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Economic and Trade Cooperation and Potential Analysis between China and Central and Eastern European Countries based on IOA

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ABSTRACT

Although China and Central and Eastern European countries are far apart, the two sides have a long history of exchanges and profound traditional friendship. China's strengthening of trade ties with Central and Eastern European countries is significant for Chinese goods to occupy the European market. From the perspective of geospatial distribution, Central and Eastern Europe is generally used for geopolitical expression. The development space is broader to make our Eurasian countries more economically connected, cooperative, and profoundly developed. We can use the innovative cooperation model to build the "Silk Road Economic Belt jointly". This paper calculates the relative trade index using an intelligent optimization algorithm (IOA). It analyses the comparative advantages of specific agricultural industries in China and Central and Eastern Europe. The comprehensive complementarity coefficient of bilateral trade is used to analyze the farm trade complementarity between the two sides. Under the background of "one belt and one road", central and Eastern European countries constitute an essential part of China's westward trade and development. To ensure that foreign trade policies can be carried out smoothly and lay a good foundation for cultural exchanges between China and Central and Eastern European countries in the new trade era.

Keywords: Trade in Central and Eastern Europe, IOA, Trade Cooperation, International Trade Cooperation

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1. Introduction

Although China and the Central and Eastern European countries are far apart, they have a long history of exchanges and profound traditional friendship [1]. As a "vacuum zone" of economic development in Eurasia,

the Silk Road Economic Belt has a vast space for growth [2]. Central and Eastern Europe are integral parts of it. Our trade and investment focus should be further shifted to Central and Eastern Europe with trade potential. Central and Eastern European countries are in the transitional stage of China's economic integration into the European Union and smooth docking [3]. On the other hand, the Central and Eastern European countries have superior geographical positions, and ports, railway transport stations, airports, and so on are more convenient [4]. Convenient transportation and lower freight rates form a natural channel for China to transport goods to many European Union countries [5]. The economic status of Central and Eastern European countries in the entire European region is on the edge. Of course, from our perspective, Central and Eastern Europe is also a relatively weak link in China's economic internationalization [6]. At the same time, Central and Eastern European countries are also countries with higher levels of economic development, relatively complete infrastructure, relatively stable political situation, and relatively high levels of national education [7]. China's strengthening trade ties with Central and Eastern European countries is significant for Chinese goods to adapt to EU standards and occupy the European market.

From the perspective of global economic development and international trade patterns, Central and Eastern Europe is an important hub connecting Eurasia. It is also a "bridge" between the Chinese economy and Chinese companies to the European market [8]. Compared with other countries along the route, the threshold for economic and trade cooperation between Central and Eastern European countries is low, the development stages of the two sides are relatively unified, and the demands for economic interests are the same. It is conducive to promoting the development of bilateral economic and trade cooperation [9]. Since 2013, racism and health: the necessary research agenda for effective intervention has begun to be studied [10]. Later, some scholars published an article on expanding the market-based profit rate in the film journal [11]. In 2016, the Chinese Dream and the "Belt and Road": Xi Jinping's Chinese foreign policy was proposed [12]. In 2017, some scholars discussed the political and strategic significance of China's Eurasian Century Belt and Road Initiative [13]. Central and Eastern European countries and many European Union countries have formed a unified European market in the long-term development, and the economy has been robustly integrated. The market has relatively uniform requirements on technical standards and product safety [14]. The trade dependence of both sides is also relatively low. Regarding geospatial distribution, Central and Eastern Europe is generally used as a geopolitical expression [15]. Benefiting from the high attention paid by the governments of both sides to multi-dimensional cooperation, agricultural cooperation between China and Central and Eastern Europe has been continuously strengthened, and agricultural trade has skyrocketed, gradually forming a good pattern of complementary advantages and common development [16].

