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Research Article

A Study of the Export Commodities Structure of China's Food Industry and International Competitiveness

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Abstract: As a basic industry to safeguard people's livelihood, food industry in china makes great contributions to achieve a trade surplus, increase exports and expand employment, etc. No doubt, China is a huge country whose food industry has a long history, but there is a quite long way for china to be a power in this field. What's worse, the export competitiveness of china's food industry becomes less competitive in the international market. Thus to develop china's food industry and maintain its competitiveness, great importance should be attached to the changes of the international competitiveness of china's food industry. For this purpose, this study tries to focus on the analysis of export commodity structure of china's food industry with the application of Revealed Comparative Advantage Index (RCA) and Trade Competitive Index (TC) and proves the fact that the international competitiveness of china's food industry is weakening and even some sub-industries have lost their competitive advantages. Therefore, at the end of the study some effective measures have been put forward according to problems in the export of china's food industry.

Keywords: Export commodity structure, food industry, international competitiveness, RCA, TC

INTRODUCTION

As a basic industry to safeguard people's livelihood and an important part of light industry, food industry plays a critical role in the economic and social development and has made great contributions to achieve a trade surplus, increase exports and expand employment, etc. In recent decades (Balassa, 1965), all kinds of food industries are developing so rapidly that they have served the people's general needs of food in china (Cai *et al*., 2003).

According to food classifications, food industries include grain processing industry, vegetable oil processing industry, meat processing industry, dairy processing industry, fruit and vegetable processing industry (Dong-Sung, 1994), aquatic products processing industry, sugar industry, convenient food manufacturing, fermentation brewing industry, etc. From the classification, we can see that the food industry is composed of different types of industries correlated with each other, which form the overall competitiveness of food industry (Chen and Chen, 2002).

China, at recent, is a huge country whose food industry has a long history, but there is a quite long way for china to be a power in this field. What's worse, its export competitiveness becomes less competitive in the international market. Therefore, in order to develop china's food industry and maintain its competitiveness, great importance should be attached to the development and the changes of the international competitiveness of china's food industry as well as the causes.

There are a large number of recent literatures available at home and abroad which focus on the industrial international competitiveness. Moreover, Chinese and foreign scholars' ideas about the concept of industrial international competitiveness are basically the same. They both believe that the industrial international competitiveness refers to, under the condition of free trade, the overall quality that one industry of a country can provide products or services to the market more effectively than the same industry of other countries (Ji *et al*., 2006). And there are two main research methods to study it. (John, 1993) Some scholars use or improve Michael Porter's diamond Model to do research and some prefer International trade index.

This study uses the available methods for reference to analyze the changes of international competitiveness of china's food industry and the major sub-industries in the international market and with the application of Revealed Comparative Advantage Index (RCA) and Trade Competitive Index (TC) to focus on the changes of china's industry from 2004-2014. According to the above research, we can find that the international competitiveness of china's food industry is weakening and even some sub-industries have lost their competitive advantages. Therefore, at the end of the

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paper some effective measures have been put forward according to problems in the export of china's food industry.

MATERIALS AND METHODS

Study the model:

Revealed Comparative Advantage Index (RCA): The calculation method (Hong and Lei, 2013) of the Revealed Comparative Advantage index (RCA) is proposed by Balassa (1965) and the calculation formula is as follows:

$$RCA = \frac{\frac{X_i}{X_t}}{\frac{W_i}{W_t}} \quad (1)$$

where, X_i refers to a country's export value of a commodity and in this study it refers to the export value of each food sub-industry in china. X_t is a country's total commodity export value and in this study it refers to china's total commodity export value. W_i is the world's export value of a commodity and it refers to the export value of each food sub-industry all over the world. W_t is the world's total commodity export value.

When RCA is greater than 1, it indicates that such product in the country has a strong competitiveness in the international market and the larger RCA is, the greater its international competitiveness is. However, when the value is less than 1, we can get that the product has no comparative advantage in the international market and the smaller the value is, the weaker its international competitiveness is.

Trade competitive index: Here is the calculation formula of TC:

$$TC = (X_{it} - M_{it}) / (X_{it} + M_{it}) \quad (2)$$

where, X and M show the value of exports and imports respectively and i represents a country, a certain industry or a product.

When TC>0, the production efficiency of this kind of product is higher than the international level and the international competitiveness is stronger. That is, the higher the value of trade competitive advantage is, the stronger the international competitiveness is. Therefore, when TC<0 it shows that the production efficiency of this kind of product is lower than the international level and it is at a disadvantage.

