Empirical Research on Influencing Factors of Trade Competitiveness of China's Agricultural Products

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Abstract Based on the analysis of the indices of RCA and TSC of agricultural products in China, according to *China Statistical Yearbook*, *China Rural Statistical Yearbook* and data from database of The Food and Agriculture Organization of the United Nations from 1996 to 2009, We select direct influencing factors and indirect influencing factors as reference as series of numbers, regard indices of RCA and TSC as index series of numbers of evaluation, and use grey correlation analysis method to conduct analysis and evaluation on influencing factors of trade competitiveness of China's agricultural products. The results show that due to different index calculation methods, the sequencing results of all factors are not wholly the same. But on the whole, in terms of transformation from cost advantage and price advantage into competition advantage, the ability of direct factors is strong, impacting significantly trade competitiveness of China's agricultural products, while the influencing effect of indirect factors is relatively weak. On the basis of this, we put forward the suggestions in order to improve trade competitiveness of China's agricultural products as follows: firstly, we should strengthen and perfect agricultural agriculture-support policy; secondly, we should promote foreign merchants' direct investment level in agriculture; thirdly, we should deepen the processing ability of agricultural products and promote quality of agricultural products; fourthly, we should create good trade environment.

Key words Trade of agricultural products, Trade competitiveness, Grey correlation analysis, China

China is a big traditional agricultural country and agriculture is the foundation of national economy. The rapid development of agriculture plays an important role in the process of constructing new socialist village. Since China joined WTO, the process of agricultural marketization and internalization has been propelled rapidly. China's agricultural products are in face of competition of international market, with mounting pressure; after the outburst of financial crisis in 2008, the world economy has a slump, which complicates the international environment faced by China's agricultural products. So, in order to triumph in the drastic international competition, we must vigorously promote the international competitiveness of China's agricultural products. Consequently, the problem of international competitiveness of China's agricultural products has become the focus of attention of academic world, society, government, agricultural enterprises and so on. On the basis of analyzing status quo of international competitiveness of China's agricultural products and influencing factors, we select direct influencing factors and indirect influencing factors as reference series of numbers. We regard Revealed Comparative Advantage (RCA) and Trade Specialized Coefficient (TSC) as evaluation index series of numbers to conduct grey correlation analysis, and put forward the countermeasures of promoting international competitiveness of China's agricultural products based on empirical analysis in order to provide theoretical reference for formulating relevant policy and promoting international trade competitiveness of agricultural products.

Received: March 8, 2011 Accepted: April 10, 2011
Supported by Philosophical Social Science Research Planning Foundation in Tianjin City; Research of Problem of Quality Safety of Agricultural Products in Tianjin City (TJGL09-004).
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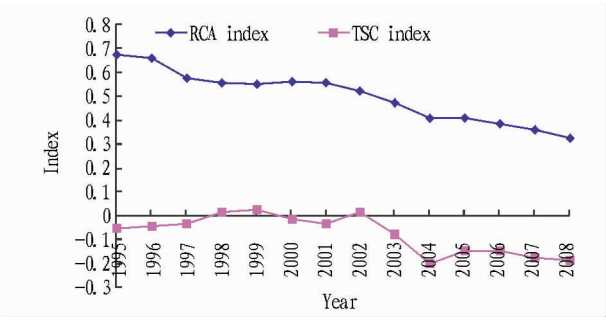
1 The status quo of international competitiveness of China's agricultural products

1.1 The status quo of trade development of China's agricultural products Since the reform and opening-up, along with the rapid development of China's international trade, the openness degree of agricultural product market has been increasingly promoted and the international trade scale has been increasingly expanded. According to the statistical data of FAO, from 2003, China has become the third biggest country of agricultural product trade. In addition, according to *China Agriculture Statistical Yearbook*, the trade volume of agricultural products increased from $ 22.41 billion in 1995 to $ 98.55 billion in 2008. It increased by 2.5 fold with average annual growth rate over 9.2%. The import volume increased from $ 12.51 billion to $ 58.33 billion, increasing by 3.7 fold, with average growth rate over 12.1%; the export volume increased from $ 15.55 billion to $ 40.22 billion, increasing by 1.6 fold, with average growth rate over 6.6%. According to statistics of Commerce Department, in 2009, due to the impact of global economic crisis, the volume of agricultural products in China decreased to $ 91.38 billion, with import volume of $ 52.17 billion and export of $ 39.21 billion, decreasing by 7.3%, 10.6% and 2.5% respectively in comparison with that of 2008.

