

## Research Article

# Study on the Influence of Food Safety on China's International Trade and Countermeasures based on TOPSIS

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**Abstract:** Since food safety as a hot issue is directly related to China's international trade. This study takes the current situation of China's food trade as the breakthrough point, by means of analyzing the influence of food safety on export trade; it explores the countermeasures of China's food safety for dealing with export trade based on TOPSIS method.

**Keywords:** Food safety, international trade, TOPSIS method

## INTRODUCTION

Since 1990's, the globalization of economy has developed very fast, the national trade for each country is more frequently, while food trade as an important part of international trade has also got an unprecedented development, which has become an important source of foreign exchange in many countries. For example, in 2007, the amount of world food trade volume exceeded US \$900 billion (Nagayama, 2005). The development of food trade has made the whole food supply chain including production, processing, storage, transportation and sale tend to globalize, at the same time, food safety issue and the corresponding issues have become global problems. Because the issue of food safety is closely related with the health of human, animal, plant as well as the ecological environment, which is related to the social stability and national security in a certain extent. Therefore, both the developed countries and the developing countries take this issue seriously, which have taken various of measures to ensure the safety of the imported food.

## MATERIALS AND METHODS

**The current status of china's food trade:** In recent years, China's food safety problem is relatively outstanding, the coverage continues to be expanded, which has caused great damage to the food industry and brought a certain degree of panic to the public (Henson and Traill, 1993). Since food safety is directly related to the survival of human and the development of agriculture, which also can affect the international food trade. Since the Reform and Opening-up Policy, the development of China's food export trade is rapid, the effect on the economy of all countries in the world has gradually been deepened. For example, the amount of China's export food trade has been increased from

\$224.81 billion in 2005 to \$523.64 billion 2011, in 7 years, it increased 1.3 times (Hathaway, 1999). However, the amount of food export trade accounted for a low share in the total amount of merchandise export, which is always accounted between 2-3%, in 2011, the total volume of China's merchandise export trade amounted to \$1898.4 billion, among them, food export trade amounted to \$50.6 billion, (according to Annual Report of the Development of World Trade and Statistical Yearbook of China, it is calculated and sort out), which accounted for only 2.7% of China's merchandise exports (according to Statistical Yearbook of China, data from the website of Ministry of Commerce), the competitiveness of food export trade is low (Table 1).

**The economic loss:** Food safety regulation as a restriction of export standards will cause losses to China's food export, which is inevitable. Today, with the continuous development of food safety's regulations, along with the implementation of new standards one by one, China's food export will face new barriers. Since the foundation of WTO in 1995, the SPS report from WTO members is increased year by year, facing with the rapid increases of food safety standards, China's food industry cannot cope with them quickly, therefore, there were lots of banned events obviously, which has brought great loss to China's food export (Antle, 1999). Such as, in 2002, EU banned the products of animal originated and imported from China with all-round blockade, whose reason was drug

Table 1: The overall competitiveness index of China's food export trade from 2005 to 2011

Particular year	2005	2006	2007	2008	2009	2010	2011
MS	0.021	0.024	0.025	0.023	0.026	0.029	0.031
RCA	0.422	0.292	0.278	0.236	0.255	0.267	0.287
TC	0.308	0.441	0.465	0.410	0.373	0.324	0.279

Table 2: Chinese food detained by USA in 2008

Sorting	Products	Batch	Proportion (%)
1	Vegetables	45	41
2	Aquatic products	29	25
3	Dry fruits	14	11
4	Grain	9	6
5	Meat products	8	8
6	Oil	3	3
7	Fruits	2	2
8	Bee products	2	2
9	Dairy	2	2
Total		186	100

residues, only this one case was involved with 94 Chinese enterprises, the value of trade was amounted to \$ 0.623 billion. At the beginning of 2002, Japan found out that China's export vegetable pesticide was residues, which greatly improved the technical standards of the imported vegetables, increasing the safety indicator of vegetables for inspection from 6 items to more than 40 items, among them, chicken inspection items are more than 40 items, fruit juice inspection can amount to more than 80 items, rice inspection is 91 items. According to the preliminary statistics, under the influence of it, China's exports to Japan in 2002 was \$5.7 billion, with zero increase, the proportion fell from 35% in 2001 to 32% in 2003, the year-on-year rate dropped 0.2% in 2003.