To give our Eurasian countries closer economic ties, deeper cooperation, and broader development space [17]. We can build the Silk Road Economic Belt with innovative cooperation mode. With the continuous promotion of the "one belt and one road" advocated by General Secretary Xi Jinping, the central and Eastern European countries have recently deepened bilateral pragmatic talks with China [18]. It reflects the ardent desire of Central and Eastern European countries to conduct trade with China. Early research focused on the transition of Central and Eastern Europe and the overall impact of EU expansion on China's agricultural trade [19]. The entry of Central and Eastern European countries into the EU affects the EU's internal and external economic and trade policies and the subtle changes in the economic and trade exchanges between the new EU and China. There has been a significant extrusion competition and transfer effect in China's trade relations [20]. In the context of the "Belt and Road", China's excess capacity needs to be exported. Studying the trade complementarity and competitiveness between China and Eastern European countries is necessary. The high

integration of Central and Eastern Europe and Western European markets has also become an essential channel for Chinese products and funds to enter the EU [21]. This paper analyses the comparative advantages of specific industries in China and Central and Eastern European countries by calculating the relative trade index. The bilateral trade comprehensive complementarity coefficient is used to analyze the complementarity of agricultural trade between the two sides.

2. Materials and Methods

The Central and Eastern European countries cover an area of 3/10 of the European territory, with a total population of one-quarter of Europe's total population and sufficient labour resources. From the analysis of Central and Eastern European countries, these countries have enough agricultural resources and mineral fuels, which are second to none in the world. However, it lacks machinery manufacturing, telecommunications, and electric power. China's products in trade with Central and Eastern European countries are more complementary. And all the values are stable, indicating that bilateral trade is in a stable state of development. From the perspective of fine classification, the complementarity of primary products is very weak, while the development of typical capital and technology-intensive products is on the rise. Affected by the US strategic eastward move and the European debt crisis, the dependence of the Central and Eastern European countries on the United States and the European Union has gradually declined, and the demand for China's economic and trade cooperation has steadily increased. China is less competitive than Central and Eastern European countries [22]. Specifically, China's competitive advantage in food and animal products is declining progressively; compared with Poland and Hungary, the major trading countries, there is no comparative advantage. However, compared with other Central and Eastern European countries, such as the Czech Republic and Slovakia, they have certain competitive advantages. Even if both economies are competitive, the competitive situation will be different if the target market is different.

According to the trade complementarity index, trade complementarity between countries X and a can be measured by the following formula:

$$U\left(x/\alpha\right)=\nabla\alpha_{i,j}\cdot\log P\left(\frac{X}{\lambda}\right)=\frac{\xi\left(x,s_j\right)}{\alpha_{i,j}}-\xi\left(s_j\right) \tag{1}$$

It is inferior to use import to measure the display of products. The concrete formulas are as follows:

$$R=\sum_{i=1}^{N}r_i\cdot c_i \tag{2}$$

The distinction between industry complementarity and industry complementarity is divided according to the nature of trade complementarity. The trade specialization index can measure whether the trade between the two countries is complementary within the industry or between industries. Calculated as follows:

$$c_j(t)=\frac{1}{N}\sum_{i=1}^{N}c_{ij} \tag{3}$$

It can visually show the utilization of resources in the two economies:

$$x(t) = \sum_j c_j(t) + r(t) \quad (4)$$

Based on the relative trade advantage index, the comprehensive complementarity coefficient of bilateral trade between China and Central and Eastern Europe is further analyzed and measured. This will more intuitively reflect the exchange between the two major economies. As shown in Table 1.

Years	Poland	Romania	Serbia	Macedonia
2013	0.42	0.42	0.25	0.19
2015	0.37	0.63	0.28	0.21
2017	0.35	0.57	0.26	0.22

Table 1. Calculation results of trade complementarity coefficient between China and Central and Eastern Europe

Due to the influence of the environment, China's agricultural products have gradually reduced their competitive advantages in internal agrarian products. Still, they are relatively mature in power, telecommunications, and machinery manufacturing. It can be in line with international technology. The advantages and disadvantages between China and Central and Eastern European countries are more evident and complementary, and the cooperation between the two sides has high value and potential. The economic pattern factor cannot be ignored. The total import and export volume and trade surplus between China and Central and Eastern European countries are shown in Figure 1.