1.2 The analysis of international competitiveness of China's agricultural products Trade Specialization Coefficient (TSC) is the ratio of the net export volume of certain product to total trade volume of this type of product in one country. The bigger the ratio, the more outstanding the com-



Data source: Data is calculated according to FAO database

Fig.1 The change of China's agricultural trade competitiveness index from 1995 to 2008

petitive advantage of products in this country is, and *vice versa*. In the light of change of trade competitiveness reflected by TSC, on the whole, China's agricultural products tend to decrease. As can be seen in Fig. 1, from 1995 to 2008, apart from the year 1998, the year 1999 and the year 2002, TSC of China's agricultural products is within interval (0, -0.2), while the index value in the year 1984 reaches 0.89. Especially since 2003, TSC index of China's agricultural products has had the outstanding tendency of decrease. It decreased to -0.17 in 2007, and further decreased to -0.18 in 2008. This indicates that China's agricultural products, on the whole, have disadvantage in international market, with no competitiveness, and further tend to deteriorate[1].

Revealed Comparative Advantage (RCA) refers to the ratio of proportion of export volume of certain product and total export volume in one country to the proportion of export volume of the same type of product and total export volume in the world. It is mainly to measure the status of certain product in the export pattern in one country, and determine the competitive advantage of this product in international trade according to the ratio value. The bigger the ratio, the stronger the international competitiveness of product in this country is. Fig. 1 shows that from 1995 to 2008, RCA of China's agricultural products tends to decrease. In 1995, it is 0.68, in 2007, it decreases to 0.37, and in 2008, this index decreases to 0.33, indicating that currently cultural products have basically lost competitive advantage. From 1981 to 1991, RCA value is between 1 and 0.8, with certain international competitiveness[2].

The value and change of two indices indicate that the international competitiveness of China's agricultural products in international market is weak; in the light of tendency reflected from TSC and RCA, the international competitiveness further tends to weaken.

2 The influencing factors and function mechanism of international competitiveness of agricultural products

The factors influencing international competitiveness of agricultural products can be classified as direct factors and indirect factors, according to the influencing effect. The so-called direct factors refer to the factors that can directly cause the change of export price of agricultural products and exert a significant impact on market share ability and export ability of agricultural products; the indirect factors refer to the factors of promoting market share ability and export ability of agricultural products by changing the domestic production conditions or production ability.

2.1 Direct influencing factors

2.1.1 The impact of exchange rate level on international competitiveness of agricultural products. In terms of the impact of exchange rate on international competitiveness of agricultural products, the change of exchange rate will directly impact the change of export and import price of agricultural products, and even impact the demand and supply relations of agricultural products in the market at home and abroad. Under direct pricing method, if the exchange rate rises, and the local currency depreciates, it indicates that the international price of agricultural products that the country exports will fall, the domestic price of imported agricultural products will rise. If it meets the conditions of Marshall-Lerner condition and there is no condition of "poverty growth", the depreciation of local currency will be conducive to the growth of export foreign exchange revenue and decrease of import foreign exchange expenditure, so as to make total export volume and net export volume of agricultural products increase, and international competitiveness of agricultural products rise; on the contrary, if exchange rate falls and local currency appreciates, it indicates that the international price of export products will rise, the domestic price of import agricultural products will fall, the foreign exchange revenue of export agricultural products will decrease and the foreign exchange expenditure of import agricultural products will rise, which is not conducive to improvement of international competitiveness of agricultural products.

2.1.2 The impact of import and export price and price of means of production on international competitiveness of agricultural products. The price level of agricultural means of production, as an important factor impacting price advantage of agricultural products, plays a crucial role in promoting international competitiveness of agricultural products. Price level of means of production will directly impact farmers' input cost of production, and further impact the price advantage of agricultural products at international market and the price competitiveness of agricultural products at home. When the price level of agricultural means of production rises rapidly, or higher than the rise amplitude of price of domestic agricultural products, it will impair the price advantage of agricultural products at international market and the price competitiveness of agricultural products at home, resulting in the rise of export volume and import volume of agricultural products, fall of index value of international market share rate, trade specialization index and revealed comparative advantage index, and decrease of international competitiveness of agricultural products[3].