Data sources of defining the scope of the food industry:

Define the scope of the food industry: With the reference of Harmonized Commodity Description and Coding System (2012), the food industries studied in this study mainly include 11sub-industries: 02 meat, 04 dairy products, eggs and honey, 07 vegetables, roots and tubers, 08 fruits and nuts, 09 coffee, tea and spices, 10 grains, 16 meat, fish and aquatic animal products, 17 sugar and confectionery, 19 cereal or milk products, 20 fruits and vegetables products and 22 beverage, wine and vinegar.

Data sources: This study uses the trade data of UN COMTEADE as the data sources which provide eleven-year china's total export value of food sub-industry and china's total commodity export value as well as the world's total commodity export value from 2004 to 2014.

RESULTS AND DISCUSSION

Analysis of export commodity structure of china's food industry: In order to analyze the export commodity structure of china's food industry and calculate its ratio in the whole food industry, this study gets the total export value of some main food sub-industries in 2004 and 2014 from UN COMTEADE. And the results are showed in Table 1.

Table 1: China's main food sub-industry, the total export value in 2004 and 2014, the ratio and changes

Food Category	Total export value in 2004	Ratio	Food Category	Total export value in 2014	Ratio	Changes
02 meat	706783794	5.15%	02 meat	1182001960	3.07%	-40.41%
04 dairy products, eggs and honey	234214380	1.71%	04 dairy products, eggs and honey	586072434	1.52%	-10.84%
07 vegetables, roots and tubers	2537344845	18.50%	07 vegetables, roots and tubers	8226338283	21.37%	15.52%
08 fruits and nuts	916373781	6.68%	08 fruits and nuts	4318162508	11.22%	67.90%
09 coffee, tea and spices	864581512	6.30%	09 coffee, tea and spices	2452616035	6.37%	1.07%
10 grains	740431899	5.40%	10 grains	445421184	1.16%	-78.57%
16 meat, fish and aquatic animal products	3488858093	25.44%	16 meat, fish and aquatic animal products	8881918823	23.07%	-9.29%
17 sugar and confectionery	252229157	1.84%	17 sugar and confectionery	1540350663	4.00%	117.59%
19 cereal or milk products	652821392	4.76%	19 cereal or milk products	1573199047	4.09%	-14.14%
20 fruits and vegetables products	2578110984	18.80%	20 fruits and vegetables products	7634631424	19.83%	5.51%
22 beverage, wine and vinegar	742997116	5.42%	22 beverage, wine and vinegar	1651194331	4.29%	-20.82%

Table 2: RCA of China's main food sub-industries of 2004-2014

	2004	2005	2006	2007	2008
02	0.197	0.169	0.138	0.126	0.091
04	0.089	0.089	0.077	0.094	0.100
07	1.315	1.369	1.245	1.295	1.008
08	0.333	0.326	0.314	0.380	0.360
09	0.916	0.834	0.801	0.701	0.722
10	0.258	0.482	0.270	0.357	0.078
16	0.410	0.391	0.412	0.408	0.547
17	0.206	0.263	0.202	0.335	0.251
19	0.376	0.372	0.330	0.311	0.244
20	1.414	1.460	1.338	1.622	1.340
22	0.006	0.006	0.006	0.005	0.006
2009	2010	2011	2012	2013	2014
0.095	0.098	0.089	0.079	0.068	0.074
0.061	0.056	0.058	0.063	0.050	0.051
1.066	1.298	1.407	1.199	1.098	1.118
0.381	0.357	0.368	0.442	0.392	0.396
0.919	0.835	0.836	0.745	0.798	0.823
0.086	0.058	0.051	0.039	0.038	0.034
0.703	0.649	0.574	0.537	0.626	0.601
0.248	0.237	0.242	0.247	0.256	0.303
0.261	0.234	0.262	0.250	0.206	0.206
1.327	1.131	1.210	1.284	1.136	1.096
0.006	0.006	0.006	0.006	0.006	0.006

Table 1 shows that china's main products for export include 16 meat, fish and aquatic animal products, 07 vegetables, roots and tubers and 20 fruits and vegetables products. The total export value of these three products accounts for 60% of the total export value of china's food industry.

