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Study on Logistics Development in RCEP Countries from the Perspective of LPI

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ABSTRACT

Using the Logistics Performance Index (LPI) as an entry point, this study provides a comprehensive analysis of the logistics development of each member country of the Regional Comprehensive Economic Partnership Agreement (RCEP) from 2010 to 2022. Firstly, the total LPI score of each country and the indicators of each dimension are carefully analysed using descriptive statistics, and it is found that there are obvious differences in the level of logistics development among member countries. China is already a logistics powerhouse, but there is still much room for improvement in customs clearance efficiency and service quality. Secondly, with the help of systematic clustering and correspondence analysis techniques, the member countries are divided into three groups of high, medium and low levels of logistics, which clearly presents the hierarchical structure of logistics performance of each country. The study shows that countries with advanced logistics such as Singapore and Japan have obvious advantages in terms of infrastructure development and customs operation efficiency; in contrast, countries with relatively low logistics development such as Cambodia and Laos have room for improvement in a number of key areas. In addition, the analysis of the coefficient of variation shows that although the unevenness of logistics performance across countries has been reduced, the improvement is limited, and the differences in the efficiency of infrastructure and customs are particularly striking, which may pose an obstacle to regional logistics integration. In this regard, this paper proposes the following recommendations: to promote the synergistic development of logistics and economic integration within the RCEP region by facilitating the development of logistics in the low-level RCEP member countries, strengthening the construction of key factors, continuously improving China's logistics performance, and deepening the regional logistics co-operation.

KEYWORDS

LPI Index; RCEP; Regional Logistics Development; Coefficient of Variation; Cluster Analysis; Correspondence Analysis.

1. INTRODUCTION

Against the backdrop of the interweaving of economic globalization and anti-globalization, the Regional Comprehensive Economic Partnership Agreement (RCEP) was officially signed in 2020, marking the birth of the largest free trade area in the world. In 2022, the RCEP agreement was fully implemented. Through the reduction of tariffs and non-tariff barriers, this agreement promotes regional trade and investment liberalization, aiming to address the challenges brought about by the reshaping of the global trade landscape, the stagnation of WTO negotiations, and the long-term nature of the Sino-US economic and trade frictions. As the core support of international trade, the efficiency of logistics directly affects trade costs, the stability of supply chains, and the coordinated development of regional economies. Under the RCEP framework, the expansion of regional trade and the

refinement of industrial divisions place higher demands on the quality of logistics services, and an efficient logistics system has become a key to enhancing the competitiveness of member countries and promoting economic integration . The Logistics Performance Index (LPI) released by the World Bank assesses the logistics levels of various countries through six dimensions including goods traceability, customs efficiency, and infrastructure, providing a scientific tool for RCEP member countries to identify their logistics shortcomings and optimize regional collaboration. Improving logistics performance is not only a key to realizing the trade facilitation of RCEP but also an important path to enhancing regional economic resilience and tapping growth potential , and it holds strategic significance for promoting the reconfiguration of global value chains and regional economic integration.

2. LITERATURE REVIEW

Currently, previous studies have proposed some definitions regarding "logistics performance". With the deepening of global trade, the importance of logistics has become increasingly prominent, and improving logistics levels to promote trade development has become a widely recognized consensus[1]. Some scholars have used logistics performance indices to analyze the impact of the logistics industry on international trade, and N. Uca et al. analyzed the mediating role of logistics performance indices in the relationship between corruption perception index and foreign trade volume and volume[2]. A. Acar et al. explored the topic of how LPI affects emerging trade and compared the LPI data of developing countries from 2007 to 2012, and the results showed that any improvement in the sub-indicators of LPI would significantly increase a country's trade volume[3]. Cemberci adjusted each sub-indicator of LPI using GCI and found that the adjustment effect had a significant impact on three sub-indicators such as international transportation, import and export volume, and tracking ability. It should be noted that a country must improve the above three sub-indicators of LPI to enhance its competitiveness[4]. Other scholars, based on the relationship between national logistics performance and international trade, have improved the LPI sub-indicators to enhance the national logistics performance. Burmaoglu & Sesen's research shows that for countries with a low LPI to become high LPI countries, they must improve logistics infrastructure and customs clearance environment[5]. Garcia et al. established the collaborative index of LPI (DEA-LPI) and decision units (DMUs) using the DEA method and found ways to improve the logistics performance of the country[6]. Later, only by improving the ability to track and transfer goods can one maintain its competitive advantage. Su S.d et al. identified the weak links in logistics and explored how to improve the logistics performance of a country (region)[7]. M. Bakar et al. evaluated logistics performance from the perspective of customers using the LPI index and analyzed the impact of the logistics environment on the LPI, and concluded that logistics-related equipment and facilities are the key elements affecting the LPI index[8].

