ISSN 1533-9211

DOI: 10.5281/zenodo.13986583

DRIVERS AND BARRIERS: A STUDY ON CROSS-BORDER E-COMMERCE TRADE POTENTIAL IN THE RCEP REGION

LILI ZHANG *

School of Business and Trade, Anhui Technical College of Industry and Economy, Hefei, Anhui, China.
Faculty of Economics and Business, Universiti Malaysia Sarawak (UNIMAS), Kuching, Sarawak, Malaysia.
*Corresponding Author Email: 21010197@unimas.my

MUHAMMAD ASRAF BIN ABDULLAH

Faculty of Economics and Business, Universiti Malaysia Sarawak (UNIMAS), Kuching, Sarawak, Malaysia.
Email: amasraf@unimas.my

Abstract

This study aims to evaluate the development levels and trade potential of cross-border e-commerce (CBEC) between China and its Regional Comprehensive Economic Partnership (RCEP) partners. Utilizing the cross-border e-commerce ecosystem theory and Principal Component Analysis (PCA), the research integrates logistics performance, information flow, and digital infrastructure as core explanatory variables within an extended gravity model framework. The study analyzes trade volume data from 2013 to 2022, employing the Generalized Method of Moments (GMM) for model estimation. Key findings indicate that supporting factors, especially logistics performance and information flow, are pivotal in enhancing CBEC development. China maintains a leading position due to its advanced logistics and network infrastructure, whereas countries like Laos lag due to infrastructural and economic disparities. The analysis further reveals that while China's CBEC development level has a limited impact on increasing total trade volumes, the development levels of partner countries significantly enhance their trade volumes with China. Additionally, per capita GDP of partner countries does not significantly influence total trade volumes, though China's per capita GDP positively affects them. Distance costs negatively impact trade volumes at a 10% significance level. Untapped trade potential exists between China and several RCEP partners, including South Korea and Japan, highlighting the need for targeted trade promotion strategies. These findings underscore the critical importance of improving logistics, infrastructure, and digital economy frameworks to maximize CBEC trade potential. Policymakers should focus on reducing trade barriers, enhancing digital infrastructure, and fostering economic cooperation to fully leverage the trade potential within the RCEP framework.

Keywords: Cross-border E-commerce, RCEP, Trade Potential, GMM.

1. INTRODUCTION

In recent years, cross-border e-commerce (CBEC) has emerged as a critical driver of international trade, revolutionizing the way businesses and consumers engage in global commerce. With the advent of the digital economy, CBEC has not only facilitated easier access to international markets but also significantly lowered the barriers to trade for small and medium-sized enterprises (SMEs). The Regional Comprehensive Economic Partnership (RCEP), which includes China and 14 other Asia-Pacific nations, represents one of the world's largest free trade agreements, further emphasizing the importance of understanding CBEC dynamics within this framework.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

The importance of CBEC lies in its ability to enhance trade efficiency, reduce costs, and expand market reach. Despite its potential, significant disparities exist among RCEP member countries in terms of CBEC development. Factors such as logistical performance, information flow, digital infrastructure, and economic policies play critical roles in shaping the CBEC landscape. For instance, while China leads in CBEC development due to its advanced logistics and network infrastructure, other countries like Laos struggle with infrastructural and economic challenges.

Existing literature extensively discusses the determinants of CBEC, highlighting the pivotal roles of logistics, information technology, and supportive policies. Studies emphasize the importance of robust ICT infrastructure and government support in fostering CBEC growth. Additionally, the Technology-Organization-Environment (TOE) framework identifies critical factors such as internet speed, online payment security, and user-friendly platforms. However, there is limited research on the comprehensive assessment of CBEC trade potential between China and its RCEP partners, particularly considering the varied levels of development across these countries.

This study aims to fill this gap by evaluating the CBEC development levels and trade potential between China and RCEP partner countries from 2013 to 2022. Utilizing an extended gravity model and Principal Component Analysis (PCA), this research integrates core explanatory variables such as logistics performance, information flow, and digital infrastructure. The study's objective is to identify key determinants influencing CBEC trade potential and provide actionable insights for policymakers to enhance trade cooperation within the RCEP framework.

