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The Potential and Efficiency of Aquatic Product Trade between China and South Korea

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Abstract

Purpose – This paper assesses the trade potential and efficiency of Korea and China in the aquatic products trade. Trade efficiency and potential are the main factors that affect the growth of a country's trade. In this study, a time-varying stochastic frontier trade gravity model was constructed to analyze the trade potential and efficiency between Korea and China. By integrating the results of trade theory and empirical analysis, measures and suggestions were proposed to encourage the release of trade potential of fish exports between Korea and China.

Design/methodology – In this paper, GDP per capita instead of economic size was chosen as an explanatory variable, and population size and relative distance were selected as explanatory variables to measure trade potential. For trade non-efficiency terms, regional organizations, political factors, and economic factors were mainly considered, and variables such as free trade agreements, political stability, regulatory quality, government efficiency, currency freedom, investment freedom, financial freedom, and trade freedom were selected. Panel data for South Korea and 14 aquatic products trading partners (including China) from 2002 to 2020 were used in the empirical analysis.

Findings – In the past 19 years, South Korea's export trade potential of aquatic products to China has never been lower than 70%. It was above 90% from 2006 to 2018, and has been at a high level for a long time. This shows that China's aquatic product market has large potential for development.

Originality/value – This study examines the effectiveness and potential of South Korea's exports of aquatic items to China in a methodical and comprehensive empirical manner. The evaluation of the export trade potential of South Korea's aquatic goods to China is more precise when the effects of regional organization, political, and economic variables are taken into account in the trade non-efficiency term of the stochastic frontier gravity model. At the same time, we propose to increase the scale of South Korea's aquatic products trade from the perspective of China's demand. This issue of trade studies is underexplored both empirically and in theory, although the issue has long been important to Korean and world trade.

Keywords: Aquatic Products, Sino-Korea Trade, Trade Potential, Trade Efficiency
JEL Classifications: F14, O53

1. Introduction

Trade potential refers to the maximum flow that trade can achieve without trade resistance and free trade conditions (Armstrong, 2007). Trade efficiency is used to describe the difference between true trade value and trade potential due to trade resistance (Ravishankar and Stack, 2014). Trade efficiency is the ratio of actual trade level to trade potential, which is an exponential function of trade inefficiency (Doanh, Truong and Heo, 2022). When trade inefficiency occurs, trade efficiency is a positive number less than 1. Higher values represent higher current trade efficiency, while lower values represent greater future trade potential

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(Svanidze and Götz, 2019). Both trade efficiency and trade potential can be measured using stochastic frontier methods (Meeusen and Broeck, 1977; Battese and Corra, 1977; Aigner, Lovell, and Schmidt, 1977). Although trade efficiency is directly related to trade potential, it is still necessary to obtain specific trade potential values to judge the extent to which future trade potential can be improved (Ravishankar and Stack, 2014; Svanidze and Götz, 2019).

Since 2001, the scale of trade in aquatic products between China and South Korea has generally maintained an upward trend. China is South Korea's largest aquatic product trading partner, largest source of imports, and second largest exporter. After Japan and the United States, South Korea is China's third largest trading partner in terms of the import and export of aquatic products (Yang and Zhang, 2015).

In 2014, trade in aquatic products between China and South Korea began to recover. In 2016, the trade volume of aquatic products between South Korea and China was $1.595 billion US dollars, of which the export value was $162 million US dollars and the import value was $1.433 billion US dollars. The scale of trade has grown rapidly over the past decade.

Fig. 1. China and South Korea's Aquatic Products Import and Export Trade Scale from 2016-2021 (Unit: Billion, US Dollars)

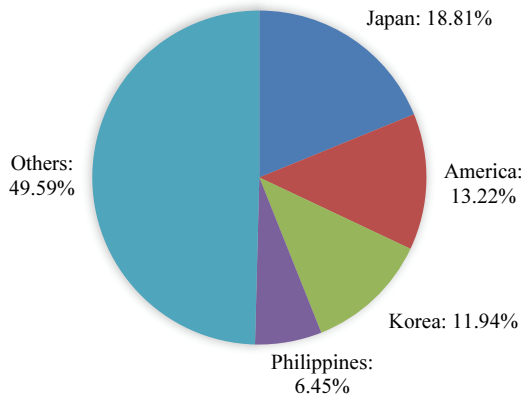
Source: Authors' calculation using UN Comtrade data.