Scholars have studied the differences in logistics performance through multi-dimensional methods. Marti L et al. pointed out that LPI is becoming increasingly important in international trade through their research on LPI of five economies such as Eastern Europe[9]; Bilovodska O. et al. analyzed the key factors of Ukraine's logistics competitiveness based on LPI[10]; when analyzing the differences in logistics performance indices, the coefficient of variation is used as a measurement tool for differences and is widely applied in regional logistics difference analysis. Some scholars analyzed logistics performance indices using correspondence analysis methods in a certain time period. Rodrigue et al. used correspondence analysis to reveal the correlation between the logistics performance of North American and European ports[11]. Many scholars have evaluated logistics efficiency from micro, meso and macro levels using multiple methods, and studied the behaviors of each entity within the logistics system and their interactions. This paper will use the coefficient of variation to analyze the changes in LPI of RCEP member states over time and use cluster analysis and correspondence analysis methods to analyze the data of RCEP member states in 2022.

3. DESCRIPTION OF THE RESEARCH SUBJECTS AND INDICATORS

3.1. Research Subjects

This research focuses on all the countries that are part of the Regional Comprehensive Economic Partnership Agreement (RCEP), which is a cooperation framework initiated and expanded by the ten ASEAN member states (Indonesia, Malaysia, the Philippines, Thailand, Singapore, Brunei, Cambodia, Laos, Myanmar, and Vietnam), and includes China, Japan, South Korea, Australia, and New Zealand. Through in-depth analysis of these 15 member states, this research aims to clarify the core role of RCEP in promoting the process of regional economic integration, reveal the interaction mechanisms and development trends among member states in various fields such as economy, trade, and logistics, and provide scientific basis and practical guidance for exploring the potential value of RCEP and promoting the coordinated development among member states.

3.2. Indicators

1) Indicators

The Logistics Performance Index (LPI) is a tool for evaluating the performance of cross-border logistics constructed by the World Bank based on the survey data of international freight forwarders and express carriers. It assesses the performance through a comprehensive scoring of six core elements (rated from 1 to 5): traceability of goods (ability for full-process tracking), logistics service capabilities (quality professionalism and reliability), convenience of transportation arrangements (tool arrangements and multimodal transport connection), customs efficiency (clearance speed and policy transparency), timeliness of transportation (performance of on-time delivery), and infrastructure (completeness of transportation/warehousing/information facilities). This index helps countries identify their logistics shortcomings and optimize improvements. The total score and sub-item indicators are based on rigorous survey data.

2) Data selection and processing

This study utilized the LPI data of RCEP member countries from 2010 to 2022 provided by the World Bank. Due to the fact that Brunei was not included in the assessment system before 2016 and that data for both Brunei and Myanmar were missing in 2022 due to the pandemic, the missing values were estimated through linear interpolation. The accuracy of the results was ensured through error testing. Eventually, a continuous and complete dataset was formed to support the analysis.