Overall, this research seeks to contribute to the existing body of knowledge by offering a nuanced understanding of CBEC dynamics and highlighting areas for policy intervention to maximize trade potential. The findings underscore the need for improved logistics, infrastructure, and digital economy frameworks, aiming to foster a more equitable and efficient CBEC environment among RCEP member countries.

2. LITERATURE REVIEW

2.1 Cross-Border E-Commerce Ecosystem Theory

In the context of the digital economy, cross-border e-commerce (CBEC) has progressed into a sustainable development phase, showcasing remarkable growth potential. The concept of the ecosystem, initially introduced by A.G. Tansley in 1935 to describe biological systems, was later adapted by James F. Moore in 1999 to describe business networks comprising companies, consumers, and suppliers. This theoretical framework has since evolved into the notion of an industrial ecosystem, emphasizing a circular economy involving producers, consumers, and regulators exchanging resources, energy, and information.

Liu (2006) extended the ecosystem concept to e-commerce, describing a network of organizations and enterprises on internet platforms that share resources and leverage mutual advantages. Subsequent work by Hu, Lu, and Huang (2009) and others has expanded this idea to include a diverse array of ecosystem participants.

The Seybold REPORT
ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

More recently, the cross-border e-commerce ecosystem theory has emerged as a foundational framework within the field. Zhang (2021) has further refined the transition from traditional ecosystems to business and e-commerce ecosystems. This ecosystem is defined as a complex network of individuals, businesses, and governmental bodies engaged in cross-border e-commerce activities, collaborating through platforms and sharing resources and advantages. It is characterized by dynamic exchanges of logistics, business transactions, capital, and information flows, forming a multi-dimensional network.

The CBEC ecosystem comprises several key components: Leading Species, which include e-commerce platforms that play a central role in coordinating resources and activities; Key Species, consisting of producers and consumers who form the primary value chain within the ecosystem; and Supporting Species, entities that provide essential services such as payment processing and logistics, which are crucial for extending the value chain and creating a global value network.

This integrated framework highlights the importance of collaborative interactions among various stakeholders in enhancing the efficiency and effectiveness of cross-border e-commerce. By facilitating the seamless flow of goods, information, and capital, the CBEC ecosystem fosters sustainable growth and development in the global digital economy.

2.2 Factors Influencing Cross-Border E-Commerce

The cross-border e-commerce ecosystem has developed into a sophisticated socio-economic system that encompasses a range of factors beyond mere digital transactions. The primary drivers for its success include strong IT infrastructure, efficient logistics, secure payment systems, and supportive policies. Key research emphasizes the importance of information technology, logistics, payment methods, customs efficiency, and trade openness.

Information technology plays a critical role, as extensive ICT and internet usage enable global market access for sellers. Essential elements include supportive national policies, advanced ICT maturity, smartphone accessibility, and robust credit card transaction systems. The Technology-Organization-Environment (TOE) framework identifies crucial factors such as communication infrastructure quality, internet speed, online payment security, data privacy, user-friendly websites, and government and business support, all of which are vital for cross-border e-commerce success. Empirical studies also highlight the significant impact of foreign direct investment and internet infrastructure on e-commerce volume.

Logistics efficiency is another key aspect, but it faces challenges like high costs, lengthy transport times, and legal risks, which hinder expansion. Effective online marketing, electronic payments, e-customs, and legal standards are crucial for e-commerce platforms. Improvements in marketing, talent development, product technology, and regulatory frameworks are suggested. Market size, trade openness, and tourism in importing countries positively affect exports, while trade distance has a negative impact. Additionally, legal governance and courier costs are critical in the digital economy.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

2.3 Measurement of the Development Level of Cross Border E-Commerce

However, to accurately assess CBEC development and the impact of various factors, it is essential to establish a robust evaluation framework. Yang, Zheng, and Yang (2014) initially proposed a set of indicators to assess CBEC development, encompassing marketing, payment, customs, logistics, and legal frameworks throughout the transaction phases. Building on this, Li, Chen, and Qin (2020) refined the framework to include six dimensions and twenty indicators, covering aspects such as cross-border logistics, payments, platform services, credit risk, talent, and online international marketing.