The analysis of the changes of each product's exports in 2004 and 2014 proves that the export value of 02 meat, 04 dairy products, eggs and honey, 10 grains, 19 cereal or milk products and 22 beverage, wine and vinegar has declined in 2004 and 2014, with the biggest drop of grains. On the contrary, the export value of 07 vegetables, roots and tubers, 08 fruits and nuts, 09 coffee, tea and spices, 17 sugar and confectionery and 20 fruits and vegetables products has increased and the rate of 17sugar and confectionery is the highest.

Analyze the international competitiveness of china's food industry:

Analyze the RCA of china's food industry: By calculating the revealed comparative advantage of eleven food sub-industries from 2004 to 2014, this study makes the analysis of RCA of china's main food sub-industry shown in Table 2.

According to Table 2, we can see that in eleven food sub-industries only the RCA of 07 vegetables, roots and tubers and 20 fruits and vegetables products are greater than 1. The value of 09 coffee, tea and spices is close to 1. And that of 16 meat, fish and aquatic animal products is about 0.5. Except that, Others' value all is less than 0.5, especially 04 dairy products, eggs and honey, as well as 22 beverage, wine and vinegar, their RCA both are less than 0.1. Based on the analysis above, the conclusion can be made that some food sub-industries, such as vegetables, fruits and vegetables products, coffee and tea, have strong competitiveness in the international competition. However, others are less competitive.

To show the changes of the RCA of each food sub-industry during the decade of 2004-2014 directly, the RCA-changing trend graph of food industries is formed using Table 1 and 2.

There are four food sub-industries whose RCA is greater than or close to 0.5 shown in Graph1. Seen from Fig. 1, the RCA of 16 meat, fish and aquatic animal products has risen steadily since 2007, so its competitiveness in the international market has been gradually enhanced. Furthermore, that of 09 coffee, tea and spices is relatively stable, floating up and down around 0.8. Among them, 0902 tea's RCA is about 2, with a strong competitive advantage in the international market. In 2014, 0902 tea's exports reach to $12.7 billion accounting for 52% of the total export value. However, the RCA of 0901coffee is only about 0.08, thus it is not competitive at all in the international market.

The RCA of 07 vegetables, roots and tubers and 20 fruits and vegetables products both are greater than 1, but their current development are with declining tendency. Vegetables and fruits as the labor intensive industry can take advantage of our labor resources. What's more, china is well-known as one of the biggest countries with her various and prolific vegetables and fruits, which have been largely exported to European and American countries as well as ASEAN countries. However, our vegetables and fruits processing equipment and technology need to be improved, especially in product quality and fresh-keeping. Recently, because of the low-security of china's vegetables and fruits, some countries increase their inspection and quarantine standards for the vegetable imports. At the same time, in recent years, China's exports of vegetables market has undergone technical barriers from some countries in the Association of South-East Asian Nations (ASEAN), for example, the competitive advantage of Thai vegetable export has got enhancement, so that the comparativeness of China's vegetable and fruit declines. To take advantage of fruits and vegetables in our country, it is urgent to enhance its technology and security.

Seven food sub-industries whose RCA are less than 0.5 are chosen in Fig. 2. Seen from the graph, as the RCA of 08 fruits and nuts and 17 sugar and confectionery tend to rise, they become more competitive in the international market. On the contrary, except for 22 beverage, wine and vinegar which has no competitive advantage at all, the RCA of other 4 sub-industries are getting declined.