In 2021, China's aquatic products were mainly exported to Japan, the United States, South Korea, the Philippines, and other countries. Among these, South Korea is the third largest exporter of Chinese aquatic products, accounting for 11.94%.

The import and export of aquatic products has long occupied an important position in the economic exchanges between the two countries. However, in recent years, trade growth has fluctuated greatly, and negative trade growth has even appeared. The signing of the China-South Korea Free Trade Agreement has also been hindered by ultra-sensitive tax items such as aquatic products. These indicate that there is still considerable resistance in the trade of aquatic products between the two countries (Miao et al., 2021). In December of 2015, the China-Korea Free Trade Agreement, which was drafted over many years, came into effect. In China's product concession list, the overall tariff level of aquatic products reaches about 10%. In South Korea's concession list, there are only 13 types of tariff adjustment related to aquatic

products, and the import tariff of aquatic products can be adjusted to a minimum of 20%. This shows that South Korea still has relatively large obstacles in importing aquatic products from China. Strict non-tariff barriers between China and South Korea have inhibited the expansion of the bilateral aquatic product import and export trade to a certain extent (Jung and Ko, 2018).

Fig. 2. China's Major Aquatic Product Exporters of in 2021



Source: Authors' calculation using the CHN National Bureau of Statistics.

A timely, comprehensive, and in-depth measurement of the trade potential and trade efficiency of aquatic products between China and South Korea will help to further improve the degree of liberalization in the aquatic product trade and promote the healthy and orderly implementation of the China-South Korea Free Trade Agreement. It is of great significance to expand the creativity of aquatic product exports and promote the growth of the Sino-Korea import and export trade of aquatic products.

2. Literature Review

Tinbergen (1962) and Poyhonen (1963) were the first to organically combine the gravity model with international trade. Linnemann (1967) added human factors to the gravity model for the first time, including population size and trade policy, which not only explained the potential of both sides of the trade, but also explained the impact of different factors on trade potential. Houcine (2008) pointed out that the former GCC reached its full trade potential between 1993 and 1996, while the newly established GCC eliminated non-tariff barriers, established common standards, and created a regulatory system while eliminating tariffs, creating more trade opportunities. Nazia and Hafiz (2011) estimated Pakistan's trade potential through a gravity model, and found that there was huge trade potential between Pakistan and other members of the South Asian Association for Regional Cooperation and the Economic Cooperation Organization. Luca and Claudio (2011) found that when a gravity model is estimated by dynamic parameters rather than static parameters, the corrected error results obtained by regression are closer to historical values; the average potential index

cannot represent the distribution of annual trade potential. Mohamed and Ayman (2014) found that GDP had a positive impact on agricultural exports and imports, and the distance between Egypt and the target country had a negative impact. Niti and Rinku (2015) empirically examined the impact of two regional trade agreements (SAFTA and APTA) on Indian agricultural exports, arguing for import and export labor force participation rate, economic size, trade openness (importing country economy) and regional trade agreements. Atif et al. (2019) believed that tariff barriers had a great hindering effect on the export of Pakistani chemical products. Pakistan still has great potential for trade in chemical products with the Middle East and EU.

Regarding research on the trade of aquatic products in South Korea, scholars mostly focus on trade relations between South Korea and Japan, China, Australia, and other countries. Shao (2013) studied the changing trend of the aquatic product trade scale between China and South Korea, and found that the increasing market demand of importing countries is the fundamental reason for the expansion of the aquatic product trade scale.

However, few existing studies have measured the efficiency and potential of the aquatic product trade between China and South Korea. Therefore, combined with the bilateral trade and aquatic product trade between China and South Korea, this paper uses a stochastic frontier gravity model to measure the efficiency and potential of the China-South Korea aquatic product trade from 2002 to 2020, and analyzes the influencing factors of the aquatic product trade.

