Analysis of Cross-border E-commerce Trade Facilitation Level of China and RCEP Member Countries

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Abstract. This paper takes the formal member countries of RCEP as the research object, combines the two aspects of trade facilitation and cross-border e-commerce, uses the trade facilitation index system, the Global Competitiveness Report (GCR), TI Transparency International and other scoring standards, and uses SPSS software to carry out principal component analysis on the score, and measures the comprehensive level of cross-border e-commerce trade facilitation in China and other major member countries of RCEP. The results indicate that the development of trade facilitation in China is highly valued, so the level of trade facilitation is showing an upward trend. However, the trend is relatively slow and there are some issues that need to be noted. Among the formal members of RCEP, China's trade facilitation level is above average, and the development of cross-border e-commerce cannot do without the improvement of trade facilitation and further improvement of environmental regulations and other aspects.

Keywords: RCEP, Trade Facilitation, Cross-border E-commerce, Principal Component Analysis

1 Introduction

On June 2, 2023, the Regional Comprehensive Economic Partnership (RCEP) officially entered into force for the Philippines, marking the full entry into force of RCEP for the 10 ASEAN countries and 15 signatories including Australia, China, Japan, the Republic of Korea and New Zealand. It marks a new stage of full implementation of the free trade area with the largest population, the largest economic and trade scale and the greatest development potential in the world. From the perspective of trade, in 2022, the total import and export volume of China and other RCEP members will reach 12.95 trillion yuan, an increase of 7.5% year-on-year, accounting for 30.8% of China's total foreign trade import and export volume. From January to April 2023, the total import and export volume of China and other RCEP members was 4.12 trillion yuan, an increase of 7.3%, accounting for 30.9% of China's total foreign trade import and export volume.

In recent years, our country's signing of regional cooperation agreements has been accompanied by various trade sanctions. While traditional trade barriers are being lowered, new trade barriers are increasing. Cumbersome customs clearance procedures in some countries, incomplete infrastructure, backward science and technology and special national policies hinder the efficiency and smooth flow of international trade. Therefore, cross-border e-commerce stands out and becomes the leading path to promote trade facilitation.

2 Literature review

Early studies on trade facilitation focus on GTAP model and trade gravity model. Patrick A. Messerlin; Jamel Zarrouk (2000) used quantitative analysis of relevant regulations and customs regulations [1]. Robert C. Feenstra; Hong Ma (2014) measured trade facilitation through port efficiency and found that the improvement of port efficiency was conducive to the diversification of exports [2]. In the empirical study on the level of trade facilitation, Wilson, Mann and Otsuki (2003) first proposed an evaluation scheme for the development level of trade facilitation from the perspective of establishing comprehensive indicators. They took into account four first-level indicators, namely port efficiency, regulatory environment, customs management and e-commerce, and derived 12 second-level indicators. Establish a trade facilitation evaluation system [3]. However, Fu Shuyi (2021) uses Wilson's research as a framework, uses gravity model to subdivide and measure trade facilitation indicators, and studies the influencing factors of cross-border e-commerce in both high and non-high income countries in terms of trade facilitation [4]. Cosimo Beverelli; Simon Neumueller; Robert Teh (2015) estimates the impact of trade facilitation on export diversification, measured on two broad margins: the number of export products by destination and the number of export destinations by product [5].

Song Yingli (2021) cited the extended gravity model for empirical analysis and found that the level of trade facilitation has a significant positive correlation effect on China's cross-border e-commerce exports. Finally, based on the current situation of trade facilitation, suggestions for improvement are put forward to promote the sound development of cross-border e-commerce [6]. Xu Xiaoli (2021) established a regression model for the import and export amount of cross-border e-commerce by taking trade facilitation, government regulation, finance and e-commerce as core explanatory variables [7]. The research results show that China's trade facilitation level has an upward trend, and the improvement of trade facilitation level has a positive incentive effect on the development of e-commerce, and the improvement of China's trade facilitation level has a more obvious impact on China's cross-border e-commerce exports. He Guihe (2022) conducted an empirical study on the non-linear effects of trade facilitation on the development of cross-border e-commerce in China based on the provincial panel data from 2013 to 2020 and took the establishment time of pilot free trade zones as the threshold variable [8]. Zhang Jing (2022) took the cross-border e-commerce between China and the shelves along the "Belt and Road" as the research core, and applied GMM method to study the impact of trade facilitation on the development of cross-border e-commerce [9]. Sheng Bin and Jin Chenxin (2019) found that the inefficiency of border agency cooperation and import and export procedures among countries is the common problem of trade facilitation for countries along the Belt and Road [10]. Countries along the Belt and Road should strengthen trade facilitation cooperation and jointly enhance the overall level of regional trade facilitation.