4. ANALYSIS OF LOGISTICS PERFORMANCE OF RCEP COUNTRIES

4.1. Analysis of the Overall Logistics Performance Indicators of RCEP

Table 1 summarizes and calculates the LPI data of 15 RCEP member countries released by the World Bank from 2010 to 2022. China's LPI has steadily risen from 3.49 in 2010 to 3.70 in 2022, consistently higher than the world average (from 2.87 to 3.00 during the same period), but still lags behind top-level countries such as Singapore (4+) and Japan (4+). There is still room for improvement in areas such as customs clearance efficiency and supply chain collaboration. The logistics powerhouses: Singapore (port technology + government efficiency), Japan (lean management + infrastructure synergy), and Australia (resource logistics advantages) have maintained an average LPI above 3.7 for a long time, forming global benchmarks. The developing countries group: Indonesia (port upgrading), Vietnam (export efficiency improvement), Malaysia (digital transformation), and Thailand (agricultural logistics network) are at a medium level and show growth potential. The lagging countries group: Cambodia, Brunei, the Philippines, Laos, and Myanmar, etc., have an average LPI below 3.1, facing multiple challenges such as weak infrastructure (e.g., low road density in Cambodia,

aging ports in Myanmar), geographical constraints (land transportation in Laos), and economic singularity (Brunei). This differentiation situation is rooted in economic strength, development strategies, and geographical location differences: developed countries continue to invest in technology, medium-sized countries accelerate their catch-up, and lagging countries urgently need international collaboration to break through bottlenecks.

Table 1. Comparison of total indicators of RCEP countries and the world Logistics Performance

	RCEP countries		World			Difference between China and the world average	The difference between RCEP countries and the world average	The difference between China and other RCEP countries	The difference between China and the world's top 10
Year	China	Other RCEP countries	Top 10	Average	Bottom 10				
2010	3.49	3.23	4.00	2.87	1.98	0.62	0.36	0.26	-0.51
2012	3.52	3.23	4.00	2.87	2.00	0.65	0.36	0.29	-0.48
2014	3.53	3.28	3.99	2.89	2.06	0.64	0.39	0.25	-0.46
2016	3.66	3.19	4.13	2.88	1.91	0.78	0.31	0.47	-0.47
2018	3.61	3.25	4.04	2.87	2.08	0.74	0.38	0.36	-0.43
2022	3.70	3.40	4.09	3.00	2.11	0.70	0.40	0.30	-0.39
Average annual growth rate /%	1.18%	1.06%	0.45%	0.89%	1.28%	/	/	/	/

Source: LPI 2010-2022, published by the World Bank

4.2. Analysis of Logistic Performance Indicators of RCEP Countries

In order to clearly show the gaps in logistics performance among countries, an in-depth analysis of the six sub-indicators of LPI is carried out, which will provide important inspiration for us to explore effective ways to improve logistics performance. Through this analysis, the aim is to identify effective strategies to improve national logistics performance, and then address the problem of economic development constraints caused by low logistics efficiency.

According to the data of the country sub-indicators for 2022 in Table 2 Comparison of sub-indicators of RCEP country and world Logistics Performance Index in 20222, China's performance is better than the world average in six aspects: cargo traceability, logistics service capacity, ease of transportation arrangements, customs efficiency, timeliness of cargo transportation and infrastructure. Compared with the world's top 10 countries in terms of logistics performance, China still has a gap. In 2022, the other 14 RCEP countries excluding China will have a score difference of 0.39, 0.34, 0.35, 0.42, 0.48 and 0.43 in the six sub-indicators compared with the world average. They still have certain advantages in customs efficiency, timeliness of cargo transportation and infrastructure. However, there is a significant gap with the top 10 countries (-0.74 to -0.86). Infrastructure is the biggest weakness of low level RCEP countries (3.35), and the score difference with China is 0.65, forming a two-way strengthening bottleneck. The sub-gap between China and RCEP countries in descending order is as follows: infrastructure > logistics service capacity > traceability of goods > convenience of transportation arrangement > customs efficiency > timeliness of transportation, among which the infrastructure gap constitutes the core obstacle of regional coordinated development.

