

Statistical Analysis of the Relationship Between Tea Import and Export and Economic Situation Between China and Japan

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Abstract: Tea, one of the most popular beverages in the world, originates from China. Both China and Japan have profound tea culture connotations. Chinese tea culture attaches importance to the art and etiquette of tea tasting, while Japanese tea ceremony emphasizes spiritual experience and simple aesthetics. The literature review method and linear regression method are adopted in this research. China's total import-export volume and China's tea export volume to Japan from 2015 to 2020 are selected and analyzed through simple linear regression analysis. A linear regression model is established to inquire about the contact and influence factors of China and Japan in the tea industry trade. This research unveils the existing problems of the Chinese tea industry. The results indicate that there is a linear relationship between China's total import-export volume and China's tea export volume to Japan. Moreover, China renders help in the tea industry development and international trade cooperation. Several factors of international trade cooperation are elucidated, such as government's intensification of policy support, the enterprise's attention to brand building to promote China-Japanese tea industry cooperation and achieve mutual benefit and win-win results, thus improving global tea industry competitiveness.

Keywords: China-Japanese trade, tea import and export, linear regression, factors impacting trade.

1. Introduction

Tea, a drink made from soaking plants in China, is the world's second most popular drink, only behind water. On average, about 3 billion cups of tea are consumed every day. By 2016, tea had been planted in 48 countries.

Chinese tea culture has a long history, emphasizes the art and etiquette of tea tasting, and combines poetry and painting to present profound cultural connotation. In China, tea is not only a kind of drink but also a kind of media for personal relationship, bearing abundant historical and philosophical thoughts.

However, Japanese tea culture centers on tea ceremony and concerns spiritual experience and simple aesthetics. Tea ceremony emphasizes the peace of mind and etiquette and create a kind of harmonious atmosphere. Tea is also an important social tool in Japan and promotes the exchange between people, embodying the unique value of Japanese culture. In both China and Japan, tea is

regarded as important symbol of their own culture, bearing profound history and philosophy and reflecting human understanding of nature, life and beauty.

In 2015-2020, China's total import-export volume tended to rise, and its tea export volume tended to be stable, which indicated that China was relatively active in international trade, but people's demands for tea did not rise [1].

According to the data, China's total import-export volume reached peak value of USD 4.622444 trillion in 2018, and tended to be stable in 2019 and 2020. China's tea export volume also reached peak value of USD 58.9882 million in 2018, and tended to decline after 2019 [2].

Simple linear regression method is adopted in this paper to research the relations between China's total import-export volume and its tea export volume to Japan. This research renders instructive suggestions for international trade cooperation of tea industry.

2. Literature review

With the sustained expansion of global trade, Chinese tea industry structure always retains stable, and foreign trade volume data is still huge. In 2006, foreign trade volume of tea was up to 2.87 million tons. During this period, China's tea industry was not impacted by external and domestic depreciation of RMB, substantial increase of production costs, and other factors. Besides, in foreign trade history of tea industry, tea sales volume reached USD 500 million the first time. However, status of China's tea industry in foreign trade declines year by year. With the fierce competition of international tea market, China's overall trade is on a downward trend, and the tea export price with great export ratio decreases apparently. The total foreign trade volume for 10 years increased by 42.96% from export volume of 202,500 tons in 1997 to export volume of 289,400 tons in 2007, and presented small steady rise for several years after 2002. Besides, the export unit price also gradually recovered during that period [2].

Japanese monk Yosai ever took lots of tea seeds and relevant production material from China to Japan, so, Japan's tea industry can reach such a prosperous state nowadays. For example, Japanese matcha has a broad market in the world [3]. Japan has limited land resources, small population and restricted resource conditions, but the export unit price of Japanese tea was over four times of Chinese tea export unit price in 2022. The United States is the largest tea import country of Japan, with export volume of USD 84.744 million in 2022, then come to Taiwan, China, the third is Germany [4]. Such phenomenon originates from people's pursuit of matcha products. Besides, prosperous Japanese tea industry also depends on its government's strong support for tea industry. For example, Japanese government develops lots of policies beneficial to tea industry, and allocates funds to subsidize tea industry. Japan has advanced technology for growing and protecting tea, and has vigorously promoted and developed tea culture. It has strictly protected tea-related utensils and tea rooms with academic value, which has contributed to the prosperity of Japan's tea industry today.