Through the review of relevant literature at home and abroad, it is found that domestic and foreign scholars have fully studied trade facilitation and established a relatively complete evaluation and index system, which is mainly based on traditional international trade. At the same time, in recent years, the research on cross-border e-commerce has become more in-depth, mainly around the digital economy, logistics model, talent training and other aspects. However, there are relatively few measurements of cross-border e-commerce trade facilitation, especially for RCEP members.

3 Measurement of cross-border e-commerce trade facilitation levels between China and major RCEP member countries

3.1 Selection of indices

Based on previous relevant studies, the evaluation indicators of trade facilitation are fully understood, selected according to the current cross-border trade environment and trend, and the weight of each index of trade facilitation is calculated by the principal component analysis method. As the Regional Comprehensive Economic Partnership (RCEP) enters into force on January 1, 2022, this article will select 12 of the countries that have officially signed the contract (Myanmar is not included in the case due to too much missing data). Due to the short establishment time of RCEP and the early selection of empirical years, the results are only for comparison after the deepening implementation of RCEP in the next few years.

Based on the collation and summary of studies related to the measurement of trade facilitation, there are a wide range of factors affecting trade facilitation. International organizations and researchers usually define first-level indicators first, subdivide them into first-level indicators, select multiple second-level indicators, and measure trade facilitation more objectively and accurately through indicators with higher correlation as far as possible. Deng Changchun and Wang Lin (2021) selected five first-level indicators: infrastructure, customs environment, regulatory environment, e-commerce and financial services [11]. Wilson (2003) proposed four first-level indicators, which consider government regulation, port facilities, customs environment, and e-commerce and finance [3]. Due to the small number of research objects in this paper, the two are integrated, respectively, government regulation, infrastructure, customs environment, e-commerce (finance and telecommunications) (as table 1).

Table 1. Trade facilitation index system and score sources.

first-level index	second-level index	score interval	Data source
Government regulation	judicial independence	1-7	GCR
	Efficiency of the legal framework	1-7	GCR
	The burden of government regulations	1-7	GCR
	Advantages of Auditing and Reporting Standards	1-7	GCR
Infrastructure	Road quality	1-7	GCR
	Train efficiency	1-7	GCR
	Aviation efficiency	1-7	GCR
	Port efficiency	1-7	GCR
Customs Environment	Customs clearance efficiency	1-5	GCR
	Universality of non-tariff barriers	1-7	GCR
	Corruption Perception Index	1-100	TI

first-level index	second-level index	score interval	Data source
e-commerce (Financial, telecommuni-cations)	venture capital availability	1-7	GCR
	Bank soundness	1-7	GCR
	Fiber optic Internet subscription	1-100	GCR①

This paper mainly takes the RCEP member countries that have formally signed contracts as the research object to calculate their trade facilitation level. The main indicator reference source, the Global Competitiveness Report (GCR), has partially changed its indicators in 18 years, changing from 2020 to the special edition of post-epidemic economic recovery, and no longer statistics specific indicators and rankings. Therefore, this paper has made a choice in the selection of indicators, and uses SPSS 26 as a stage for analysis from 2017 to 2019.

3.2 Data processing

First of all, the data is described and statiscs-frequency, and all indicators can be selected to find the missing indicators. For some data published every two years, it is regarded as the mean value by default, for a few missing values, the index scores of the other two years are weighted to average, and for indicators with more missing values, conversion and recoding are carried out. And because the scoring range of each value is different, all the data are processed:

$$X_{IJ} = \frac{X_{ij} - X_{min}}{X_{max} - X_{min}} \tag{1}$$

In order to facilitate the calculation of the data, the deviation standardization is finally used to process the data in combination with several literatures to map the result value to [0-1], see equation (1) for an example, where the variable X_{ij} is introduced, X_{min} is the lower limit of the value and X_{max} is the upper limit of the value.

3.3 Trade facilitation indicators

Comprehensive score and weight.

The composite score is calculated by adding the product of variance explanation rate and component score (as table 2). Finally, the comprehensive score coefficient is normalized to get the weight value of each index.

Table 2. Comprehensive score and weight results.

first-level index	second-level index	Composite score	weights
Government regulation	judicial independence	0.1919	6.97%
	Efficiency of the legal framework	0.2002	7.27%
	The burden of government regulations	0.1391	5.05%
	Advantages of Auditing and Reporting Standards	0.1932	7.01%

① Data source: GCR Global Competitiveness Report, TI Transparency International

first-level index	second-level index	Composite score	weights
Infrastructure	Road quality	0.235	8.53%
	Train efficiency	0.261	9.48%
	Aviation efficiency	0.2379	8.64%
	Port efficiency	0.2413	8.76%
Customs Environment	Customs clearance efficiency	0.1712	6.22%
	Universality of non-tariff barriers	0.16	5.81%
	Corruption Perception Index	0.1907	6.92%
Electronic commerce (Financial, telecom)	venture capital availability	0.1868	6.78%
	Bank soundness	0.1133	4.12%
	Fiber optic Internet subscription	0.2322	8.43%

Data source: Based on the above calculations

In the first-level index of trade facilitation, it can be seen that infrastructure accounts for 35.4% of the weight, followed by government regulations 26.3%, customs regulations and e-commerce are 19% and 19.3%, respectively. From the secondary indicators, it can be seen that the weight of road quality, train efficiency, aviation efficiency, port efficiency, and the use of optical fiber Internet is more than 8%, while government regulations, non-tariff barriers, and the robustness of banks account for a relatively small proportion.