3. Methodology

3.1. Model

Before measuring the efficiency and trade potential of the aquatic products trade between South Korea and China, it is necessary to expand on the basis of the original trade gravity equation function, select appropriate explanatory variables, and explain the variables (Svanidze and Götz, 2019).

Factor endowment theory states that the difference in the supply, demand, and price of production factors of commodities produced by countries promotes the development of international trade (Maslak et al., 2020; Ragland et al., 2015; Erickson and Hayward, 1992). Location analysis method explains the importance of geography; industrial sectors are sometimes limited to a certain geographical range, and transportation costs and other reasons hinder the free flow of products (Tierney et al., 2019). FTA reflects regional economic integration, which can eliminate trade barriers between countries in a certain region, simplify trade terms and procedures, and promote the free flow of commodities in the region, so as to promote the full flow of resources and more efficient allocation (Stoyanov, 2009; Juust, et al., 2021).

According to the above theoretical analysis, GDP per capita instead of economic size was chosen as an explanatory variable, and population size and relative distance were selected as explanatory variables to measure trade potential (Tinbergen, 1962; Armstrong, 2007). For trade non-efficiency terms, regional organizations, political factors, and economic factors were mainly considered, and variables such as free trade agreements, political stability, regulatory quality, government efficiency, currency freedom, investment freedom, financial freedom, and trade freedom were selected (Niti and Rinku, 2015; Nguyen, 2022). With this,

the equations below were constructed.

$$\ln EXP_{ijt} = \beta_0 + \beta_1 \ln PGDP_{it} + \beta_2 \ln PGDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln DIS_{ij} + v_{ijt} - u_{ijt} \quad (1)$$

$$u_{ijt} = a_0 + a_1 FTA_{ijt} + a_2 STA_{jt} + a_3 REG_{jt} + a_4 Gov_{jt} + a_5 MON_{jt} + a_6 IF_{jt} + a_7 FIN_{jt} + a_8 TF_{jt} + \varepsilon_{ijt} \quad (2)$$

EXPijt is the total amount of aquatic products exported from country *i* to country *j* in period *t*. *PGDPit* and *PGDPjt* represent the per capita economic size of country *i* and country *j* in period *t*, respectively. GDP per capita reflects the economic strength of a country. The stronger the economic strength of the exporting country, the stronger the export supply capacity (Ravishankar and Stack, 2014). The stronger the economic strength of the importing country, the stronger the purchasing power and greater the import demand (Atif, Haiyun, and Mahmood, 2017). This has a positive effect, so the expected coefficient is positive.

POPit and *POPjt* represent the population size of country *i* and country *j* in period *t*, respectively. Unlike economic size, population size has the opposite effect on export trade volume in exporting and importing countries. The larger the population of the exporting country, the greater domestic demand, and thus a weaker export supply capacity (Nguyen, 2022). The larger the population of the importing country, the greater the gap between domestic supply and demand, generating a greater import demand. The expected coefficient of the exporting country's population size is negative, and positive for the importing country (Atif, Haiyun, and Mahmood, 2017; Park and Cho, 2021).

DISij represents the relative distance between country *i* and country *j*. In this paper, the relative distance between the two countries refers to the shortest air route distance between the capitals of the two countries. The distance between the two countries will affect the transportation cost to a certain extent, transportation cost will affect trade cost, and trade cost is the main factor affecting trade potential, so transportation distance will affect trade potential. The expected coefficient is negative (Atif, Haiyun, and Mahmood, 2017; Svanidze and Götz, 2019).

In the trade inefficiency formula, *FTAijt* indicates whether country *i* and country *j* sign a free trade agreement in period *t*. It is also a dummy variable, which takes a value of 1 if it has been signed, and 0 otherwise.

STAjt, *REGjt* and *Govjt* represent the political stability, regulatory quality, and government effectiveness of country *j*, respectively. The pros and cons of the three are evaluated by scoring, and the score range is (-2.5, 2.5). The three indicators evaluate the ability of a country's politics (Keat, 2008; Hasan, 2015). The higher the score, the better the domestic political environment of a country, and the higher the level of governance (Hasan, 2015).