2.2 Indirect influencing factors and analysis of international competitiveness of agricultural products

2.2.1 The impact of agricultural financial expenditure level on international competitiveness of agricultural products. The financial support level in China is also an important factor impac-

ting international competitiveness of agricultural products. The financial support for agriculture in China will reduce domestic farmers' input, decrease input cost and finally promote greatly the price advantage of agricultural products. Consequently, by the transmission of production process, one country's agricultural financial expenditure level will finally impact change of import and export volume: the higher the financial support level, the smaller the farmers' input, the stronger the transformation ability of price advantage, then the international competiveness of agricultural products is correspondingly promoted. On the contrary, if the financial support level is low, the transformation ability of price advantage will be weak and the international competiveness of agricultural products will be decreased.

2.2.2 The impact of using foreign merchants' direct investment in agriculture on international competiveness of agricultural products. The impact of using foreign merchants' direct investment in agriculture on international competiveness of agricultural products is as follows: firstly, foreign merchants' direct investment can promote export ability of agricultural products in China. The reason of foreign merchants' direct investment in China lies in that China has the advantage of low-cost labor forces and excellent location advantage, while the agricultural products it produces are generally sold to motherland and other countries, which makes great contribution for the export of agricultural products in China; secondly, foreign merchants' direct investment often causes " spillover effect" and " effect of learning by doing" , namely that foreign merchants' direct investment will bring advanced technology and management experience, so as to promote domestic holistic technology level and production ability, and finally promote quality of China's agricultural products export ability and quality of export products[4].

3 Analysis of international competiveness of agricultural products of China and grey correlation degree of all influencing factors

3.1 Data source, index selection and research method

3.1.1 Data source. The research data are mainly from *China Statistical Yearbook*, *China Rural Statistical Yearbook* and database of The Food and Agriculture Organization of the United Nations from 1996 to 2009.

3.1.2 Index selection. We select exchange rate of Renminbi against US dollar in China from 1995 to 2008(X_1), index of agricultural means of production price (X_2), agricultural use of foreign merchants' direct investment (X_3), agricultural financial expenditure X_4, index of export price of agricultural products (X_5), and index of import price of agricultural products (X_6) as subsequence of correlation analysis, namely reference series of numbers. We select index RCA and index TSC as parent sequence, namely evaluation index system series of numbers.

3.1.3 Research method. We use grey correlation analysis method to analyze the correlativity between index RCA and index TSC, and main influencing factors of international competiveness of agricultural products.

3.2 Analysis of grey correlation

3.2.1 Calculation of correlation coefficient. We conduct processing of equating and nondimensionalization on all sequencing data, and select identification coefficient as 0.5. According to formula 1, we calculate correlation coefficient value of all influencing factors and index of international competiveness of agricultural products in China, which can be seen in Table 1 and 2.

Table 1 Correlation coefficient between RCA and all influencing factors

Year	X_1	X_2	X_3	X_4	X_5	X_6
1995	0.808 567	0.915 21	0.882 62	0.549 301	0.769 414	0.738 859
1996	0.825 284	0.827 992	0.978 74	0.572 08	0.888 633	0.867 725
1997	0.917 973	0.869 308	0.741 406	0.626 786	0.906 339	0.910 762
1998	0.949 313	0.868 69	0.760 339	0.656 764	0.919 787	0.898 58
1999	0.949 384	0.876 298	0.807 282	0.669 242	0.871 581	0.882 26
2000	0.936 371	0.884 296	0.779 064	0.685 027	0.861 525	0.831 596
2001	0.944 468	0.891 623	0.928 074	0.731 211	0.894 833	0.898 801
2002	0.994 47	0.945 429	0.939 916	0.824 423	0.952 734	0.934 982
2003	0.955 796	0.999 104	0.894 66	0.894 592	1	0.964 834
2004	0.870 86	0.852 827	0.757 539	0.790 326	0.872 224	0.827 217
2005	0.876 515	0.864 967	0.996 829	0.757 367	0.868 416	0.962 673
2006	0.863 882	0.874 941	0.934 704	0.640 565	0.834 425	0.885 365
2007	0.862 035	0.814 044	0.813 142	0.438 197	0.799 265	0.729 019
2008	0.869 955	0.725 743	0.658 011	0.337 669	0.730 534	0.677 864

$$r[(X'_0(k), X'_i(k)] = \frac{m + \xi M}{\Delta_i(k) + \xi M} \quad (1)$$

$r[X'_0(k), X'_i(k)]$ is correlation coefficient; $\Delta_i(k)$ is the absolute value of difference of evaluation index system series of number and reference series of number; m is minimum value of $\Delta_i(k)$; M is maximum value of $\Delta_i(k)$; ξ is identification coefficient, the value of which is in $[0,1]$, the greater the difference among correlation coefficients, the stronger the identification ability, and ξ is 5 in this thesis.