Government and enterprises shall jointly propel construction and promotion of tea brand, only in this way, a country's tea export volume could improve. Government shall offer policy support, perform macro control and create advantageous socio-economic environment to guarantee legality and public credibility of tea brand.

Enterprises shall intensify self-owned brand development awareness and build unique brands by innovating tea products to draw more consumers. Tea brands not only shall attach importance to the improvement of quality, but also needs to pay attention to shaping their brand culture. Tea serves important component of traditional Chinese culture, and brand culture shall embody cultural connotation, historical inheritance and drinking habit of tea. Building brand culture could intensify consumers' emotional identity to brand. Enterprises could propagate the culture of tea brand via package design, advertising propaganda, and offline activities, thus improving the brand's cultural value and social recognition, and further expanding brand impact [5].

The differences in tea varieties, production areas and processing techniques all provide conditions for the differentiated positioning of tea brands. Companies have created unique brands based on different tea varieties, origins and processing methods. Taking brands with geographical indication such as West Lake Longjing Tea, Dongting Biluochun as examples, they have set up higher popularity on the market by virtue of unique regional characteristics and historical background. Such method could be referred to build a favorable tea brand, namely, the detailed and differentiated brand position is performed for producing area, variety, process, etc. of tea to attract target consumer group [6].

Brand protection is particularly important for an enterprise. Sichuan government takes legislation and some administrative measures to protect tea brand intellectual property right of heat-clearing healthy tea, crack down on counterfeit and shoddy products, and prevent infringement act from negative impact on brand image, thus maintaining legitimate rights and interests of its local brand. Besides, enterprises could register trademark, patent to intensify the legal protection of brands and guarantee independence and market competitiveness of their brand.

3. Research methods

Simple linear regression is a kind of basic, comprehensible and explicit regression analysis method with high computational efficiency. A model could be established via least square method to determine regression coefficients β_1 and β , then the linear relationship between dependent variable and independent variable is found.

The advantages of simple linear regression are that it has a certain mathematical basis, is simple and clear, and is easy to understand and implement. The slope and intercept of the model have clear explanatory meanings, which makes it easy to understand the impact of the independent variable on the dependent variable, so it has strong interpretability. In addition, it has a small amount of calculation, is not prone to calculation errors, and improves calculation efficiency.

Upon linear regression analysis, several basic assumptions shall be checked. The first is linear relation hypothesis, namely there is a linear relationship between dependent variable and independent variable. The second is the independence assumption, namely residual terms are mutually independent and observed data are independent. The third is normality hypothesis, namely residual term complies with the normal distribution with mean value of 0. The fourth is homoscedasticity hypothesis, namely variance of the residuals is constant, without heteroscedasticity. And the fifth is non-multicollinearity assumption, multicollinearity issue doesn't exist due to only one independent variable in simple linear regression [7]. The validity and reliability of model could be ensured after these assumptions are met, and the relations between dependent variable and independent variable proved is more accurate.

As shown in Table 1, China's total import-export volume in 2015 - 2020 and its tea export volume to Japan are selected. There are 5 groups of data in total, with a small computation.

China's total import-export volume contains China's tea export volume to Japan, such two variables must present linear relationship. Among the 5 groups of data, each group of data are corresponding to different years, and the import and export data of each year are mutually independent and do not influence each other, namely, the change between China's total import-export volume and its tea export volume to Japan per year is not impacted by the status of previous year and last year. When data residual diagram is made, residual data complies with the normal distribution with mean value of 0, and residual distribution does not apparently reveal the change with the change of independent variable. Only one independent variable exists in the data selected, which is China's tea export volume to Japan, so, non-multicollinearity issue does not exist.

The data of this research originate from the Ministry of Commerce of the People's Republic of China. China's total import-export volume in 2015 - 2020 and China's tea export volume to Japan are selected as data in this thesis [2].