Table 2. Comparison of Sub-Indicators of World Logistics Performance Index between RCEP Countries and the World in 2022

Indicators	Top 10	Average	China	RCEP other countries average	Comparison between China and the top 10 countries in the world	Comparison between China and the average of the world	Comparison between other countries in the RCEP and the top 10 countries in the world	Comparison between other countries in the RCEP and the average of the world	Comparison between China and other countries in the RCEP
Goods traceability	4.20	3.05	3.8	3.44	-0.40	0.75	-0.76	0.39	0.36
Logistics service capability	4.18	3.03	3.8	3.37	-0.38	0.77	-0.81	0.34	0.43
Convenience of transportation arrangement	3.79	2.93	3.6	3.28	-0.19	0.67	-0.51	0.36	0.32
Customs efficiency	3.96	2.80	3.3	3.22	-0.66	0.50	-0.74	0.42	0.08
Timeliness of goods transportation	4.17	3.24	3.7	3.72	-0.47	0.46	-0.45	0.48	-0.02
Infrastructure	4.21	2.92	4.00	3.35	-0.21	1.08	-0.86	0.42	0.65

Source: LPI 2010-2022, published by the World Bank

4.3. Analysis of Coefficient of Variation (CV) for RCEP Countries

Table 3. Comparison of variation coefficients of the general and sub-indicators of the RCEP national LPI

	Goods traceability	Logistics service capability	Convenience of transportation arrangement	Customs efficiency	Timeliness of goods transportation	Infrastructure	Integrated LPI
2010	0.18	0.22	0.16	0.22	0.12	0.26	0.18
2012	0.16	0.17	0.15	0.19	0.15	0.22	0.17
2014	0.16	0.18	0.15	0.19	0.15	0.21	0.17
2016	0.20	0.20	0.16	0.20	0.14	0.24	0.18
2018	0.17	0.18	0.13	0.19	0.14	0.23	0.17
2022	0.16	0.18	0.15	0.19	0.13	0.21	0.16

Note: Coefficient of Variation = (Standard Deviation / Average Value) * 100%

As a dimensionless index to measure the degree of sample variation, the coefficient of variation can be used to measure the degree of dispersion of logistics performance of RCEP member countries, reflect the differences and equilibrium of countries in the total score and sub-indicators of LPI, and provide a basis for putting forward targeted policy recommendations. As can be seen from the data in Table 3, the coefficient of variation of RCEP's national logistics performance decreased from 0.18 in 2010 to 0.16 in 2022. Table 3 Comparison of variation coefficients of the general and sub-indicators of the RCEP national LPI3This indicates that the imbalance of overall logistics performance within the region is gradually improving, but the improvement is not large. In-depth analysis of the sub-indicators shows that although the differences between some indicators are gradually narrowing, the differences between countries in terms of customs efficiency and infrastructure level are still significant. From 2010 to 2022, the coefficient of variation of infrastructure level is 0.26, 0.22, 0.21, 0.24, 0.23, 0.21, which is always higher than 0.20. The coefficient of variation of customs efficiency

is also roughly maintained at around 0.20. This unbalanced development may have a negative impact on the RCEP regional logistics integration process and the efficient development of cross-border trade. In addition, the two indicators of cargo traceability and logistics service capacity have fluctuated considerably, and there is still much room for improvement. To sum up, the unbalanced state of logistics levels among RCEP countries poses a clear obstacle to the efficiency of overall logistics operations in the region. Going forward, we should prioritize infrastructure construction and improving customs efficiency as key areas for improvement.

5. CLUSTER ANALYSIS AND CORRESPONDING ANALYSIS OF LOGISTICS DEVELOPMENT IN RCEP COUNTRIES

5.1. Description of Cluster Analysis Methods and Data Rocessing

Through the in-depth analysis of the RCEP logistics performance index and its six dimensions, it is found that the logistics development level of member states is significantly different. Cluster analysis aims to divide RCEP member countries into different groups according to their logistics performance characteristics, revealing the hierarchical structure within the region. In SPSS software, the scores of logistic performance index sub-indexes of RCEP countries are taken as independent variables and 15 sample countries are taken as categorical variables. After data standardization pretreatment, systematic clustering is carried out. Subsequently, the clustering results were further visualized through Arcgis 10.8.1 software. Different countries with varying levels of logistics were color-coded regionally, and Table 4 and Figure 1 were obtained.