In summary, the four first-level indicators have a positive impact on the import and export of cross-border e-commerce. Among RCEP member states, the impact of infrastructure and government regulations is relatively greater, and customs clearance and e-commerce have great room for improvement.

Trade Facilitation Index.

The trade facilitation index is the sum of each weight multiplied by the standardized value of its corresponding indicator. The trade facilitation index calculated here is based on the establishment of this paper, and the major RCEP member countries are taken as the object and the relevant indicator data are calculated, which has certain limitations. The trade facilitation index is set as TFI and the calculation formula is as equation (2) :

$$TFI = \sum \left(Weight_x * X_{IJ} \right) \tag{2}$$

$$Weight_x, x \in (1,14)$$

$$Standardized\ values\ X_{IJ}, I, J \in (1,14)$$

The results are as follows:

Table 3. Trade Facilitation Score and ranking 2017-2019 (100 percent).

Nation	Year					
	2017		2018		2019	
	score	rank	score	rank	score	rank
Singapore	75.6	1	74.1	1	74.1	1
New zealand	68.1	2	66.3	2	64.4	3
Malaysia	64.5	3	63.9	3	64.6	2
Japan	60.2	4	61.4	4	63.2	4
Australia	57.4	5	58.1	5	58.2	5
China	56.4	6	56.9	6	57.7	6
Korea	49.7	8	50	7	52.2	7
Thailand	51.3	7	49.6	8	50.3	8
Laos	45.6	9	45	9	45.7	9
Vietnam	44.3	10	43.3	11	44.9	10
Brunei	43.8	11	43.7	10	44.9	11
Cambodia	40.5	12	40.4	12	43.4	12

Data source: Calculated by combining weights.

Through the establishment of trade facilitation evaluation system, the principal component analysis is used to determine the weight of each index, the basic income weight is used to calculate the level of trade facilitation. As table 3, on the whole, Singapore, New Zealand, Malaysia and Japan scored higher in trade facilitation, among which Singapore scored the highest. Laos, Vietnam, Brunei and Cambodia scored relatively low, while China's level of cross-border e-commerce trade facilitation remained low in 2017-2019, ranking in the middle.

According to the World Bank Doing Business Report 2020, the trade facilitation level of Singapore and New Zealand has increased on the whole, but the growth rate is small, because this paper only calculates a small number of indicators and may cause errors. The general score and ranking of other countries are close to international organizations such as the World Bank and the World Trade Organization. Among them, China's trade facilitation level has increased to a certain extent, but the increase is small, the change of the trade facilitation level of other countries is not obvious from 2017 to 2019. As mentioned above, many policies have been implemented since the establishment of RCEP. Although we cannot immediately see the growth of the facilitation score brought by RCEP, we can really feel the simplification of the process, the improvement of quality, the preferential price and so on from the perspective of customers and manufacturers, and look forward to seeing more obvious growth in the next few years.

4 Conclusions

Table 4 establishes indicators and calculates the score of trade facilitation level of cross-border e-commerce based on the influence factors of cross-border e-commerce. The contents of China's Annual Report on Trade Facilitation from 2020 to 2022 are summarized and analyzed with reference to other literatures as supplements.

Table 4. Changes in China's Trade Facilitation Index 2019-2022.

year	Trade Facilitation Index
2020	76.93
2021	78.6
2022	86.23

Data source: China Trade Facilitation Annual Report 2023

The 2023 edition of the Annual Report on China's Trade Facilitation mentioned that China's trade facilitation index has steadily improved. Although the global trade facilitation process has been continuously impacted by the epidemic, the Chinese government has made efforts to stabilize the industrial chain and supply chain, has promoted the development of China's trade facilitation. In particular, China's customs and other port management departments have provided strong support for enterprises to cope with the impact of the epidemic. It can be seen from the report that China's trade facilitation has made obvious progress in some areas in recent years. In the 2022 Report on the Development of China's Cross-border Export E-commerce, it is mentioned that cross-border e-commerce exports continue to grow rapidly, fully demonstrating the vitality of the market and the growth resistance of cross-border e-commerce exports. The report also shows that the number of registered enterprises in China participating in cross-border e-commerce is increasing year by year, these enterprises are gradually achieving a leap from product exports to brand exports, reaching the gateway of competing for refined operations and localization strategies.

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