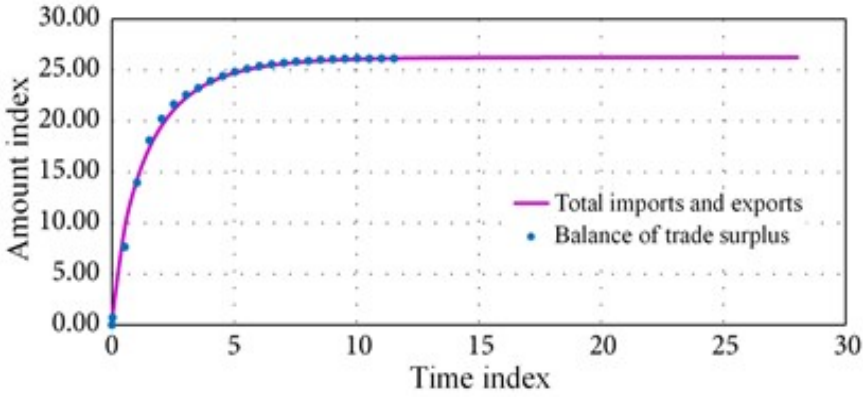

Figure 1. Total import and export volume and trade surplus

Compared with Western European countries headed by Britain, France and Germany, Central and Eastern European countries are typical representatives of transition economies. To sum up, from the 1980s to the 1990s, 16 countries in Central and Eastern Europe are experiencing a transition from emerging market coun-

tries to developed countries. Economic and trade cooperation is an important area of cooperation between China and Central and Eastern European countries. In recent years, China's trade with Central and Eastern European countries has developed rapidly, economic complementarity has increased, and financial and trade cooperation has become increasingly broad. In the future, trade development between China and Central and Eastern European countries will still have a wide development space, and bilateral trade cooperation is expected to be further deepened, achieving coordinated development of bilateral trade and mutual benefit and win-win. In the stochastic frontier gravity model, those factors that restrict or promote trade are put in the inefficient item, and the trade resistance problem can be adequately solved. Therefore, the stochastic frontier gravity model has been widely used since it was proposed. Figure 2 is the Forum on Agricultural Science, Technology, and Economic and Trade Cooperation of Central and Eastern European Countries held in China.

Figure 2. Forum on Agricultural Science and Technology and Economic Cooperation in Central and Eastern Europe

The enterprise education system can enhance the enterprise's opportunity recognition ability, and optimizing the enterprise environment will provide more enterprise opportunities. This will help individuals develop new businesses and expand the Central and Eastern European markets. Table 2 shows the results of the empirical analysis of corporate policies and business models.

Variable	Survival enterprise	Opportunistic enterprise
Corporate funding	0.263	0.264
Corporate Education	0.249	0.243
Business environment	0.172	0.176
Type of economy	1.481	2.312

Table 2. Empirical Analysis of Enterprise Policy and Enterprise Model

The comparative trade advantage index calculates the comparative trade advantage between China and Central and Eastern European countries. China has certain competitive advantages in food, livestock, manufactured goods, machinery, transportation equipment, and miscellaneous products. Regarding beverage tobacco, China has no competitive advantage and is complementary to most Central and Eastern European countries. Although the relative competitive advantage index of Central and Eastern European countries has changed, most countries have shown substantial advantages in most years. Traditional gravity models can only consider a few objective trade resistance factors, such as geographical distance. However, most other difficult observing factors are generally placed in the random perturbation term, which estimates the model deviates somewhat. China has apparent disadvantages because of the rapid development of its economy and its large population, which require a large amount of raw materials to meet its needs. Currently, trade between China and Central and Eastern European countries is mainly concentrated in machinery manufacturing and transportation. The trade channels and types are relatively narrow, which is not conducive to the construction of a complementary model of trade between the two sides. Regardless of the direction of development of the enterprise, the business development of the enterprise is ultimately affected by the performance of the enterprise. We propose a hypothetical model as shown in Figure 3.