5.2. Clustering Results and Analysis

Table 4. Cluster analysis results for RCEP countries in 2022

Countries	Goods traceability	Logistics service capability	Convenience of transportation arrangement	Customs efficiency	Timeliness of goods transportation	Infrastructure	Integrated LPI	Cluster
SGP	4.40	4.40	4.00	4.20	4.30	4.60	4.30	1
JPN	3.80	3.80	3.60	3.30	3.70	4.00	3.70	
AUS	3.80	3.80	3.40	3.90	3.80	4.10	3.80	1
KOR	4.00	4.10	3.30	3.90	4.00	4.20	3.90	1
NZL	4.10	3.90	3.10	3.70	3.60	4.10	3.70	1
MYS	3.80	3.70	3.20	3.40	3.80	3.80	3.60	1
THA	3.70	3.70	3.70	3.30	3.70	3.60	3.60	1
CHN	3.60	3.50	3.50	3.30	3.50	3.70	3.50	1
IDN	3.00	2.90	3.00	2.80	3.30	2.90	3.00	2
PHL	3.30	3.30	3.10	2.80	3.90	3.20	3.30	2
VNM	3.40	3.20	3.30	3.10	3.30	3.20	3.30	2
BRN	2.76	2.80	2.68	2.67	2.67	3.18	2.54	3
KHM	2.80	2.40	2.30	2.20	2.70	2.10	2.40	3
LAO	2.40	2.40	2.30	2.30	2.80	2.30	2.40	3
MMR	2.33	2.28	2.29	2.20	2.22	2.89	2.04	3
Group I country average	3.90	3.86	3.48	3.63	3.80	4.01	3.76	/
Group II country averages	3.23	3.13	3.13	2.90	3.50	3.10	3.20	/
Group III country averages	2.57	2.47	2.39	2.34	2.60	2.62	2.34	/

The results of cluster analysis reveal the distribution of the logistics level of RCEP member countries in three echelon. The first tier consists of countries with highly developed logistics, including Singapore, Japan, Australia, the Republic of Korea, New Zealand, Malaysia, Thailand and China. Its logistics services show the characteristics of refinement and intelligence, professional enterprises to support the efficient operation of the supply chain, electronic customs clearance and full traceability technology to ensure delivery timeliness. These countries have developed economies and advanced technologies. Through long-term strategic investment, they have built high-end logistics systems and become regional benchmarks. Although the medium-level RCEP countries (Indonesia, the Philippines and Vietnam) have a certain logistics foundation, they face multiple challenges: Indonesia faces difficulties in network integration due to the geography of the archipelago, the Philippines suffers from inefficient customs and decentralized transportation systems, and Vietnam needs to improve the level of refinement of services. Low level countries (Brunei, Cambodia, Laos, Myanmar) due to weak infrastructure (such as Cambodia road, Lao railway lag), backward technology (such as cumbersome customs clearance, lack of traceability), resulting in significant backward logistics performance, need to break through the development bottleneck through international assistance and regional coordination.