MONjt, *IFjt*, *FINjt* and *TFjt* represent the monetary freedom, investment freedom, financial freedom, and trade freedom of country *j* in period *t*, respectively.

3.2. Data Collection

The selected research objects are countries with the highest export value of Korean aquatic products in the United Nations Commodity Trade Database. The selected trading partner countries are the United States, Canada, the Philippines, Indonesia, Vietnam, Thailand, China, Japan, Russia, Chile, Denmark, Argentina, New Zealand, and Spain, a total of 14 countries. These countries were chosen mainly because of the comparability of countries with

a large trade volume of seafood products in Korea.

The export trade value of South Korea's aquatic products to each partner country is from the United Nations Commodity Trade Database, based on SITC codes. Data on per capita GDP (current US dollars) and total population come from the World Bank database. The shortest route distance data between the two capitals was taken from the Distance Calculator website. The information on whether a free trade agreement between the two countries was signed comes from the China Free Trade Zone Service Network. Data on political stability, regulatory quality, and government effectiveness were obtained from the World Bank Global Governance Database. Based on the availability of data on the seafood trade between Korea and other nations, the measurement time span is 2002 to 2020, a total of 19 years, and the above total 266 observations.

3.3. Model Test

In order to determine the rationality of the function formulation of the stochastic frontier gravity model mentioned above, it is necessary to conduct a hypothetical test on the model before calculating trade potential. Two tests were set: if (1) there is a test of trade inefficiency, and whether (2) to introduce the test for the population variables. The test results are shown in Table 1.

Table 1. Hypothetical Test Results of the Stochastic Frontier Gravity Model

Null Hypothesis	Constraint Model	Unconstrained Model	LR Statistic	1% Threshold	Result
There is no trade inefficiency term.	195.62	199.34	34.51	12.03	Refuse
No demographic variables are introduced.	199.62	199.34	18.95	9.52	Refuse

As can be seen in Table 1, Hypothesis 1 rejects the null hypothesis; that is, there is a trade inefficiency term in the model. Hypothesis 2 rejects the null hypothesis, and the population variable is also included in the model function. Therefore, the model setting is reasonable, and the final model function formula is:

$$\begin{aligned}\ln EXP_{ijt} = {} & \beta_0 + \beta_1 \ln PGDP_{it} + \beta_2 \ln PGDP_{jt} + \beta_3 \ln POP_{it} \\ & + \beta_4 \ln POP_{jt} + \beta_5 \ln DIS_{ij} + v_{ijt} \\ & - (a_0 + a_1 FTA_{ijt} + a_2 STA_{jt} + a_3 REG_{jt} + a_4 Gov_{jt} + a_5 MON_{jt} \\ & + a_6 IF_{jt} + a_7 FIN_{jt} + a_8 TF_{jt} + \varepsilon_{ijt})\end{aligned} \tag{3}$$

4. Results and Discussion

Based on South Korea's export data on aquatic products to 14 major trading partners, including China, from 2002 to 2020, this study utilized logarithmic GDP per capita, population size, relative distance data, and trade non-efficiency items. Variable data were estimated via Frontier 4.1.

4.1. Model Estimation

It can be seen in Table 2 that the per capita GDP coefficients of South Korea and its trading partners are 0.726 and 0.537, respectively, both of which are significant at the 1% statistical level. Both are positive, as expected. This shows that the stronger the economic strength of Korea and its trading partners, the more it is able to promote the export of Korean aquatic products. However, the action mechanisms of the two on the export of aquatic products are different. The stronger the economic strength of South Korea, the stronger the export and supply capacity of aquatic products. The stronger the economic strength of the partner country, the stronger the national purchasing power and the greater the import demand for aquatic products. The coefficient of South Korea's per capita GDP is larger than that of partner countries, indicating that South Korea's per capita GDP has a greater role in promoting aquatic product exports than partner countries.