Table 1: The import and export of China's tea from 2015-2020 [2]

Date	China's total import and export amount (in billions of US dollars)	China's total export of tea to Japan (in ten thousand of US dollars)	Average of Total Import and Export	Average of Export of Tea to Japan
2020	23,279.57	3224.04	38790.0325	4284.686667
2019	45778.91	3309.76		
2018	46224.44	5898.82		
2017	41071.38	4118.2		
2016	36855.57	4458.8		
2015	39530.33	4698.5		

The model $Y=4.323X+20266.673$ could be concluded based on the data in Table 1.

The model shows that when X increases by 1, Y would increase by 20,270.996, indicating their strong positive relations. The model and data show China's overall development level and Japan are impacted by China-Japanese economic situation and international relations. If China's tea export to Japan is vigorously developed in the future, China's international trade will be promoted.

4. Discussion

China and Japan have a close trade relation, but defects are revealed in some aspects, particularly in trade imbalance, political factors, and insufficient complementarity of industrial structure [8].

First, trade imbalance is a significant issue. China's tea export volume to Japan is often far higher than the import volume, which not only leads to trade deficit, but also triggers Japan's doubt about quality and competitiveness of products made by China. Such imbalance relations may aggravate the economic friction between two countries, even impact broader foreign relations.

Second, insufficient complementarity of industrial structure gives rise to fierce competition of both countries in some fields. For example, enterprises of both countries directly compete on market in the electronic products and automotive industries, which restricts cooperation potential. Although both countries may cooperate in some fields, such as new energy and environmental protection technology, but on the whole, the overlapping of industrial structure causes both countries finding effective cooperation space difficultly.

Finally, political factor often becomes barrier of restricting trade development of both countries, and is one of current most important factors. Historical legacy issues and local territorial disputes certainly affect bilateral relations, but the impact of political decisions and policies on trade between two countries is most important. The policy adjustment of two governments, the change of diplomatic position and the change of domestic political situation would directly or indirectly influence the stability of economic cooperation of both countries. In current international situation, political friction between countries is increasingly frequent, and economic cooperation is often impacted by geopolitics, national security, etc. Those impacts make global economy difficult to stabilize. Therefore, at policy level, countries shall attach more importance to coordination of domestic and foreign policies, and create more favorable investment environment for multinational enterprises. Moreover, government shall intensify policy communication and cooperation with other countries to jointly propel recovery and growth of global economy, particularly in the global issues, including reform of global economic governance system, environmental protection, public health, etc., closer partnership shall be formed between the government of China and other countries. Facing the change of international economic environment, all countries shall promote the concept of centering on human

community with a shared future, seek common ground with countries around the world, and ensure the global economic order is fairer, more transparent and stable via joint promotion of development of global economy.

5. Conclusion

Tea export data of China and Japan in 2015-2020 are dissected in this research to probe into situation and problems of China and Japan in tea industry and trade field. The result indicates that competitiveness of Chinese tea industry on international market gradually weakens and Chinese tea industry faces many obstacles in international trade.

The tea industry in both China and Japan has a profound historical and cultural background, even Chinese history culture is more profound, but there is apparent difference in export unit price, market demands, government support between two countries, particularly in respect of tea export unit price, Japan's tea market scale is much smaller than China's, but its export unit price is apparently higher than China's, which indicates the branch value of Japanese tea, cultural added value and government policy support.

This research unveils the issues of Chinese tea industry existing on global market, particularly tea export unit price declines year by year. Chinese tea industry needs to enhance tea quality, produce new related products, intensify brand construction and expand emerging market. The support and subsidy of government is most important. Based on the research data and information, it can be found that the influence extent of cultural value, government support, industry structure and market demands to international trade. Apparently, they are very important for the export of a product. Systematic regression analysis is performed in this research for Chinese and Japanese tea industries, but some limited problems still exist. Research data only implicate the period of 2015-2020, rather than other time periods. Moreover, research focuses on Chinese tea industry, without full consideration of the impact of other factors on tea industry export. Therefore, the author hopes more variables could be considered in future research, and the data of this research are utilized to further probe into the tea trade relations between China and Japan.

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