and non-price conduct of the industry are the most direct determinants. With the further exploration of other scholars in the Harvard School, SCP pattern become more and more mature. XIE Le *et al.* revel that the relations among market structure, market conduct and market performance are so simple causal relationships and the feedback effect exists in the relationship. That is to say, the market performance has feedback effect on market conduct and market structure; the market conduct has feedback effect on market structure and basic situation, the relations can be seen on Fig. 1.

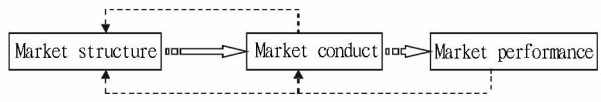

Fig. 1 SCP pattern

2 The market structure of agricultural industrialization

2.1 The market structure of agricultural industrialization

The agricultural market structure is the starting point of analyzing agricultural industrialization organization by using SCP pattern. It is the comprehensive expression of features and contract way among buyers and sellers, agricultural market structure and potential entrant in the market. The agricultural market structure determines the competitive and monopoly degree of market; the formation mechanism of market price, and then determines the competitive method and performance and results of the enterprises. There are many factors that affect the market structure including market concentration rate, scale economy, product differentiation, entry and exit barriers.

2.1.1 The market concentration rate and scale economy. The market concentration rate and scale economy are the structural indexes, which are used to reflect the relative scale of buyers and sellers in the specialized market. Comparing with other in-

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dustries, the operation main bodies of agriculture are rural households and the agriculture has the characteristics of large volume, small scale, and dispersed market share. In any country, the market concentration rate of agriculture is low, even in the America, the industrial concentration degree has only 15%[1], let alone that in China, which has more than 0.2 billion rural households. From the perspective of operation main body, Chinese rural households have increased from 24 148.7 in 2000 to 25 435.0 in 2007, and showed the escalating trend. China has a large number of agricultural population, which accounts for 45.19% of the social employment personnel, far higher than the secondary and tertiary industry. Although the agricultural output value of state-owned farm has increased with the increase of national agricultural output value, the proportion is still lower than 10%, and its grain output only takes about 5% of the total grain crops. It can be seen that the agriculture is mainly undertaken by small rural households, which is accountable for the over low concentration rate of producers. From the perspective of basic production materials, Chinese agriculture is characterized by dense population and limited land. What' worse, after the land contract system implemented in 1978, the land area per household was lower than the world average level. According to the statistics, from 2002 to 2007, the area of farmland owned by Chinese rural households has only 0.5 hm^2 and in recent years it shows descending trend. Taking the proportion of state-owned farmland to the area of national farmland as basis, the agricultural concentration rate is only 4.07%. Comparing with other country, the farmland area of average rural household takes only 1/300 of America, 1/40 of European Union and 1/20 of Japan. The small scale operation directly leads to the low agricultural concentration rate in China.

2.1.2 The differentiation of products. The product differentiation is another factor of market structure. It mainly reflects that the cross-elasticity of demand of the same industrial products is positive. At present, Chinese agricultural products are affected by the natural factors including landscapes, soil, climate, water *et al.*, which lead to the same features of two kinds of agricultural products. At the same time, due to the multiple suppliers in the market, farmers' subjective differentiation is not so obvious. The demand of consumers does not have great change except for the demand on the agricultural products with obvious high costs and quality. Besides, the diversity of Chinese agricultural products is relatively low caused by imperfect circulation policy of agricultural products, asymmetric information obtained by farmers, weak consciousness of marketing and blind production lead to the low diversity degree of agricultural products.

2.1.3 The entry and exit barriers. Entry and exist barriers are also crucial factors for measuring the industrial market structure. The factors are different from the market relations among main bodies in the industry researched by the market concentration degree and diversity of agricultural products, they only lay stress on the market relations of potential competitors within and without industry. Put it simple, the entry and exit barriers are the entry threshold and exit obstruction.

Comparing with Chinese industrial entry barriers, the agricultural industrial market barriers are relatively low. The first reason is that the scale economy barriers of agricultural market are low. Since 2000, the number of Chinese rural households has been increasing. Under the stable agricultural market volume, the shrinking market scale will inevitably lead to the lack of scale economy barriers in agricultural market. The second reason is that the barriers of production differentiation are relative low. In China, the diversity of Chinese agricultural products does not exist. As long as the individual rural household owns a piece of land, it can enter agricultural market and produce agricultural products. The third reason is that the necessary capital barriers are low. The necessary capital of agricultural production is land and labors. Family operation, with low concentration degree of land and production main bodies, is the major way of Chinese agriculture, so the necessary capital needed is low. The fourth reason is the low technical barriers of farmers, poor operation capability, low technical content of agricultural production, low educational degree of farmers and weak competitiveness of farmers.