Despite these advancements, many regions struggle to identify comprehensive metrics for evaluating CBEC growth. The OECD (2007) highlighted internet and mobile subscription rates as foundational e-commerce infrastructure indicators. Zhang and Tang (2020) utilized internet users, fixed and mobile broadband subscriptions to appraise infrastructure development levels. Song (2021) applied principal component analysis, using indicators such as internet use, broadband subscriptions, mobile users, education quality, and tertiary enrollment rates to determine e-commerce growth. Shen (2023) examined G20 countries (excluding the EU) from 2012 to 2021, employing logistics, informatization, customs efficiency, and potential development in a factor analysis, using 11 indicators to assess CBEC development and rankings.

Research on CBEC within the RCEP framework remains limited, often focusing on singular metrics like internet access and informatization, lacking a holistic perspective. As the digital economy rapidly evolves into a strategic area of international competition, understanding the impact of digitalization on international trade, particularly e-commerce, is crucial. The digital economy, defined by the Oxford Dictionary as "an economy primarily based on digital technologies, especially internet-based transactions" (OUP, 2021), underscores the need for a comprehensive approach. This study aims to leverage the CBEC ecosystem theory, employing the TIMG index to analyze digital economy development, measuring CBEC growth through indicators of digital technology, infrastructure, market, and governance.

2.4 Definition and Measurement of Cross-Border E-Commerce Trade Potential

The concept of cross-border e-commerce (CBEC) trade potential, though not universally defined, generally refers to the gap between the maximum theoretical trade volume and actual trade outcomes, often due to inefficiencies in production technology, capital and labor investment, infrastructure, and geographical constraints. Armstrong (2007) and Shu (2018) define trade potential as the unrealized maximum trade volume achievable under certain conditions, emphasizing the need for advancements in production technology and resource optimization.

This study defines CBEC trade potential as the unrealized maximum trade volume between countries, influenced by geographical location, infrastructure, and production capacity, while assuming stable CBEC development levels. The trade gravity model, which analyzes bilateral trade based on GDP and distance, serves as a key tool for assessing CBEC potential. Extensions by Kong and Dong (2015) and Zhang et al. (2016) have enhanced this analysis.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

Empirical research indicates a positive correlation between actual trade volumes of China and ASEAN countries and their e-commerce development and economic conditions, while distance shows a negative but minor correlation. Shen (2023) highlights that China's CBEC exports to G20 countries are significantly affected by GDP per capita, trade distance, and tariff levels.

Nilsson (2000) and Egger (2002) categorize trade potential into three levels based on actual versus theoretical trade volumes: values above 1.2 indicate "potential to be re-engineered," 0.8 to 1.2 suggest "potential to be developed," and below 0.8 signify "significant potential," reflecting varying trade dynamics. Analyses reveal high potential between China and countries like Singapore and Malaysia, while Vietnam, the Philippines, and Laos show exploratory potential. Shen (2023) identifies rapidly developing markets such as Japan and South Korea as having significant re-engineering potential.

This synthesis deepens the understanding of CBEC trade potential and informs strategic initiatives for its development. However, further investigation is needed to explore trade potential across all RCEP countries and the nuanced impact of distance on trade volumes.