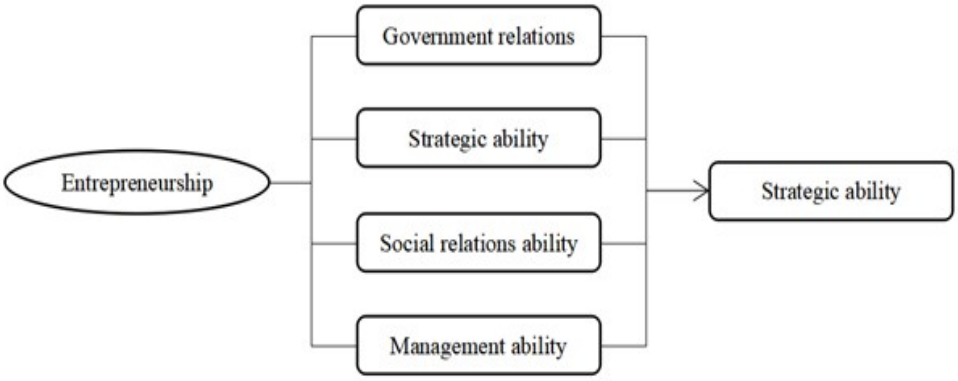

Figure 3. Research model

The trade complementarity between China and the 16 countries of Central and Eastern Europe is precisely based on the market competitiveness of trade among countries. Because these countries have their own advantages, they also have some disadvantages. Chinese companies invest in developed countries and collaborate with external sources such as upstream and downstream channels. It is possible to simply write the price competition between the price of a single enterprise and the average price of the market as:

$$dR_t = \chi \cdot a(t) \cdot dt + \delta \cdot a(t) \cdot dw_t \tag{5}$$

Initialize, calculate the connection weight and threshold, and assign any value:

$$dR_t^{\pi} = \xi \cdot a_{\pi}(t) dt + \zeta \cdot a_{\pi}(t) \cdot dw_t - dU_t^{\pi} \tag{6}$$

Differentiated products can be used to meet their needs. Provide input samples and expected output:

$$R_t^{\pi^*} = x + \int_0^t \xi \cdot a\left(R_s^{\pi^*}\right) \cdot ds + \int_0^t \zeta \cdot a\left(R_s^{\pi^*}\right) \cdot dw_s - U_t^{\pi^*} \tag{7}$$

3. Result Analysis and Discussion

China is a big agricultural country, but the annual amount of farming imports is also huge, and many agricultural products depend on imports. Import sources are the United States, Australia, South Korea, Latin America, etc. Some countries compete fiercely with China internationally, and trade frictions are serious. China is often subjected to illegal trade control. China has a weak advantage regarding finished products classified by materials. Central and Eastern European countries are at a disadvantage, except Montenegro. Compared with Central and Eastern European countries, China has obvious advantages. Regarding mechanical transportation equipment, China has changed from a non-existent to a competitive advantage. The Central and Eastern European countries, except the Czech Republic, Hungary and Slovakia, are disadvantaged. As Central and Eastern Europe is the economic hub of Eurasia, it will become the primary market for the transition of China's economic transformation and the extension of foreign trade in the future. Re-examine China's agricultural trade with Central and Eastern European countries. And test the factors that influence the adjustment of China's agricultural trade policy. For products, we also need to orientate the product model. Product pattern positioning is shown in Figure 4.

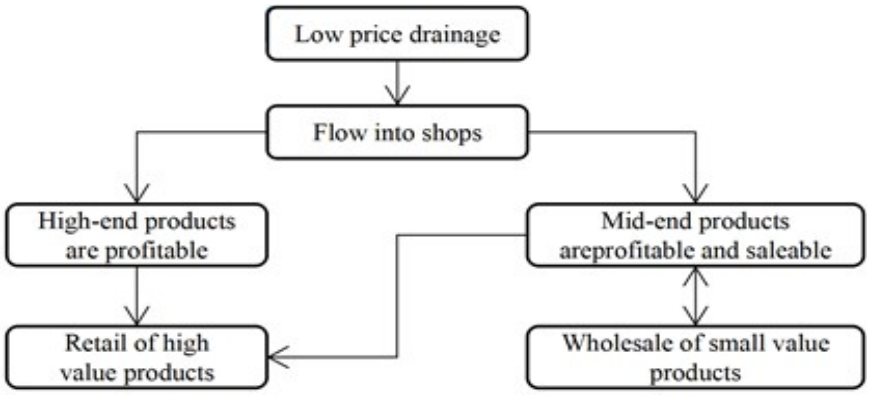

Figure 4. Product mode positioning

Based on the analysis of the status quo of agricultural trade between the two sides, the stochastic frontal gravity model is used to measure the trade efficiency and potential. Since the establishment and maintenance of social relations requires certain emotional and spiritual support, if entrepreneurs have effective social relations, this is also an emotional guarantee for entrepreneurial activities. Table 3 shows the results of empirical analysis of corporate policies and corporate strategies.

