A Study on the Impact of Trade Facilitation Level in RCEP Member Countries on China's Export Potential

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ABSTRACT

This paper constructs a trade facilitation evaluation indicator system from four dimensions: port environment, customs efficiency, finance and e-commerce, and institutional environment, measures the trade facilitation level of RCEP member countries by using principal component analysis, and analyses the impact of trade facilitation level of RCEP member countries on China's export trade potential through the expanding gravitational model. The results show that the improvement of trade facilitation level can effectively stimulate China's export to RCEP members, the trade facilitation levels of import countries increase 1%, and China's export to them will increase by 6.3%. The population size of import countries also has a significant contribution to China's export potential. While the distance between the two countries and GDP of import countries are not significant.

Keywords: Trade facilitation, Trade potential, Principal component analysis, Gravity model, RCEP.

1. INTRODUCTION

With the development of economic globalization and global value chain, the level of trade facilitation has become a prominent factor affecting global trade and international competitiveness. Trade facilitation can affect the trade flow of the whole economy, which in turn affects production process, production factors and remuneration, and last affects government income and overall social welfare [1]. The Regional Comprehensive Economic Partnership Agreement (RCEP), which was first proposed by ASEAN, takes trade facilitation as the focus of negotiations. By implementing facilitation tools, reducing non-tariff barriers, lowering hidden costs caused by cumbersome procedures, complex processes, backward road facilities and other issues faced by member countries', RCEP further stimulates trade potential to promote economic growth of all member countries.

This paper analyses the trade facilitation level of RCEP member countries, and applies the gravity model to explore the impact of trade facilitation on China's exports, so as to put forward corresponding policy recommendations for better cooperation between China and other member countries in RCEP.

2. LITERATURE REVIEW

The establishment of RCEP marks the establishment of a free trade area with the largest population, the largest economic and trade scale and the greatest development potential in the world. In recent years, more and more attention has been focused on RCEP.

Zhang Jun and Zhan Jinyong (2018) used the GTAP model to analyse the economic effects of RCEP on major economies and found that RCEP could improve the GDP and trade of member countries [2]. Ahmed, YN et al. (2020) investigated the impact of RCEP on trade liberalisation between member countries and found that RCEP agreement had a positive impact on all member countries [3]. Wen, H et al. (2021) explored the impact of tariff reductions in RCEP on global value chains and found that tariff reductions in RCEP could strengthen the position and participation of member countries in global value chains in both short and long term [4]. Duan Hongbin and Lu Xishuai (2022) examined the impact of trade and investment

facilitation levels on trade efficiency in RCEP member countries, demonstrating that strengthening infrastructure development, improving customs and border management measures, and increasing the level of trade and investment facilitation could significantly improve the trade efficiency of both sides [5]. Fan, MY et al. (2022) constructed a trade gravity model to analyse the impact of green logistics performance of RCEP member countries on China's export trade, and the results showed that improving the green logistics performance of RCEP member countries can significantly boost China's export trade to RCEP member countries [6].

From the perspective of research content, the existing research mainly focuses on the economic effects and practical impacts of RCEP, and few studies are conducted from the perspective of trade facilitation. Therefore, this paper constructed a trade facilitation level indicator system, measured the trade facilitation level of RCEP member countries, and studied the impact of trade facilitation on China's export potential through expanding trade gravity model, which has a great significance for giving full play to the advantages of RCEP and expanding China's export trade scale.

3. MEASUREMENT OF TRADE FACILITATION LEVELS IN RCEP COUNTRIES

3.1 Construction of Indicator System

Wilson et al. (2003) selected port efficiency, customs environment, regulatory environment and e-commerce to build a trade facilitation indicator system, and used the weighted average method to empower indicators at all levels to measure the trade facilitation level of APEC member countries [7]. Zuo Ximei (2018) incorporated financial factor into evaluation system, and used the principal component analysis method to empower the selected indicators and measure the trade facilitation level of nine member countries in Shanghai Cooperation Organization (SCO) [8]. Duan Pingfang and Zhu Shanshan selected four first-level indicators: infrastructure and logistics quality, customs environment, regulatory environment, e-commerce and financial environment, and studied the constraints of trade facilitation in countries along the "the Belt and Road" based on the principal component analysis [9]. When building the trade facilitation indicator system, this paper mainly refers to the framework idea of Wilson (2003), and draws on the research of

other scholars, and finally selects four first-level indicators, namely port environment, customs efficiency, finance and e-commerce, and institutional environment. The indicator system is shown in "Table 1".

Table 1. Indicator system of trade facilitation level

First level	Second level
Port Environment	Railway Infrastructure Quality
	Road Infrastructure Quality
	Port Infrastructure Quality
	Aviation Infrastructure Quality
Customs Efficiency	Prevalence of NTBs
	Trade Tariff
	Complex Tariff
Finance & E-Commerce	Percentage of Internet Users
	Bank Robustness
	Fixed Broadband Users
Institutional Environment	Burden of Government Regulation
	Policy Transparency
	Strength of IPR Protection

3.2 Data Sources

The data are all from the Global Competitiveness Report (GCR) issued by the World Economic Forum (2019), and the value range for scoring is 1-7. Since Myanmar was not included in GCR 2019, resulting in the unavailability of Myanmar data, this paper focuses on 14 RCEP member countries except Myanmar.