3. METHODOLOGY AND DATA

3.1 Construction of Cross-Border E-Commerce Index System

Based on the connotation of the cross-border e-commerce ecosystem and in conjunction with the cross-border e-commerce evaluation system proposed by existing scholars and the evaluation indicators of national e-commerce demonstration cities (trial), the study constructs an evaluation indicator system for the cross-border e-commerce ecosystem. The mathematical representation of the principal component analysis is articulated as follows Eq (1).

$$F_i = a_{1i}X_1 + a_{2i}X_2 + \cdots + a_{pi}X_p \quad (1)$$

$X_1, X_2, \cdots X_p$ represents the index of each individual, $a_{1i}, a_{2i}, \cdots a_{pi}$ represents P constant vectors, F_i represents the linear combination of P index vectors $X_1, X_2, \cdots X_p$ of data matrix X (i.e., comprehensive index vector).

In subdividing the elements of the cross-border e-commerce ecosystem, this study prioritizes the objectivity and availability of indicator data. Given the absence of specific cross-border e-commerce platform data, it employs goods import and export trade volume to represent trading subjects, primarily focusing on goods. For key participants like manufacturers and wholesalers/retailers, the study selects manufacturing value-added as an indicator. For consumers, represented by online shoppers, the number of internet users serves as a substitute indicator to gauge the potential consumer base.

Regarding supporting elements, the logistics performance index is used to assess logistics, encompassing logistics service efficiency, international freight efficiency, customs clearance efficiency, and delivery efficiency to destination countries. For information flow, the study considers the development of the digital economy and utilizes the ITMG index from the Chinese Academy of Social Sciences (2023), which includes digital technology, digital

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

infrastructure, digital market, and digital governance as sub-indices. Capital flow is measured using two indicators: the number of commercial banks and per capita national net income. The analysis spans data from 2013 to 2022, focusing on 12 key RCEP countries due to data availability constraints. Table 1 outlines the detailed indicator systems and their sources:

Table 1: Indicator composition of CBEC system

Species	Primary Indicators	Secondary Indicators	Data Source
Leading Species	Scale of goods import and export transactions	Import volume of goods (LS1)	World Bank Database
		Export volume of goods (LS2)	World Bank Database
Key Species	Manufacturers and Consumers	Manufacturing value added (KS1)	World Bank Database
		Individuals using the Internet (KS2)	World Bank Database
Supporting Species	Logistics Performance	Ability to track and trace consignments (LP1)	World Bank Database
		Competence and quality of logistics services (LP2)	World Bank Database
		Ease of arranging competitively priced shipments (LP3)	World Bank Database
		Efficiency of customs clearance process (LP4)	World Bank Database
		Frequency with which shipments reach consignee within scheduled or expected time (LP5)	World Bank Database
		Quality of trade and transport-related infrastructure (LP6)	World Bank Database
	Information Flow	Digital technology (IF1)	Chinese Academy of Social Sciences (CASS)
		Digital Infrastructure (IF2)	
		Digital Market (IF3)	
		Digital Governance (IF4)	
	Cash Flow	Number of commercial banks (CF1)	International Monetary Fund Database
		Per capita net national income (CF2)	World Bank Database

Considering the extensive range of indicators within the cross-border e-commerce development level indicator system, which cover various aspects impacting cross-border e-commerce development, there is a risk of high correlations among these indicators. Directly incorporating them into the empirical model could result in significant multicollinearity issues. Additionally, the direct application of these indicators may complicate the empirical model, potentially affecting the accuracy of the empirical results. To address this issue, this study employs Principal Component Analysis (PCA) to process the cross-border e-commerce development level indicator system.

3.2 Extended Gravity Model

In the 1960s, pioneering attempts to apply the gravity model to the analysis of bilateral trade flows were made by Tinbergen and Poyhonen. Their research suggested that the economic size of two countries facilitates trade flows, while the distance between them impedes such flows. Over the years, with the contributions of numerous scholars, the gravity model has evolved

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

into a critical analytical tool for predicting trade potential between countries or regions within the realm of traditional international trade. The formula for the gravity model is typically expressed as follows Eq (2).

$$T_{ijt} = \frac{A \cdot Y_{it} \cdot Y_{jt}}{D_{ij}} \quad (2)$$

Where T_{ijt} represents the bilateral trade volume between country i and country j in year t, A is a constant, Y_{it} represents the GDP of country i in year t, Y_{jt} represents the GDP of country j in year t, and D_{ij} represents the distance between country i and country j.