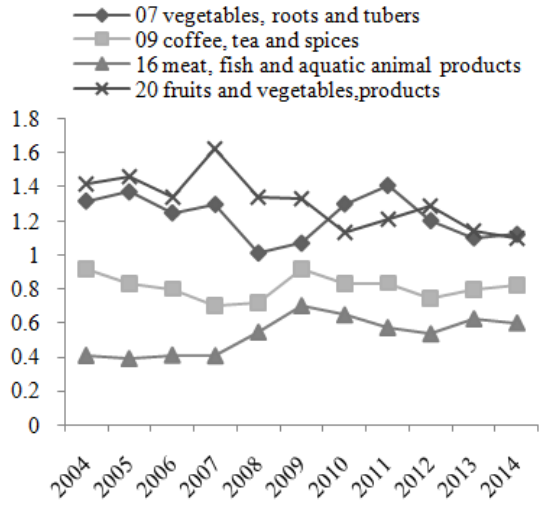

Fig. 1: RCA changing trend graph of food sub-industry 07, 09, 16, 20

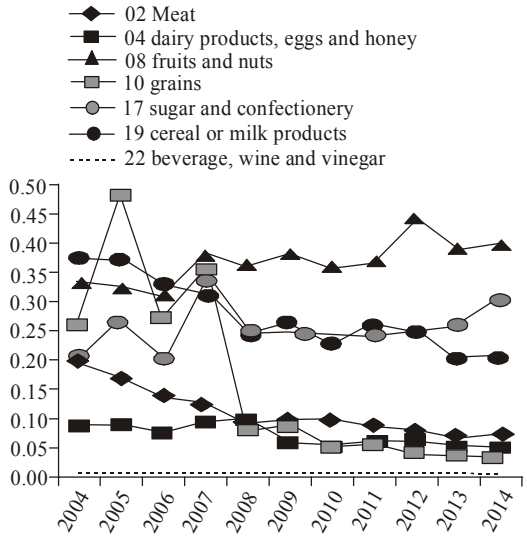

Fig. 2: RCA-changing trend graph of food sub-industry 02, 04, 08, 10, 17, 19 and 22

Since 2008, the RCA of 04 dairy products has begun to decline. In 2008, it was reported that Sanlu infant milk powder was tainted, which damaged China's dairy brand image in the international market, so that many countries start to doubt the quality of Chinese dairy products. Then it resulted in the decrease of China's dairy exports so greatly that Chinese dairy products have lost the competitive advantage completely in the international market.

The 10 grains belongs to land intensive industry and its RCA is less than 0.1 after 2008, thus it has no competence at all in the international market. Similarly the RCA of 19 cereal or milk products becomes less than 0.3 so that it lost the international competitiveness.

Table 3: TC of China's main food sub-industries of 2004-2014

	2004	2005	2006	2007	2008
02	0.195	0.117	0.043	-0.350	-0.488
04	-0.313	-0.267	-0.304	-0.240	-0.169
07	0.725	0.707	0.662	0.670	0.757
08	0.194	0.237	0.270	0.282	0.259
09	0.928	0.914	0.897	0.867	0.857
10	-0.499	0.007	0.117	0.585	-0.019
16	0.985	0.987	0.984	0.977	0.974
17	-0.143	-0.039	-0.144	0.076	0.230
19	0.540	0.521	0.411	0.348	0.160
20	0.896	0.904	0.900	0.904	0.902
22	0.480	0.274	0.301	-0.022	-0.138
2009	2010	2011	2012	2013	2014
-0.380	-0.382	-0.521	-0.615	-0.714	-0.664
-0.509	-0.664	-0.684	-0.718	-0.812	-0.834
0.644	0.663	0.654	0.483	0.511	0.523
0.161	0.112	0.025	-0.005	0.009	-0.087
0.885	0.834	0.794	0.728	0.795	0.755
-0.173	-0.471	-0.536	-0.829	-0.815	-0.865
0.977	0.966	0.955	0.960	0.957	0.945
0.236	0.012	-0.246	-0.336	-0.239	-0.073
-0.013	-0.026	-0.040	-0.129	-0.256	-0.282
0.869	0.846	0.843	0.848	0.845	0.818
-0.145	-0.246	-0.367	-0.382	-0.390	-0.286

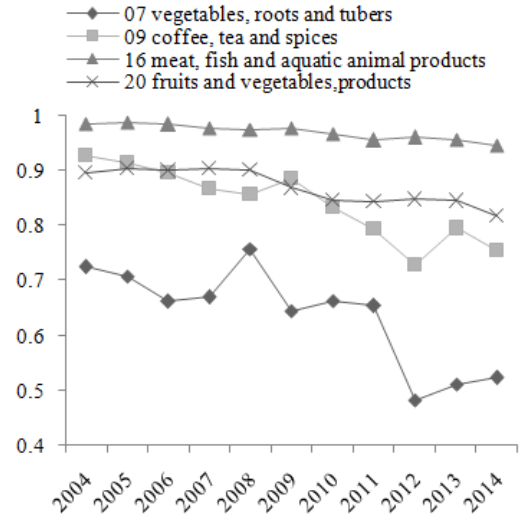

Fig. 3: TC-changing trend graph of food sub-industry 07, 09, 16, 20

Analyze the TC of china's food industry: This study tries to analyze the TC of china's main food sub industries using the data of the TC of eleven food sub-industries in ten years from 2004 to 2014, as shown in Table 3.