3.3 Measurement of Trade Facilitation Levels

3.3.1 Determination of Indicator Weights

In this paper, principal component analysis was used to assign the weight to each indicator. First, the data were analysed by principal component analysis method using SPSS 26 software. From "Table 2" and "Figure 1", it can be seen that the inflection point of factor analysis is at the third factor, and the cumulative variance contribution rate of the first three principal components has reached 78.296%, which means three principal components need to be extracted.

Table 2. Explanation rate of total variance

| Components	Initial Eigenvalues			Sum Squares of Extracted Loads		
	Total	Variance Percentage	Cumulative %	Total	Variance Percentage	Cumulative %
1	6.189	47.607	47.607	6.189	47.607	47.607
2	2.502	19.245	66.852	2.502	19.245	66.852
3	1.488	11.444	78.296	1.488	11.444	78.296
4	0.899	6.917	85.212			
5	0.724	5.568	90.781			
6	0.413	3.181	93.961			
7	0.291	2.237	96.198			
8	0.224	1.724	97.922			
9	0.142	1.095	99.017			
10	0.093	0.718	99.735			
11	0.027	0.208	99.943			
12	0.006	0.043	99.986			
13	0.002	0.014	100			
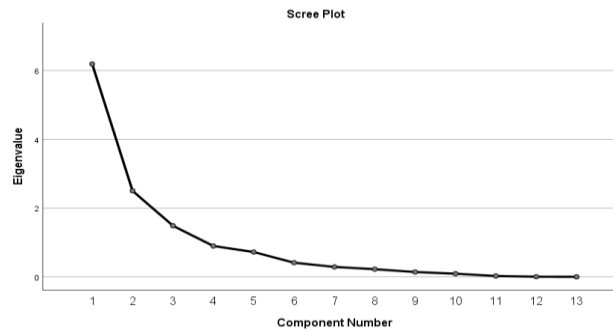
Figure 1 Factor analysis scree plot.

According to the load coefficient of each item in principal components, the load coefficient is divided by the square root of corresponding characteristic root, the linear combination coefficient matrix is obtained. The linear combination coefficient is multiplied by the variance interpretation rate and then accumulated, and divided by the cumulative variance interpretation rate, the comprehensive score coefficient is obtained (shown in "Table 3").

Table 3. Linear combination coefficient and overall score coefficient

Name	Components			Overall score coefficient
	1	2	3	
x11	0.295445	-0.24277	-0.09346	0.106311
x12	0.350917	-0.0354	0.03771	0.210181
x13	0.206209	-0.49249	-0.01722	0.001815
x14	0.140286	-0.4476	-0.15658	-0.04761
x21	0.327201	0.119486	0.245935	0.264267
x22	0.243592	0.409035	-0.02295	0.245298
x23	-0.01005	0.452025	-0.05902	0.096369
x31	0.308308	0.134659	-0.33775	0.171196
x32	0.300269	0.08029	0.399234	0.260664
x33	0.315946	-0.08851	-0.39432	0.112718
x41	0.168826	-0.12391	0.675501	0.170929
x42	0.343681	0.24972	-0.12461	0.252139
x43	0.359358	0.032242	0.005738	0.227267

The weights are calculated according to the score coefficients. Since the overall score coefficient has a negative value, the weights can be obtained first by translating, then summing and normalizing (shown in "Table 4").

Table 4. Normalized weight coefficients

Name	Weight
x11	0.073404
x12	0.080296
x13	0.066471
x14	0.063192
x21	0.083884
x22	0.082626
x23	0.072744
x31	0.077709
x32	0.083645
x33	0.073829
x41	0.077691
x42	0.08308
x43	0.081429

3.3.2 Ranking of Trade Facilitation Levels in RCEP Member Countries

According to the weights calculated above, the trade facilitation Index (TFI) and ranking of 14 RCEP member countries are obtained as shown in "Table 5".

Table 5. TFI and ranking of RCEP member countries

Country	TFI	Rank
Singapore	6.39	1
Japan	5.68	2
New Zealand	5.38	3
Korea	5.31	4
Australia	5.26	5
Malaysia	4.82	6
China	4.47	7
Brunei	4.24	8
Philippines	4.18	9
Thailand	3.98	10
Vietnam	3.94	11
Indonesia	3.90	12
Lao PDR	3.29	13
Cambodia	3.26	14

3.3.3 Result Analysis

The trade facilitation levels of non-ASEAN countries in RCEP member countries are higher than those of ASEAN countries. In the ranking of trade facilitation levels of RCEP member countries, the top five are Singapore, Japan, New Zealand, South Korea and Australia. Only Singapore is an ASEAN country, and the trade facilitation levels of ASEAN countries are generally lower. Among non-ASEAN countries, Japan has the highest level of trade facilitation and China has the lowest level, which also shows that China's trade facilitation level has great room for improvement.