Subsequently, scholars have continually expanded and refined the gravity model, exploring additional determinants of foreign trade flows and incorporating various new variables to enhance its explanatory power. For instance, Bergstrand (1985) included factors such as national income levels, exchange rates, and common borders. Hamilton (1992) further expanded the model by adding variables such as per capita GDP, common language, and the presence of free trade agreements. More recently, Zhang (2020) integrated trade facilitation and trade dependency into the gravity model, underscoring the evolving complexity and applicability of this analytical tool.

Clearly, the gravity model has undergone significant development, with various extended versions being formulated for empirical analysis. These sophisticated iterations of the model are now extensively used in international trade research to assess trade competitiveness, estimate and analyze trade potential and volume, and explore the factors influencing trade flows between countries.

In this study, building on the foundation of existing research, we incorporate the level of cross-border e-commerce development, common borders, and common languages into the gravity model. This approach allows for a more nuanced analysis of the factors influencing trade flows in the context of cross-border e-commerce. The correlation formula is as shown in Eq (3).

$$\begin{aligned} lnTre_{jt} = \alpha + \beta_1 lnTre_{jt-1} + \beta_2 \ln CBEC_{it} + \beta_3 \ln CBEC_{jt} \\ + \beta_4 lnPGDP_{it} + \beta_5 lnPGDP_{jt} + \beta_6 lnDistoil_{ijt} + \varepsilon_j \end{aligned} \quad (3)$$

Where i represents China, j represents RCEP partner countries, and t denotes time. "ln" indicates logarithm in the equation for all variables to standardize the dataset. Further, $\mathrm{Tre, CBEC, PGDP, Distoil and} \varepsilon_j$ represent cross-border e-commerce trade, cross border e-commerce development level, per capital gross domestic product, trade distance and the error term, respectively.

However, directly obtaining the cross-border e-commerce trade volume between China and RCEP partner countries presents a significant challenge.

To address this, the study employs a method utilized by iResearch, which estimates trade volume based on the trade data between China and RCEP partner countries in conjunction with China's total cross-border e-commerce trade volume.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

The specific calculation method is as follows Eq (4):

$$Tre_{jt} = \frac{Ex_{jt} * Exe_{it}}{Ex_{it}} + \frac{Im_{jt} * Ime_{it}}{Im_{it}} \tag{4}$$

Where Exe_{jt}, Ime_{jt} and Tre_{jt} respectively represent China's cross-border e-commerce export, import and total trade volume with RCEP partner countries. Ex_{jt}, Im_{jt} and denote China's export and import volume with RCEP partner countries. Ex_{it} and Im_{it} represent China's total export and import volume. Exe_{it} and Ime_{it} indicate China's total cross-border e-commerce export and import transaction scale.

In this study, dynamic panel models are employed to analyze the potential for cross-border e-commerce trade between China and RCEP partner countries. Leveraging GMM estimation methods to analyze cross-sectional panel data serves to surmount the challenges posed by endogeneity, thereby enhancing the robustness of the analytical framework.

3.3 Calculation of Trade Potential Value of Cross-Border E-Commerce

A comparison is made between the theoretical trade volume and actual trade volume to assess trade potential. Its metaethical expression is derived as Eq (5).

$$Trade\ Potential\ Value = \frac{actual\ trade\ volume}{theoretical\ trade\ volume} \tag{5}$$

There exists an evaluation approach known as the "0.8 and 1.2 benchmark method." This method classifies the ratio of actual to theoretical values into three intervals.

4. RESULTS AND DISCUSSION

4.1 Measurement of Cross-Border E-Commerce Development Level

To ensure the variables meet the strong correlation prerequisite for principal component analysis, this study conducted the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity.