However, the exit mechanism of agricultural market is mainly represented in policies and regulations, except for the sunk cost of agricultural machine of some agricultural enterprises when the machine being sold. For example, difficulties for farmers to transfer to cities; imperfect land transfer system and low circulation speed; at the same time, the exit barriers of policies and regulations deepen farmers' uncertainty. Farmers think that land is the basic security of farmers, even they come to work in cities and undertake non-agricultural work, they do not want to give up their land, which leads to the vacant and barren land. The vacancy and desolation are rarities in industrial production, so the exit barrier of agricultural industrial market is relatively high.

Generally speaking, Chinese agricultural market is characterized by low concentration rate, different agricultural products, difficult to enter and exit. Few agricultural enterprises are similar to market competition, which leads to the excessive completion within agricultural industries; unreasonable resource distribution and low efficient of farmers' interests. The problems are conducive to the improvement of agricultural market performance.

2.2 The market conduct of agricultural industrialization

A certain market structure determines the special market conduct, meanwhile, the market conduct determines market structure in turn, and agricultural market conduct is the conduct adopted by the agricultural operation main body in order to realize the maximum profits. According to the industrial organization theory, the agricultural market conducts mainly include price conduct and non-price conduct.

2.2.1 Price conduct. It can be seen from the market structure of agricultural industry that Chinese agricultural market is closely similar to complete market competition, and the rise and fall of prices also do not been controlled by individual rural household. The supply and demand of agricultural products lack of elasticity; the number of rural households are large, the production scale is small; the decision is dispersed; the organiza-

tion degree is low; the market circulation system is imperfect and farmers are easy to be affected by sensations, so once the balance between supply and demand is broken, the prices will fluctuate violently. Besides, the concentration degree of agricultural industrial market is low and farmers can not form the price Cartel and price leadership of large area, so it is hard to form the price cooperation conduct.

2.2.2 Non-price conduct. Farmers have two kinds of cooperation forms. The first one is the combination and merger among rural households, which is the horizontal integration under the same market background; the second one is the combination and merger among rural households and companies, rural households and special markets, rural households and intermediary organizations, rural households and comprehensive development groups. It is the vertical integration, which connects the agricultural production, agricultural processing and agricultural marketing into an integrated agricultural, industrial and commercial chain. The second agricultural census reported that, by the end of 2006, there were only 5 636 towns and villages has entity type agricultural cooperatives in china, accounting for 16.2% of the total towns and villages; only 5.3% of rural households who participated in rural cooperatives; the gap between the east and the west was large. it can be seen that at present the coverage of cooperative economic organization is small, the cooperative area is wide, the development is unbalance and the operation is not normal. The slow development of horizontal integration has restricted the materialization of vertical integration. In the vertical integration-based agricultural production mode, rural households, as the producer can not change their inferior position in negotiation and cooperation no matter with which kinds of main bodies, thus farmers' interests can not be ensured, the market performance is low and the cooperation organization is unstable.

2.3 Market conduct of agricultural industrialization Market performance is the last section of SCP analysis mode. Under specific market structure, the market conduct of operation main body determines the operation efficiency of the industry. Market performance refers to the final economic results formed under specific market structure and specific market conduct in terms of prices, output, costs, profits, quality and species etc. Market conduct is specifically reflected in four aspects including agricultural profit margin, agricultural production rate, farmers' income and agricultural technology progress.

2.3.1 The profit margin of agriculture. The most important mark in industry organization theory that reflects the market performance is whether the market can effectively allocate the rare economic resources. General economics theory think that the optimized allocation of resources is materialized in the status of complete competition, when all the enterprises can get normal profits, the profits of each industry will be equalized and the average profit rate of the industries is the mark of optimized resource allocation. The extra profits and low profit margin caused by excessive competition are the expression of unbalanced resource allocation. According to *China Statistical Yearbook*, the profit margin of agriculture is obviously lower than that of industry and service industry, and also lower than the average profit margin of each year, which indicates that the low efficiency of agricultural resource allocation and lack of mobility caused by surplus production resources still exist in Chinese agriculture. The problems will lead to the excessive competition of agriculture and lower agricultural profit margin comparing with the average social industrial level.

2.3.2 The production efficiency of agriculture Since 20th century, the gross domestic of products has kept the over 8% of growth rate, from 2003 to 2007, the growth rate even surpassed 10%, the GDP of the three industries all kept growth momentum. But the contribution rate made by three industries to GDP varies greatly, the industrial added value of agriculture took less than 10% of the growth value of GDP, in 2007, the figure dropped greatly, but the share took by the growth value of the secondary and tertiary industries took 40% or 50% of the total growth value of GDP, which was in accordance with the general rule of Kuznets industrial development. Chinese industrialization process is smooth and industry has become the main stay. The proportion taken by the tertiary industry has increased and become the main stay of GDP growth. But the contribution made by agriculture to GDP is weak and shows the downward trend.