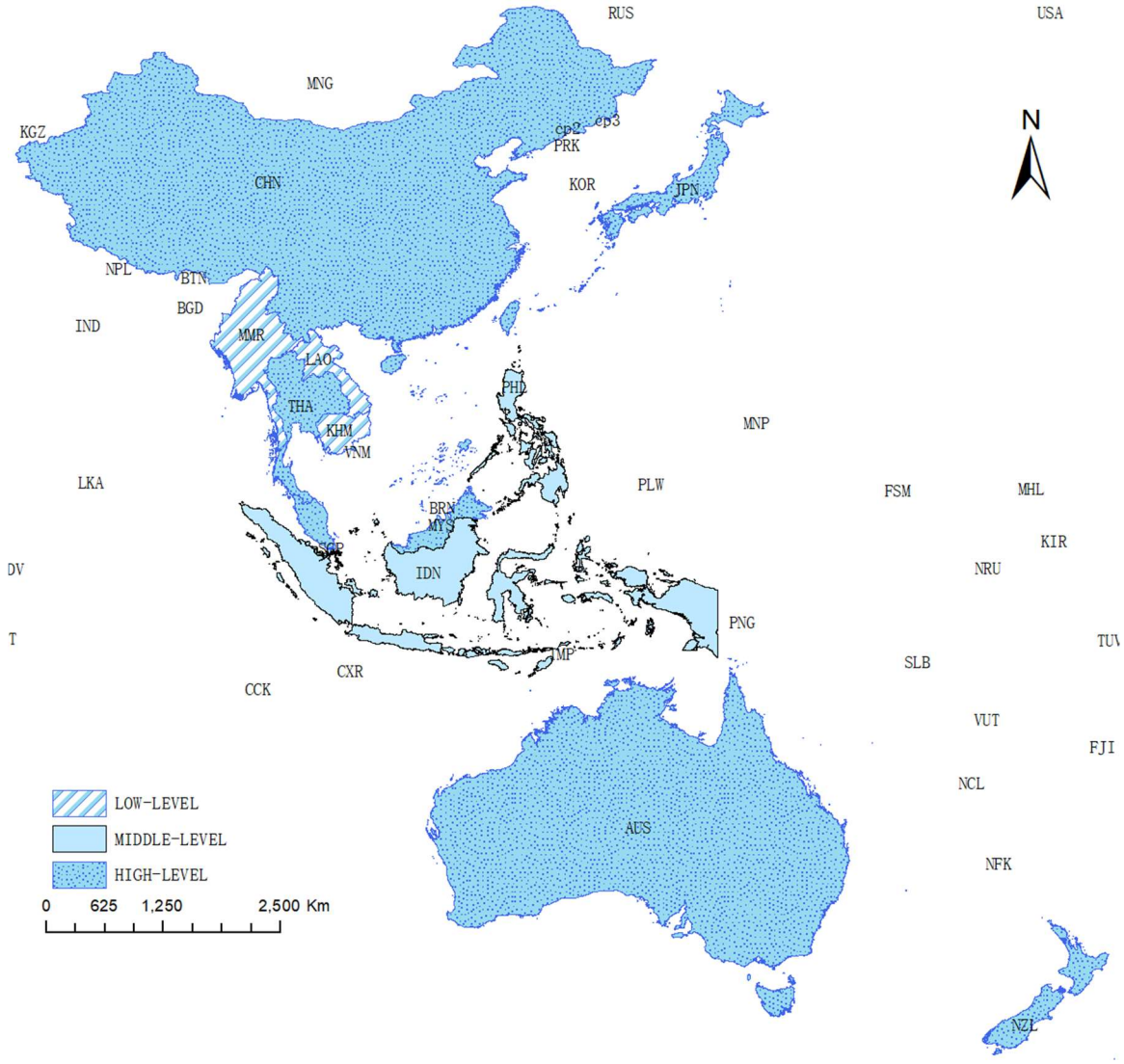

Figure 1. LPI cluster analysis of RCEP countries

5.3. Corresponding Analysis of RCEP National Logistics Performance

Correspondence analysis projects the RCEP member countries and LPI sub-indicators onto the common factor space, thereby graphically revealing the correlations between national logistics performance and indicators. The study uses the preprocessed data and employs SPSS software to construct a chi-square model (with LPI indicators as row variables and countries as column variables), analyzing the strengths and weaknesses of each country in six dimensions such as traceability of goods and customs efficiency, and the synergy relationships among indicators. As shown in Figure 2, the results indicate that the first two dimensions cumulatively explain over 85% of the information volume, providing a visual basis for accurately identifying logistics shortcomings and synergy paths.