Table 2. Estimation Results of the Stochastic Frontier Gravity Model

Variable	Coefficient	t-statistic
β0	28.624***	6.958
lnPGDPi	0.726***	10.625
lnPGDPj	0.537***	9.362
lnPOPi	-0.268***	-4.628
lnPOPj	0.695***	18.524
lnDISij	-0.268***	-11.063
α0	0.805**	3.574
FTAij	-0.103**	-4.203
STAj	-0.016	-1.517
REGj	0.116**	3.326
Govj	-0.145**	-2.856
MONj	-0.011**	-3.084
IFj	0.002*	2.364
FINj	0.004**	5.629
TFj	0.001	0.574
δ2	0.028***	10.326
γ	0.886***	9.635
Log Likelihood	88.642	
LR Test	184.578***	

The population size coefficient of South Korea is -0.268, which is significant at the 1% statistical level, and the coefficient is negative, which is in line with expectations. A negative coefficient indicates that an increase in the population of South Korea will have an inhibitory effect on the export of aquatic products. An increase in South Korea's population will lead to an increase in domestic demand for aquatic products, which will reduce the export supply to a certain extent. The population size coefficient of trading partners is 0.695, which is also significant at the 1% statistical level, and the coefficient is positive, which is in line with expectations. A positive coefficient indicates that an expansion in population of a partner country will promote the export of Korean fishery products. This is because an increase in

the populations of partner countries will lead to an increase in domestic demand for aquatic products, resulting in a larger gap between domestic supply and domestic demand, and an increase in import demand. This will promote the export of Korean aquatic products to a certain extent. The absolute value of South Korea's population size coefficient is greater than that of partner countries, indicating that an increase in South Korea's population has a greater inhibitory effect on the export of aquatic products than an increase in partner country population on the promotion of South Korea's aquatic product exports.

The relative distance coefficient is -0.268, which is significant at the 1% statistical level, and the coefficient is negative, as expected. A negative coefficient means a greater distance between the two countries, and a smaller export volume. Because distance affects transportation costs to a certain extent, increasing distances will lead to increased transportation costs, and may lead to increased trade risks.

The γ coefficient of the trade inefficiency item is 0.886, which means that the trade inefficiency item has a significant impact on the aquatic product trade. Since the coefficient of the trade inefficiency term is negative, this effect is negative.

The regional organization factor FTA coefficient was -0.103, which was significant at the 5% statistical level. A negative coefficient indicates that FTA is negatively correlated with the non-efficiency term of trade; that is, the signing of a free trade agreement has a promoting effect on the export of Korean aquatic products.

The political factor STA coefficient is -0.016, but only has weak significance, indicating that political stability is not the main factor affecting China's aquatic product exports to trading partners. The REG and Gov coefficients were 0.116 and -0.145, respectively, which were both significant at the 5% statistical level. The coefficients of the political stability and government efficiency of the trading partner country were negative, indicating that the political stability of the trading partner country is negatively correlated with the government effectiveness and trade non-efficiency term. The quality coefficient of government supervision is positive, which is positively related to the inefficiency of trade. That is, the higher the supervision quality of the trading partner country, the less conducive it is to the export of Korean aquatic products.

The MON coefficient of the economic factor is -0.011, which is significant at the 5% statistical level, and is negatively correlated with the non-efficiency term of trade. That is, the higher the currency freedom of the trading partner country, the more favorable it is for the export of Korean fishery products.

The IF and FIN coefficients are 0.002 and 0.004, respectively, which are significant at the 10% and 5% statistical levels, respectively, and are both positively correlated with the trade inefficiency; that is, the higher the investment freedom and financial freedom of trading partners, the more hindering it is to China's export of aquatic products. The TF coefficient is 0.001, which is only weakly significant, so the degree of trade freedom is not the main factor affecting South Korea's exports of aquatic products to trading partners.