2.3.3 Farmers' income. Farmers' per capita net income is the comprehensive index used to reflect the actual income level of rural households. According to the statistics, since 2000, the per capita net income of Chinese urban and rural residents has showed the upward trend. In 2000, the per capita net income of rural residents was 2 253.42 yuan and the per capita disposable income of urban residents was 6 279.98 yuan, 2.79 time more than the per capita net income of rural residents. In 2009, the gap between urban and rural per capita net income has widened to 3.33 times and it is still widening. The widening gap fully displays that it is difficult for farmers to increase income and the growth speed of rural residents' per capita net income is always lower than that of urban residents.

2.3.4 The contribution rate of agricultural technology progress. Since the Eighth Five-Year Plan, the contribution rate made by agricultural technology progress has been increasing gradually. In the Eighth Five-Year Plan period, the rate was 32.14%, in the Ninth Five-Year Plan period, the rate was 40.53%, and in the Tenth Five-Year Plan period, the rate increased to 45.88%. According to the statistical conducted by the Ministry of Agriculture from 2004 to 2010, the national comprehensive mechanization rate of farming and harvesting has achieved 52%, 16% more than 36% at the end of the Tenth Five Year Plan , and the contribution rate of agricultural technology rate has achieved 51%. The results indicate that the adjustment of agricultural structure has obtained certain fruits. However, comparing with the contribution rate of agricultural technology progress in developed counties, China still has long way to go. The contribution rate made by agricultural progress in America is around 80% , but in Israel, the rate has achieved 96% in the 1980s[2] , so the agricultural technology supporting strength in China should be further improved.

3 Suggestions on improving agricultural market performance

Through SCP pattern analysis, it can be seen that Chinese agricultural market is characterized by low concentration degree, low diversity of agricultural products and low entry and exit barriers of production elements. The problems lead to excessive competition. In agricultural market, the labors are excessive seriously; the competitiveness of individual rural households and agricultural enterprises is hard to be improved; agricultural profit margin is lower than the social average level; the contribution rate of agriculture is less than 1/10 of the secondary and tertiary industries; the labor production efficiency of farmers is low and the contribution rate of agricultural technology progress in China still has wide gap comparing with that in the developed countries. According to the industrial economics theory created by the Harvard School, the government can adopt some industrial organization policies in view of the inefficiency of market operation and the government can achieve the aim of improving market performance by adjusting market structure and influence market conduct of operation main body.

3.1 In the first place, the government should intensify the cooperation main bodies and develop rural cooperatives The giant number of rural households and small scale of family operation are the main reason of the low agricultural market concentration degree. Intensifying the horizontal integration of rural households, establishing and developing rural cooperative economic organization, underpinning the merger and reorganization of agricultural enterprises, enlarging the outside scale of agricultural, improving the market concentration degree are the effective ways for improving market concentration degree and promoting the market-retention and organization of agricultural market. The establishment of farmers' cooperatives is conducive to improving the negotiation position of rural households with the upper and lower stream of industries[2]; enhancing the competitiveness of enterprises; effectively paring down the transaction costs in the circulation of agricultural products; adjusting the price coordination conduct among rural households; raising the purchase price of agricultural products and increasing farmers' income.

3.2 In the second place, the government should promote land transfer and clarify land property system In order to solve the low-efficient resource allocation caused by dispersed family operation and scattered land, the government should clarify the land property right; propel the land transfer and appropriately concentrate land. The government should concentrate the land to farmers with strong capability of operating land; reduce the input cost and obtain scale interests to materialize agricultural industrialization. The government should, for one thing, perfect the social security system and improve the land transfer rent to let farmers get the long-term and stable non-agricultural income; for another thing, clarify the land property rights and abstract the investment in land market to promote the speed of land transfer and realize the land scale operation.

3.3 In the third place, the government should accelerate the transfer of rural surplus labors and abate exit barriers Abating the exit barriers of labors is the necessary measures for eliminating the excessive competition of agricultural market, improving labor production efficiency and optimizing resource allocation. In the first place, the government should break the urban and rural dual structure and establish a united register system and labor security system[3] to provide fair environment for the transfer and circulation of agricultural labors[1]. In the second place, the government should establish and develop the supporting labor-intensive service industry related to agriculture; accelerate the labor circulation; abate the transportation and capability obstruction of labor transfer, at the same time, the government should promote the development of industrial chain of villages and towns and realize the vertical integration. In the third place, the government should establish the information exchange platform; avoid the asymmetric employment information and the unbalance of labor transfer. In the fourth place, the government should intensify the training on labors; improve farmers' non-agricultural skills; enlarge employment and ensure the stable job after transference.