Variable	Scale expansion	International expansion
Corporate funding	0.146	0.183
Corporate education	0.138	0.219
Business environment	0.124	0.114
Type of economy	0.331	0.245

Table 3. Empirical Analysis of Enterprise Policy and Entrepreneurship Strategy

The relative trade advantage index and market competitiveness index between China and Central and Eastern European countries reflect the advantages and disadvantages of various products in China and Central and Eastern European countries from the perspective of product competitiveness and market competitiveness. The results of the competitive analysis fully show that China has a sure foundation for cooperation with Central and Eastern European countries, and there should not be too many competitive concerns. If the "One Belt, One Road" strategy is developed smoothly, China can shift the focus of foreign trade to the Asia-European continent. Form a close-knit, trade-friendly partner. Expanding emerging trade targets and trade zones will help strengthen the links between China and Central and Eastern European countries and the European Union. Optimize the internal economic structure and expand new trading partners and trade relations [23]. Reduce the trade restrictions of the United States, South Korea, and other countries in our country. Based on the deep dependence of the Central and Eastern European countries on the EU and the fact that they have not formed a vital position in the EU countries, the Central and Eastern European countries need to seek new foreign economic and trade partners actively. This coincides with China's implementation of the "one belt and one way" strategy. Intelligent optimization processes for economic analysis and management in Central and Eastern Europe are shown in Figure 5.

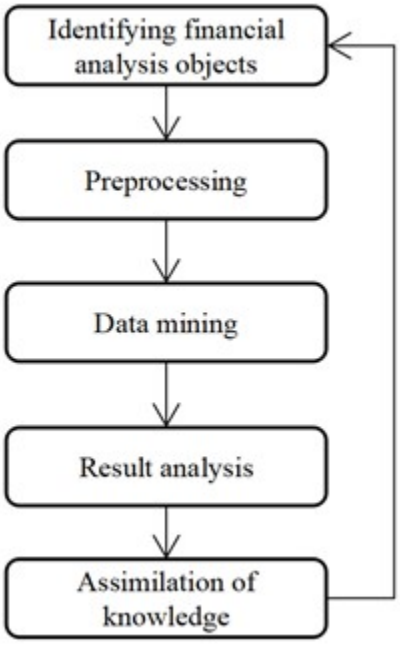

Figure 5. Intelligent optimization process in economic analysis and management

For trade imbalances, China can also provide more preferential trade policies to Central and Eastern European countries. Encourage them to increase their exports to China, and encourage Chinese outstanding enterprises to invest in Central and Eastern Europe. Fix connection weights and thresholds:

$$Y_i = \alpha + \sum_{j=1}^{k} \beta_j \cdot X_{ji} \tag{8}$$

By actively providing differentiated products, enterprises can weaken price competition and gain monopoly profits and market power. Calculate the average increment and initial exponential smoothing value for each period in two cycles as shown in the formula:

$$F(x) = 1 / \sum (x_i - x_i^0)^2 \tag{9}$$

Indicators that measure market structure by market share, concentration, etc. reflect the size of market power. Estimate the price cost of the enterprise based on the output elasticity of the factor, and then get the Lerner index:

$$P_i = \frac{f_i}{\sum_{i=1}^{N} f_i} \tag{10}$$

On this basis, using the share of various products as a weight, the complementary index is aggregated, and finally the comprehensive trade complementarity index of the two countries is obtained. As shown in Table 4.