4. IMPACT ANALYSIS

4.1 Model Setting

The idea behind the trade gravity model is derived from the physics law of gravity, which states that the trade volume between the two countries is in direct proportion to their total economic output, and is inversely proportional to the distance between them. The basic form of trade gravity model is:

$$lnX_{ij} = a_0 + a_1 lnY_i + a_2 lnY_j + a_3 lnD_{ij} + u_{ij} \quad (1)$$

Where X_{ij} is the export trade volume of country i to country j, Y_i is the GDP of country i, Y_j is the GDP of country j, D_{ij} is the distance between country i and country j, a_0 is the constant, u_{ij} is the random error, and a_1, a_2 and a_3 are all elasticity coefficients.

To better explain the economic phenomenon, other explanatory variables were subsequently added to the model, extending the form of gravity model. Linnemannn introduced the population variable into the model, arguing that the trade volume between two countries is proportional to the size of population, extending the trade gravity model as:

$$lnX_{ij} = a_0 + a_1 lnY_i + a_2 lnY_j + a_3 lnD_{ij} + a_4 lnP_i + a_5 lnP_j + u_{ij} \quad (2)$$

Where P_i and P_j are the populations of country i and j respectively, and a_4 and a_5 are both elasticity coefficients.

In order to study the impact of trade facilitation level on China's export to RCEP member countries, this paper introduces the trade facilitation level measured above into the extended gravity model, and the extended model is:

$$lnEXP_i = a_0 + a_1 lnGDP_i + a_2 lnPOP_i + a_3 lnDIS_i + a_4 TFI_i + u_i \qquad (3)$$

Where EXP_i is China's export to country i, GDP_i and POP_i are GDP and total population of country i respectively, DIS_i is the distance between the capital of country i and the capital of China, and TFI_i is the trade facilitation index of country i calculated above, a_0 is the constant, a_1, a_2, a_3 and a_4 are elasticity coefficients, and u_i is the random error.

4.2 Data Sources

Data of China's export to RCEP member countries are from China Commerce Yearbook (2019), GDP and total population of each RCEP member country are from World Bank database, and the distance between capital of China and capital of each RCEP member country is from CEPII database.

4.3 Regression Analyses

This paper uses Eviews software to conduct regression analysis on cross-sectional data between China and RCEP member countries through expanded gravity model. The measurement results are significant on the whole, and the regression results are shown in "Table 6".

Table 6. Regression results

Independent Variable	Regression Coefficient	T-statistic
a_0	-3.213	-0.109
lnGDP	-0.371	-0.917
lnPOP	0.69***	5.248
lnDIS	-0.297	-1.056
lnTFI	6.13**	2.541
R^2	0.922	

Regression results of the model are largely in line with theoretical expectations, the following empirical equation is as follows:

$$lnEXP_i = -3.213 - 0.371 lnGDP_i + 0.69 lnPOP_i - 0.297 lnDIS_i + 6.13 TFI_i \qquad (4)$$

It can be seen that the trade facilitation level in RCEP member countries has a significant impact on China's export potential. The trade facilitation levels of import countries increase 1%, China's export volume to them will increase by 6.3%. Therefore, taking corresponding measures to improve the trade facilitation levels of RCEP member countries is an important factor to promote China's export to other RCEP member countries, and this result is consistent with the expectation.

The population size of import countries also has a significant contribution to China's export potential. The population size reflects a country's population carrying capacity and demand potential, and the population of import countries increase 1%, China's export volume to them will increase by 0.69%.

The distance between the two countries has a certain hindrance to China's export potential. The geographical distance is related to the transportation cost. The larger the geographical distance is, the higher the fuel consumption and time cost will be.

While the estimated coefficient of GDP of import countries is negative, which is inconsistent with the expected results. The possible reasons are: on the one hand, GDP represents the economic scale of a country. The larger the GDP is, the more sufficient the conditions for domestic self-sufficiency are, which decline the import demand and limit China's export to other countries. On the other hand, affected by the international economic crisis, the economies of European and American countries are sluggish and the external demand is seriously insufficient, which has greatly restricted China's export.

However, the distance between the two countries and GDP of import countries are not significant, which shows that under the RCEP cooperation mechanism, geographical distance and GDP of import countries are not significant factors affecting export trade potential.

5. CONCLUSION

From the research results of trade facilitation level of RCEP member countries and its impact on China's export potential, we could find out that, the trade facilitation level of RCEP member countries varies greatly, and the performance of developed countries is better than that of developing countries.

The trade facilitation level of China is in the middle position among RCEP member countries. The trade facilitation level of RCEP member countries has a significant role in promoting China's trade export potential, so improving trade facilitation level of RCEP member countries is conducive to release China's export potential.

China could promote the development of trade facilitation by actively optimizing port environment, improving customs efficiency, expanding finance and e-commerce, and improving institutional environment. At the same time, China should actively increase economic and trade cooperation with RCEP member countries and improve trade facilitation conditions.

AUTHORS' CONTRIBUTIONS

Dan Liu wrote the manuscript, Lanxin Zhang and Hao Yang were responsible for data simulation and analysis, and Chun Wang contributed to revising and editing.

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