4.2. Trade Efficiency and Trade Potential

The coefficients estimated by the model are brought into the model function. Combining the data on per capita GDP, population size, relative distance, and trade inefficiency between South Korea and 14 major trading partners in 2020, the trade potential ranking of the 14 partner countries in 2020 was obtained, as shown in Table 3

Table 3. Trade Potential Ranking of Aquatic Products between South Korea and 14 Major Partner Countries in 2020 (Unit: USD million)

Rank	Country	Trade Volume (Real Value)	Trade Value (Analog Value)	Trade Efficiency	Untapped Potential
6	America	8635	49907	0.1730	0.8270
13	Japan	11203	22845	0.4904	0.5096
4	China	5526	37448	0.1476	0.8524
1	New Zealand	1123	13121	0.0856	0.9144
2	Spain	846	6408	0.1320	0.8680
3	Russia	2026	14005	0.1447	0.8553
5	Denmark	1016	6197	0.1640	0.8360
8	Canada	1264	6877	0.1838	0.8162
9	Chile	896	3963	0.2261	0.7739
7	Indonesia	2352	12870	0.1828	0.8172
11	Philippine	1962	7641	0.2568	0.7432
10	Argentina	1162	4600	0.2526	0.7474
12	Thailand	3362	8236	0.4082	0.5918
14	Vietnam	5548	7082	0.7834	0.2166

Note: 1. Trade efficiency = actual value / analog value
2. Untapped potential = 1-Trade efficiency

In <Table 3>, it can be seen that among the 14 trading partner countries, 8 countries have trade potentials higher than 80%, 5 countries are above 50%, and 1 country is higher than 20%. The top three countries with untapped potential are New Zealand, Spain, and Russia, with untapped potentials of 91.44%, 86.80% and 85.53%, respectively.

The relative distance between these three countries and South Korea is large, and South Korea has not signed free trade agreements with Spain and Russia. As a Pacific island nation, New Zealand is rich in aquatic resources. New Zealand's annual fish catch is 600,000 tons, of which 85% to 90% is exported. Spain is close to the ocean, so fish resources are also very rich. There are more than 450 kinds of fish in the Mediterranean Sea. Spain is Europe's largest export market for aquatic products. Spain is the world's number one exporter of canned and semi-finished seafood. Russia's seafood exports accounted for 3% of global exports, ranking tenth. All three have abundant aquatic product resources. However, their aquatic product trade with South Korea is hindered by factors such as relative distance, the signing of free trade agreements, political stability, trade freedom, regulatory quality, and government effectiveness, resulting in low trade efficiency. For these aquatic product trading partners with huge trade potentials, South Korea should actively explore its domestic aquatic product import needs, and release untapped trade potential through various means.

The last country in the ranking is Vietnam, and untapped potential with South Korea is about 21.66%, which means that the trade efficiency of aquatic products between the two countries is relatively high. South Korea needs to enhance trade between the two in other goods, and improve its trade efficiency while unlocking its existing potential.

The untapped potential of South Korea’s export trade of aquatic products to China is about 85.24%, ranking 4th. This shows that South Korea’s export trade efficiency of aquatic products to China is low. South Korea needs to further explore and understand China’s

domestic aquatic product import needs. It can unleash the potential of aquatic product trade between the two countries by adjusting the export structure of aquatic products to South Korea.

In order to more accurately understand the export trade potential of South Korea's aquatic products to China, the coefficients estimated by the model were introduced into the model function, combining the data from 2002 to 2020 in Korea and China per capita GDP, population size, relative distance, and trade inefficiency. Table 4 shows the untapped potential of South Korea's export of aquatic products to China from 2002 to 2020.

Table 4. Export Potential of South Korea's Aquatic Products to China from 2002 to 2020

(Unit: USD million)

Year	Trade Volume (Real Value)	Trade Value (Analog Originality)	Trade Efficiency	Untapped Potential
2002	723	3388	0.2134	0.7866
2003	716	4218	0.1697	0.8303
2004	695	5436	0.1279	0.8721
2005	716	7065	0.1013	0.8987
2006	753	9001	0.0837	0.9163
2007	1065	11917	0.0894	0.9106
2008	1185	13432	0.0882	0.9118
2009	1262	13348	0.0945	0.9055
2010	1562	17319	0.0902	0.9098
2011	1715	21540	0.0796	0.9204
2012	1816	23533	0.0772	0.9228
2013	1892	26349	0.0718	0.9282
2014	1862	29059	0.0641	0.9359
2015	1688	29312	0.0576	0.9424
2016	1595	29360	0.0543	0.9457
2017	2069	32275	0.0641	0.9359
2018	2236	35842	0.0624	0.9376
2019	3584	33627	0.1066	0.8934
2020	5526	37448	0.1476	0.8524