3.2.2 Calculation of correlation degree and ordering. According to the correlation coefficient, we use formula 2 to calculate the correlation degree of evaluation index series of number and reference series of number, and conduct ordering, which can be seen in Table 3.

$$r(X_0, X_i) = \frac{1}{n}\sum_{k=1}^{n} r_{0i}(k) \quad (2)$$

In the formula, $r(X_0, X_i)$ is correlation degree, n is the number of data in series of number, and $r_{0i}(k)$ is correlation coefficient, namely that correlation degree is equal to the arithmetic average.

Table 2 Correlation coefficient between TSC and all influencing factors

Year	X_1	X_2	X_3	X_4	X_5	X_6
1995	0.761 127	0.658 355	0.532 877	0.677 835	0.816 81	0.871 246
1996	0.655 67	0.653 255	0.556 937	0.835 8	0.606 763	0.621 31
1997	0.602 014	0.635 203	0.774 071	0.982 785	0.609 315	0.606 497
1998	0.416 152	0.441 73	0.492 523	0.576 31	0.424 657	0.431 346
1999	0.386 524	0.406 151	0.430 424	0.510 291	0.407 606	0.404 349
2000	0.511 522	0.536 065	0.606 775	0.715 672	0.548 574	0.567 068
2001	0.608991	0.644 019	0.619 026	0.831 54	0.641 652	0.638 774
2002	0.409 532	0.422 373	0.388 01	0.465 846	0.420 324	0.425 395
2003	0.993 306	0.933 462	0.949 334	0.783 209	0.932 35	0.979 732
2004	0.340 718	0.344 777	0.371 676	0.361 212	0.340 421	0.351 029
2005	0.486 799	0.491 99	0.435 575	0.555 926	0.490 414	0.454 638
2006	0.478 761	0.474 035	0.408 34	0.660 331	0.492 473	0.469 77
2007	0.385 081	0.400 076	0.400 387	1	0.405 318	0.435 612
2008	0.346 123	0.390 005	0.423 331	0.606 796	0.388 059	0.412 276

Table 3 The sorting of correlation degree and influencing effect between trade competitiveness indices of agricultural products and the influencing factors

	X_1	X_2	X_3	X_4	X_5	X_6
RCA	0.901 777	0.872 176	0.848 023	0.655 254	0.869 265	0.857 896
Relational Series	1	2	5	6	3	4
TSC	0.527 309	0.530 821	0.527 806	0.683 111	0.537 481	0.547 789
Relational Series	6	4	5	1	3	2

3.2.3 Analysis of results. From the distribution range of correlation degree data in Table 1, the correlation degree of all factors and international competitiveness of agricultural products is in [0.527 3, 0.999 9], indicating that the international competitiveness of agricultural products has a close relationship with all influencing factors. But more specifically, the influencing effect of all factors is different and the detailed analysis is as follows:

(1) Analysis of index RCA.

From index RCA, apart from the small correlation degree of agricultural financial expenditure (X_4), exchange rate (X_1), price index of agricultural means of production (X_2), export price index of agricultural products (X_5), import price index of agricultural products (X_6) and agricultural use of foreign merchants' direct investment level(X_3) have high correlation degree with international competitiveness of agricultural products, and the correlation degree value is in [0.848 0, 0.901 8].

Specifically, the variation of exchange rate have the most outstanding impact on variation of index RCA, the variation of domestic means of production price index, export price index, import price index and agricultural practical use of foreign merchants' direct investment level has outstanding impact on variation of index RCA, and the variation of domestic financial support level has a relatively weak impact on variation of index RCA. The main reason is that the preceding five factors are direct influencing factors, namely that the change of these factors can directly cause the change of export price of agricultural products, and have significant impact on market share ability and export ability of agricultural products, while domestic financial support is indirect influencing factor, which is transformed into price advantage by domestic production process so as to directly impact change of export volume of agricultural products and variation of index value of RCA, with strong laggardness. In the light of domestic financial support, on one hand, national financial support increases the input aggregate of agricultural production factors and decreases price of agricultural means of production so as to support the price advantage of agricultural products in international market; on the other hand, being that some programs, as construction of infrastructure, with long profiting period, cannot be transformed into cost advantage and price advantage in the short run, so that the influencing effect of this factor is less outstanding than the previous five factors.