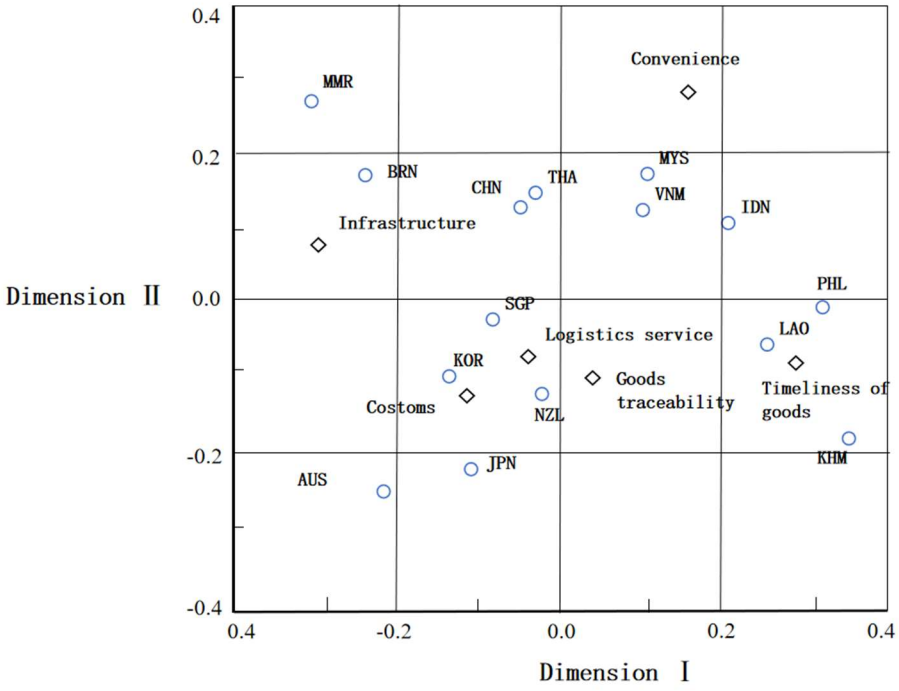

Figure 2. Correspondence Analysis of LPI in RCEP Countries in 2022

In the two-dimensional correspondence analysis diagram, the positive and negative combinations of dimensions I and II are divided into four quadrants. The correspondence analysis results show that dimension I explains 56.2% of the information, and dimension II explains 23.9%. The first two dimensions cumulatively explain 80.1% of the information volume. The smaller the angle between the vectors, the higher the similarity between the two icons. The acute angle indicates that the two icons have similarities. The smaller the angle, the higher the similarity. From the diagram, in the first quadrant, Indonesia, Malaysia, and Vietnam are close to the indicators of convenient transportation arrangements, and the convenience of transportation arrangements is prominent; in the second quadrant, China, Thailand, and Myanmar are close to the infrastructure indicators, and may have advantages in infrastructure; in the third quadrant, Australia, Japan, and South Korea are around the indicators of customs efficiency and logistics service capabilities, and perform well in these two aspects; in the fourth quadrant, the Philippines, Laos, and Cambodia are close to the indicators of timely goods transportation, and have certain characteristics in the timeliness of goods transportation, but may be relatively weak in other logistics performance aspects.

The correspondence analysis shows that the vectors of logistics service capabilities and customs efficiency, and the vectors of goods traceability and transportation timeliness have small angles,

indicating a high degree of correlation and mutual promotion: efficient customs processes can improve logistics timeliness, and strengthening logistics service capabilities is also beneficial to customs efficiency; goods traceability ensures transportation timeliness through real-time monitoring, and transportation timeliness requirements also drive the upgrade of traceability technology. At the national level, there is regional convergence: countries in East Asia such as Japan and South Korea have outstanding performance and concentrated positions in logistics service capabilities and customs efficiency, which may be due to similar economic levels and development models; Southeast Asian countries show convergence in dimension distribution, reflecting the common impact of similar economic stages, industrial structures, and policy orientations on logistics performance.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