It can be seen in Table 4 that the overall trade potential of South Korea's aquatic products with China have shown an expanding trend. In 2002, the unexploited potential of South Korea's export trade of aquatic products to China was 78.66%. In 2003, unexploited potential was the lowest, at about 83.03%. In 2016, unexploited potential reached its peak at 94.57%. It decreased by 2020, with the untapped potential at 85.24%. In 2015, China and South Korea signed a free trade agreement, which improved the efficiency of South Korea's export of aquatic products to China. In 19 years, South Korea's export trade potential of aquatic products to China has never been lower than 70%. It was above 90% from 2006 to 2018, and has been at a high level for a long time. This shows that China's aquatic product market has space for development.

4.3. Suggestions

From the above analysis, we can see that South Korea has huge potential for exporting aquatic products to China, and there is an expanding trend. Among the 14 trading partner countries, China ranks fourth in terms of trade potential of aquatic products with South Korea, and has great potential advantages. The untapped potential of the Korea-China seafood trade is 85.24%. In the past 20 years, the export trade potential of South Korea's aquatic products to China has not been lower than 70%. This is a huge potential market. Faced with such a market, South Korea needs to actively explore methods to release its potential through various means.

First, communication between the Chinese and Korean governments should be strengthened. In order to promote the release of the aquatic product trade potential between China and South Korea, South Korea should establish good political relations with the Chinese government (Jung & Ko, 2018). On one hand, communication between the leaders of the two countries and high-level governments can enhance mutual political trust between the two countries, and promote the further development of the political relations. It also enable the two to deal with disputes and friction arising from trade in a more harmonious and rational manner. It will not only help to solve the problem quickly but also enhance the sense of trust (Kim & Lee, 2017). Regional economic cooperation has become a new feature of world trade development. It can promote the development of aquatic product trade between China and South Korea, and enhance the international competitiveness of aquatic products between China and South Korea.

Second, South Korea should fully grasp the needs of China's domestic market. Only when South Korea's export structure matches China's import demand structure can it effectively promote the growth of South Korea's aquatic product exports to China, thereby promoting the release of South Korea's export trade potential of aquatic products to China (Atif et al., 2019). Compared with South Korea, China is rich in land and labor resources, but lacks capital. According to factor endowment theory, South Korea should export labor-rich aquatic products, such as seaweed, tuna, oysters, and flounder. In addition, over the past few years, COVID-19 has driven a sharp increase in the demand for fast food, and fish cakes have become the main export product of South Korea, so it can also become an important direction for the export of South Korean aquatic products (Miao, et al., 2021).

In addition, it is recommended that China and South Korea build an "Internet +" cross-border e-commerce platform to promote the convenience and timeliness of the aquatic product trade. Cross-border aquatic product e-commerce has become a new development hotspot in the field of fishery (Miao, et al., 2021). Relevant departments should propose the building of a cross-border e-commerce platform for Sino-Korea cooperative aquatic products, and provide discounts for a certain period of time to companies or individuals from both sides that enter the platform. At the same time, the trade departments of the two countries must cooperate with the media for publicity, and establishe advertising alliances with well-known Chinese e-commerce companies Tmall and JD.com, as well as South Korea's popular search engine Naver. This will greatly promote the development of cross-border e-commerce between South Korea and China, and open a channel for cross-border trade for consumers and aquatic product companies.

5. Conclusion

This study examined the effectiveness and potential of South Korea's export trade of aquatic items to China in a methodical and comprehensive empirical manner. The evaluation of the export trade potential of South Korea's aquatic goods to China is more precise when the effects of regional organization, political, and economic variables are taken into account in the trade non-efficiency term of the stochastic frontier gravity model. The export trade of Korean aquatic goods to China has a trade potential of more than 80%, according to this empirical study of a stochastic frontier gravity model. In order to unleash the potential of South Korea's export trade of aquatic products to China, South Korea needs to strengthen communication with the Chinese government, fully grasp China's domestic import demand, build a cross-border e-commerce platform for the development of the China-South Korea aquatic product trade, and promote the convenience and timeliness of the aquatic product trade.

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