(2) Analysis of index TSC.

In terms of index TSC, domestic financial support level (X_4) has the greatest correlation degree with it, and then they are import price index of agricultural products (X_6), export price index of agricultural products (X_5), price index of agricultural means of production (X_2), agricultural use of foreign merchants' direct investment level (X_3), and exchange rate (X_1) successively. The result of ordering is different from result of ordering of influencing factors of index RCA, which concentrates on two influencing factors: domestic financial support level and exchange rate, namely the domestic financial support level, as indirect influencing factor of international competitiveness of agricultural products, impacts outstandingly TSC, while the exchange rate, as direct influencing factor, impacts insignificantly TSC. The reason is as follows: on one hand, the original data of index TSC involves change of import volume of agricultural products, and the export volume keeps high growth rate, though the change of exchange rate and other direct influencing factors has not promoted the great increase of export volume, so as to make the effect of these direct influencing factors insignificant; on the other hand, according to the calculation formula of index TSC, the calculation result of index data

has eliminated the impact of exchange rate variation, so as to abate the correlation degree of index TSC and exchange rate. All in all, these finally cause the outstanding influencing effect of domestic support level which is as indirect influencing factor.

4 Constructive suggestions of promoting international competitiveness of agricultural products in China

4.1 Continue to strengthen and perfect agricultural support policy In comparison with the developed countries, the agricultural support level of China is low, and its influencing degree on international competitiveness of agricultural products is relatively weak. So, China should fully take advantage of Blue Box policy and Green Box policy of WTO; increasingly strengthen the governmental input in agriculture; promote support degree in service system construction, such as agricultural infrastructure construction, agricultural scientific research education, technology popularization, quality standard and market information; improve production conditions; promote comprehensive production ability of agriculture. Meanwhile, China should strengthen the price support for agricultural products and subsidization for agricultural means of production; adjust price support subsidization structure of agricultural products; perfect direct subsidization policy and promote subsidization efficiency. In addition, it should strengthen research and exploration on Blue Box policy in order to increasingly perfect agricultural support policy and support system in China.

4.2 Continue to promote agricultural use of foreign merchants' direct investment level China is populous country, with high endowment of labor forces factor, so it is difficult to change the status by using foreign merchants' direct investment in the short run. At the present time, on one hand, we should concentrate our efforts on developing labor-intensive agricultural products; on the other hand, by policy to guide the development of agricultural industries with higher level labor and capital and by national financial support, we should increasingly perfect domestic agricultural investment environment, in order to provide good development platform for attracting overseas investment for high technology agricultural industry, and avoid blind development of technology and unsalable capital-intensive agricultural products.

4.3 Deepen processing ability of agricultural products and promote quality of agricultural products On the basis of the characteristic of low elasticity of agricultural products abating the impact of all factors, such as exchange rate, international market price level and so on, on international competitiveness of agricultural products, we should promote quality of agricultural products, deepen processing ability of agricultural products, and specially processing ability and quality level of export agricultural products, which plays significant role in strengthening influence of all factors. Specially, firstly, we should adjust agricultural production structure and improve quality and variety of agricultural products; secondly, we should support development of agricultural leading enterprises; thirdly, we should establish and perfect quality standard system of agricultural products, and strengthen and perfect quality safety and warning system of agricultural products[5].

4.4 Create good trade environment In terms of trade status of existing China's agricultural products, it needs more "voice rights", for example, the government should actively participate in confrontation with overseas green trade barrier and technological trade barrier and protect legitimate rights of enterprises which are blocked. Meanwhile, China's government should take restriction and rules of WTO into consideration when formulating relevant policies, seek the opportunity of participating in formulation of future international trade rules of agricultural products, and analyze and research negotiation stance on trade problem of agricultural products in order to better protect interests of China.

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market of agricultural products is essential. Each wholesale market of agricultural products should conduct the evaluation on its core competitiveness regularly, and find out its shortcomings and further rectify them.

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