In this study, we conducted a detailed description and analysis of the logistics performance indices of 15 RCEP member countries. By applying various statistical methods such as cluster analysis, coefficient of variation calculation, and correspondence analysis, we conducted in-depth comparisons and analyses of the logistics performance of each member country, and finally reached the following key conclusions:

1) There is a significant differentiation in logistics levels among RCEP member countries. The logistics performance of RCEP member countries presents a three-tiered structure - Singapore, Japan, etc., are in the high-level tier (with excellent LPI performance), Indonesia, the Philippines, Vietnam are in the medium-level tier (with infrastructure integration difficulties and other shortcomings in the process of catching up), and Brunei, Cambodia, etc., are in the low-level tier (with LPI averages < 3.1). In 2022, more than half of the member countries entered the high-level tier, but the low-level countries still constrained the process of regional logistics integration.

2) Key constraints are prominent. Goods traceability, logistics service capabilities, customs efficiency, and infrastructure are the core shortcomings. The coefficient of variation shows that the differences in customs efficiency and infrastructure are the greatest (up to 0.20), while the fluctuations in goods traceability and logistics service capabilities are significant. Technological upgrading, data sharing, and professional services need to be improved to enhance these aspects.

3) The opportunities for RCEP regional collaboration are emerging. Geographical proximity (such as transportation connectivity between China and ASEAN) and economic stage similarity (such as common demands of Southeast Asian countries) provide a foundation for logistics collaboration. After the implementation of RCEP, industrial chain cooperation has deepened, and member countries should rely on regional convergence to promote standard unification, information sharing, and infrastructure interconnection to improve overall logistics efficiency and international competitiveness.

6.2. Recommendations

Promote the progress of logistics in low-level RCEP member countries. To narrow the logistics gap among RCEP member countries, all member countries should enhance communication and coordination at the policy level, and jointly formulate logistics development plans. Encourage high-level logistics countries to offer assistance to medium- and low-level countries, provide technical support and training, and help them improve their logistics performance. At the same time, establish a regional logistics development fund to specifically support the improvement of logistics infrastructure and technological innovation, and promote the balanced development of regional logistics.

Focus on key factors for improvement. In the field of logistics, we should deepen the application of information technology, build a unified goods tracking system, and enhance the traceability of goods. Improve the professional and personalized level of logistics services to meet the diverse needs of customers and enhance satisfaction. Optimize customs procedures, strengthen collaboration between customs and logistics enterprises, improve data sharing and transparency, and reduce cross-border trade costs. In particular, increase investment in infrastructure construction in low-level countries, improve their logistics networks, and enhance operational efficiency.

Deepen RCEP regional logistics cooperation. RCEP member countries should fully utilize their geographical proximity and similar economic development stages to strengthen the interconnection of logistics infrastructure and the unification of logistics standards. Promote the deep integration of regional industrial and supply chains, facilitate the free flow of production factors, and create more favorable conditions for the coordinated development of logistics. In particular, strengthen logistics cooperation with countries such as ASEAN, jointly build an efficient and convenient regional logistics network, and enhance regional logistics performance and international competitiveness. At the same time, establish a regional logistics coordinated development mechanism, hold logistics cooperation meetings regularly, share logistics development experiences, and jointly solve problems in the coordinated development of logistics.

6.3. Shortcomings and Prospects

During the discussion of this article, the correlation analysis between logistics performance and trade data of member states has not been conducted yet, thus failing to fully reveal the positive promoting role of logistics in trade development. Moreover, due to the limitations in data acquisition, this article only utilized data up to 2022 and failed to fully reflect the current latest development trends in the logistics field. Looking forward, future research can further integrate the latest trade data, deeply analyze the dynamic correlation between logistics and trade, and focus on examining the logistics performance at the industry or enterprise level, in order to provide more precise and targeted guidance for the optimization of regional logistics.

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