SITC	2009	2011	2013	2015	2017
0	0.43	0.42	0.47	0.49	0.51
1	0.17	0.16	0.21	0.13	0.11
2	0.13	0.22	0.17	0.15	0.16
3	0.12	0.17	0.26	0.24	0.21

Table 4. Trade Complementarity Index between China and Central and Eastern European Countries

Based on the perspective of agricultural economic and trade cooperation, this paper explores China's cooperation policy with it. As well as exploring the competitiveness and complementarity of China and the Central and Eastern European countries in fruit and vegetable market, it is concluded that China has relative comparative advantages in fruit and vegetable market, and the overall level of China and the Central and Eastern European countries belong to the relationship of competition. Innovation-driven economies scored higher on entrepreneurship policies than investment-driven economies. This is mainly due to the higher level of economic development driven by innovation, the more perfect policy system and the higher allocation efficiency of entrepreneurial resources. Figure 6 is a conceptual model of the impact mechanism of entrepreneurship policy on entrepreneurship behavior.

Except for the difference in competitive advantage caused by the difference in factor endowments between China and Central and Eastern European countries. It lies in the distance between the two places, the market of the major trading countries of the country is different, and the level of economic development is somewhat different. China and Central and Eastern European countries are highly complementary on the basis of comparative advantage. The economic development levels of the countries in Central and Eastern Europe are not consistent. Some countries have entered the unified economic and trade zone of the euro, and some are still at a low level of development. Therefore, each country has its own development appeal. Central and Eastern European countries have gradually formed their own distinctive cultural, religious and political models in the

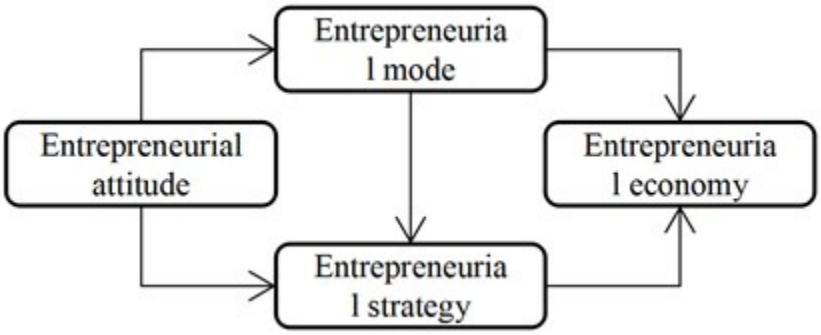

Figure 6. Conceptual model of the impact mechanism of entrepreneurial policy on entrepreneurial entrepreneurial behavior

long-term historical development, and there are great differences among countries. Eastern Europe and China have deep exchange partners with foreign trade relations, and can try to expand new trade industries and find the demands that both countries need. China has made full exchanges between the two countries in the process of trade docking in Central and Eastern Europe, avoiding the fact that trade is too focused on the regional trade imbalance caused by a certain country.

4. Conclusions

This paper adopts product relative trade index, export market similarity index, bilateral trade comprehensive complementarity index and trade density index. Using historical trade data, the gravitational model is used to analyze the potential of cooperation and growth of China with these countries. It may provide possible suggestions for China's future expansion of trade with Central and Eastern European countries. While attaching importance to the old trading partners of Central and Eastern Europe, the potential of new partners should be continuously developed. It is necessary to fully understand the importance of the Central and Eastern European markets to the Chinese market. China's trade competitiveness with Central and Eastern European countries is far less than complementarity. Under the background of the "Belt and Road", Central and Eastern European countries are an important part of China's trade development to the west. Although the two sides are far away, the government departments must promote Chinese goods in Central and Eastern European countries through trade fairs and other means to promote trade between the two sides. For land fallow, the main aspects to be considered are the local population, the demand for grain production and the development of agricultural science and technology. These are essential aspects to be taken into account in the implementation of the local fallow farming system. We should earnestly convey the value and significance of the "one belt and one way" strategy so that all countries worldwide can understand the essential connotation of "one belt and one road" and reduce Western countries' misunderstanding of our country. To ensure that foreign trade policies can be carried out smoothly and lay a good foundation for cultural exchanges between China and Central and Eastern European countries in the new trade era.

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