Table 3 shows that in the eleven food sub-industries, there are four sub-industries: 07 vegetables, roots and tubers, 20 fruits and vegetables products, 09 coffee, tea and spices, 16 meat, fish and aquatic animal products, whose TC is close to or greater than 0.8, which proves that they are competitive in the international market. However, as for 04 dairy products, eggs and honey and 22 beverage, wine and vinegar, their TC value is minus, which means that they are less

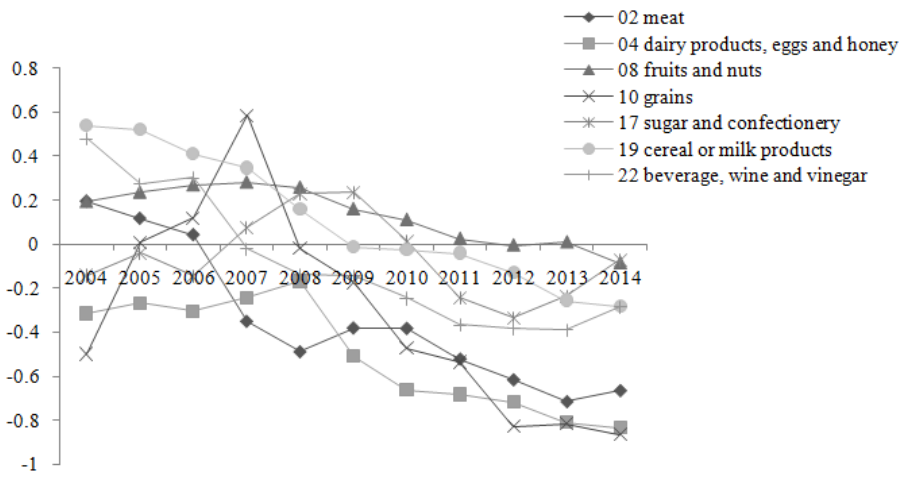

Fig. 4: TC-changing trend graph of food sub-industry 02, 04, 08, 10, 17, 19 and 22

competitive in the international market. All above results are consistent with the analysis of RCA. To study the changes of their TC value in the past ten years of 2004-2014, the TC changing trend graph is formed.

According to Fig. 3, we can see that the sub-industry of 16 meat, fish and aquatic animal products' TC value is about 1, which is the sign of strong competitive advantage in the international market. On the contrary, the value of 07 vegetables, roots and tubers, 20 fruits and vegetables products and 09 coffee, tea and spices tends to decline with weak international competitiveness.

Figure 4 can tell us that there are seven sub-industries whose TC value has declined from 2004 to 2014. They are 02 meat, 04 dairy products, eggs and honey, 08 fruits and nuts, 10 grains, 17 sugar and confectionery, 19 cereal or milk products and 22 beverage, wine and vinegar. Especially, the value of 04 dairy products, eggs and honey has fallen rapidly after 2008, so its international competitiveness has been weaken badly.

CONCLUSION

All in all, by analyzing the export commodity structure of china's food industry and the revealed comparative advantage and trade competitive advantage of china' main food sub-industries, it comes to some conclusions as follows.

First, in china, meat, fish and aquatic products, vegetables and fruits are the main export products and they do have great competitive advantage in the international market. Especially the exports of meat, fish and aquatic products are larger than their imports, which plays a major role in China's food trade surplus.

Second, the international competitiveness of China's food industry shows a trend of weakening. The RCA and TC value of these eleven food sub-industries analyzed in this study all generally tend to decrease and especially there are some sub-industries, such as grains, dairy products and beverage and so on, have lost their competitive advantage. Thus, these products largely depend on constant imports, which is the result of weak Supply guarantee for them. The causes leading to the situation can be shown in two aspects. On the one hand, it follows the change of china's overall international statue in exports. In the process of the transition from an agricultural country to an industrial country, the low value-added and labor-intensive products become less competitive. On the other hand, because it is related with China's food safety, food quality and technology content which need to be improved.

Third, food safety has a great impact on the international competitiveness of food industry. From the analysis of the international competitive advantage of Chinese dairy products, we can see that food safety is the basis of ensuring the international competitive advantage of food industry. Once a certain kind of food is found with quality problems, food exports will be affected badly and then in a few years it will affect the international competitiveness of this kind of food.

According to the research conclusion, this study argues that to maintain international competitive advantages of China's food industry, the following points need to be done. First, it's urgent to eliminate backward technology and equipments and improve the level of related technologies and equipments, such as food storage technology, cold chain transportation technology and food detection technology. Then, the food quality inspection standards should be strengthened, by establishing food inspection and testing system and food quality traceability system to ensure the safety of food. Finally, the food structures should be changed to adapt to the need of the international market.

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