**Technical barriers block the development of china's food trade:** Food industry is one of the largest industries that can be affected by the technical barriers, food safety regulation as well as the original security measures for developing a variety of food standard is to protect the health of human, animal, plant, as well as ecological environment. In international trade, the imported country, for the sake of the economic interests of the state, will take many unreasonable technical implementation measures on food safety, which is not consistent with the world standard. Thus, the technical trade measures will become trade barriers, which will hinder the development of trade.

China's exported food must achieve the requirements of the imported countries, on one hand, it must improve the quality of the food production and increase the cost; on the other hand, as for the detection technology of food safety, it must increase the level of technology correspondingly and increase the additional cost. The increase of the cost is bound to make food production enterprises reduce production; the amount of the export volume is also inevitable declined. As for some imported country which have too high food safety standard, with the current production and detection technology, it is impossible for China to meet the requirements, the function of technical barriers to trade is basically equivalent to banning the import (Table 2).

**TOPSIS methods and results:** The determination of evaluation index, in order to reflect the situation of food sanitation supervision work throughout the years, we chose 2010~2014 years five supervision indexes, they

are respectively supervision coverage, supervision ration, examination rate, food monitoring qualified rate, qualified rate of monitoring.

And calculate the corresponding weights of every index, such as 1.128, 1.122, 1.118, 1.124 and 1.108, respectively according to its methods and results: raw data matrix is established:

$$X(x) = \begin{bmatrix} 9.176 & 8.119 & 9.194 & 8.192 & 6.106 \\ 1.010 & 8.181 & 9.110 & 8.196 & 7.190 \\ 1.101 & 9.123 & 9.180 & 8.179 & 5.163 \\ 1.100 & 9.152 & 1.101 & 8.152 & 8.133 \\ 1.100 & 9.154 & 1.010 & 8.128 & 8.168 \end{bmatrix}$$

**Data normalization:** Relative dimensionless processing, the transformed formula is as follows:

$$Z_{ij} = x_{ij} / \sqrt{\sum_{n=1}^n x_{ij}^2}$$

where,  $i$  is evaluation index,  $j$  is the year, in the same way, for the rest of the  $Z_{ij}$ . Standardization of decision matrix  $Z$  is:

$$Z = \begin{bmatrix} 0.4464 & 0.3988 & 0.4417 & 0.4314 & 0.4122 \\ 0.4474 & 0.4118 & 0.4469 & 0.4369 & 0.4779 \\ 0.4474 & 0.4686 & 0.4455 & 0.4465 & 0.3551 \\ 0.4474 & 0.4900 & 0.4510 & 0.4609 & 0.4866 \\ 0.4474 & 0.4602 & 0.4510 & 0.4596 & 0.4887 \end{bmatrix}$$

## RESULTS AND DISCUSSION

**Strengthening the construction of china's food safety control system:** International experience shows us that the total quality management "from farm to table" on food production and processing, which is very important to ensure the safety of food. China should strengthen and improve GMP system, GVP system, SSOP system, HACCP system, combined with the practice of the construction of China's food security system, trying to establish the whole monitoring system of food production from the source to the protection of consumption.

**Establishing the domestic and foreign information system:** Food industry should set up information institutions, analyzing and sorting out the quantity and price of the exported products, paying special attention to the dynamic states of the international food trade. Making full use of the information feedback from the trade partners, establishing information database of trade, tracking with the related information of foreign government, industry, sorting out and analyzing the major trading technical regulations, standards and conformity assessment procedures and other technical measures of trade issued by nations, which can provide

comprehensive, accurate and timely information support for food enterprise to make decision scientifically.

**Exporting foods that are suitable for foreign markets:** The domestic food safety problems should maintain a high degree of attention, enterprises need to do more market research work. China should improve the allocation rate of the domestic agricultural resources and develop the food exports of agricultural products that had comparative advantages vigorously, at the same time, China should also develop the deep processing agricultural products, adjust the export structure of agricultural products, encourage and support the product sales that can be linked with the overseas market directly, set up agricultural products shop chains and food enterprises for selling in the foreign supermarket, establish marketing network construction of food export. As for estimating food consumption demand, it turns to the development and marketing of healthy, safe and natural food.

#### **CONCLUSION**

In recent years, not only the developed countries, but also the developing countries have taken food

security as the focus of the technical barriers of trade. Some countries have taken measures with protectionist colors. The level of China's food industry production is backward, which is unable to meet the diversified international market demand, the overall level of food standard is low with weak research and poor implementation status. China's food safety issue is more outstanding, which has a larger difference with the standard of the developed countries. Therefore, in the future, China must ensure food with high quality to break through the trade protection, so as to widen the international market.

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