3.4 In the fourth place, the government should increase the input on technology and increase the contribution rate of technology progress Intensifying technology input and implementing the transfer of capital-intensive industry to technology-intensive mode are the effective ways for improving the agricultural profit margins. In the first place, the government should increase the input from central government and governments at various levels; improve the agricultural infrastructure and abstract the non-agricultural investment in agricultural enterprises. In the second place, the government should increase agricultural research; research improved seeds and explore new species of plants; intensify the promotion, popularization and spreading of agricultural academic communication and results. In the third place, the government should perfect the agricultural innovation system; clarify the tasks of scientific research institutes at various levels; address the low efficiency of unclear labor division and repeat research. In the fourth place, the government should intensify the training on farmers; develop vocational education and cultivate high-quality farmers; stabilize and enhance the land productivity and lift the competitiveness of agricultural products.

3.5 In the fifth place, the government should improve the circulation channel and enhance the agricultural competitiveness The unsmooth channel of agricultural products circulation and the monopoly of downstream purchasers are the major reasons that cause the weak competitiveness of agricultural products. The slow increase of farmers' income is accountable for the low efficient agricultural market. Therefore, it is suggested that the governments at various levels should create the information exchange platform for agricultural products; publish the marketing information of agricultural products timely by using e-commerce, television, broadcast, papers and other media; break through the asymmetric information between farmers and purchasers; transform the marketing channel of agricultural products through the corporation among farmers; resist low-price purchase; axe the marketing costs, such as

(To page 36)

City, Ding'an County, Chengmai County, Ledong County, Changjiang County in 2002 and 2008 are non-DEA effectiveness units. Here taking the year 2008 as an example, by calculating with MATLAB programming, we conduct projection analysis on these six cities and counties, and the results are shown in Table 2.

Table 2 The result of projection analysis of regions with non-DEA effectiveness in the year 2008

Region	X_1// ×10⁴ people		X_2// ×10⁴ kW		X_3// ×10⁴ t		X_4// ×10⁴ people		X_5// ×10³ hm²		X_6// ×10⁴ kW·h		Y// ×10⁸ yuan	
	Projection value	Real value	Projection value	Real value	Projection value	Real value	Projection value	Real value	Projection value	Real value	Projection value	Real value	Projection value	Real value
Wenchang City	0	21.97	6.052 9	30.32	0	9.11	389.07	1 597	2.937 0	17.43	8 655	20 522	0	59.05
Wanning City	0	17.86	0	14.02	0	4.74	75.85	1 470	0	9.70	581	2 332	0	32.26
Ding'an County	3.99	11.60	0	5.80	1.340 0	4.04	0	193	4.300 0	8.04	1 340	2 032	0	19.53
Chengmai County	0	18.84	5.167 7	22.22	1.989 2	8.82	0	785	2.773 8	13.23	0	1 240	0	29.44
Ledong County	0	22.49	15.235 0	46.71	0	6.87	951.20	2 261	1.471 4	13.27	0	1 932	0	35.06
Changjiang County	0	8.00	1.559 1	9.36	1.254 6	4.11	0	171	2.426 5	6.93	616	1 457	0	16.48

From the projection results in Table 2, we can analyze the existing problems of all regions with DEA effectiveness in the year 2008 and improvement ways. In the agricultural production system, the rate of input redundancy of agricultural machinery power (X_2), use amount of pesticides (X_4), effective irrigation area of farmland (X_5), and rural power consumption (X_6) is relatively high, indicating that utilization rate of these input resources is not high, and we should appropriately reduce the number of input factors, in order to improve use efficiency.

The rate of input redundancy of rural household practitioners (X_1) and consumption of chemical fertilizer (X_3) is relatively low, indicating that the utilization rate of input factors is good. From the perspective of agricultural output, the output of total output value of agriculture, forestry, animal husbandry and fishery is optimal. The existing problems and analysis methods of improvement approach in agricultural production system of Wanning City, Ding'an County, Chengmai County, Ledong County, and Changjiang County, are similar to the analysis of Wenchang City, so we will not repeat them.

From the results of projection analysis of regions with non-DEA effectiveness in Table 2, we can also find that in the year 2008, the rate of input redundancy of effective irrigation area of farmland (X_5) in 6 regions with non-DEA effectiveness in Hainan Province is relatively high, followed by agricultural machinery power (X_2), rural power consumption (X_6), consumption of chemical fertilizer (X_3), and use amount of pesticides (X_4). The above can explain that the use rate of production tools in these regions with non-DEA effectiveness of Hainan Province in the year 2008, lacking knowledge of agricultural technology relatively. Therefore, we should spare no efforts to vigorously promote the service of knowledge of agricultural technology for rural areas in order to improve efficiency of agricultural production in these areas, which becomes an important policy approach.

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(From page 33)

entry fee and booth cost; intensify the green channel and internal management of fresh agricultural products to really give preference to farmers and accelerate the circulation speed of agricultural products.

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