As shown in Table 2, the KMO value is 0.858, significantly surpassing the widely accepted threshold of 0.7. Furthermore, Bartlett's test of sphericity indicates a significant level.

These findings collectively confirm that the selected indicators are highly suitable for principal component analysis. See Table 2 for detailed results.

Table 1: Summary of Bartlett's Test and KMO Measure.

Measure	Value
Bartlett's Test of Sphericity χ^2	3887.212
Degrees of Freedom (df)	120
p-value	< .001
Kaiser-Meyer-Olkin (KMO)	0.858

Data source: Obtained through STATA18 software calculation

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

As depicted in Table 3, the eigenvalues for the first two components both surpass the threshold of 1, underscoring their robust reliability. Furthermore, the cumulative variance contribution rate of these components reaches 82.08%, indicating that the present indicator system effectively accounts for a substantial portion of the variance in the cross-border e-commerce development level.

Table 3: Total Variance Explanation

Component	Eigenvalue	Proportion	Cumulative
Comp1	10.0054	0.6253	0.6253
Comp2	3.1281	0.1955	0.8208
Comp3	0.8422	0.0526	0.8735

Source: Obtained through STATA18 software calculation

The coefficients for the linear combinations Comp1 and Comp2 are derived by dividing the component score of each indicator by the square root of the respective principal component's eigenvalue. They are then calculated as shown in Eqs (6) and (7).

$$Comp1=0.0396*LS1+0.041*LS2+0.03*KS1+0.0799*KS2+0.0947*LP1+0.0955*LP2+0.0819*LP3+0.0916*LP4+0.0916*LP5+0.0958*LP6+0.0922*IF1+0.0838*IF2+0.0809*IF3+0.0871*IF4+0.0565*CF1+0.0759*CF2 \quad (6)$$

$$Comp2=0.2881*LS1+0.2851*LS2+0.2953*KS1-0.0854*KS2-0.0129*LP1-0.0158*LP2+0.0327*LP3-0.0548*LP4-0.036*LP5-0.0037*LP6-0.005*IF1+0.0307*IF2+0.1002*IF3-0.1154*IF4-0.099*CF1-0.1447*CF2 \quad (7)$$

Comp1 and Comp2 represent the scores for RCEP member countries influenced by the first two principal components, respectively. The overall composite score, Comp, integrates these influences. For computational convenience, the coefficients for Comp are normalized, yielding the following composite scoring model Eq (8).

$$CBEC=0.0953*LS1+0.0956*LS2+0.0898*KS1+0.0391*KS2+0.0666*LP1+0.0665*LP2+0.0676*LP3+0.0547*LP4+0.059*LP5+0.0695*LP6+0.0666*IF1+0.0686*IF2+0.0824*IF3+0.0375*IF4+0.0188*CF1+0.0225*CF2 \quad (8)$$

The weights for the primary indicators within the cross-border e-commerce framework for RCEP countries were derived by aggregating the weights of their respective secondary indicators.

Following these calculations, the primary indicator weights for cross-border e-commerce in RCEP countries are as follows: Scale of goods import and export transactions (LS) = 0.1909, Manufacturers and Consumers (KS) = 0.1289, Logistics Performance (LP) = 0.3839, Information Flow (IF) = 0.2551, and Cash Flow (CF) = 0.0413.

By substituting the variables from the established indicator system into the composite score formula Y, the development level and ranking of cross-border e-commerce among the 12 RCEP countries were obtained. The results are detailed in Table 4 and Table 5.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

Table 4: Development level of cross-border e-commerce in RCEP countries

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	0.4561	0.4459	0.4472	0.4474	0.439	0.4339	0.4432	0.4576	0.4925	0.3273
CHN	0.8344	0.8291	0.8668	0.9414	1.053	1.2216	1.2653	1.3424	1.6864	1.4985
IDN	-0.4344	-0.6938	-0.7233	-0.7383	-0.5994	-0.4063	-0.4225	-0.4204	-0.3819	-0.3308
JPN	0.3604	0.7573	0.7696	0.8163	0.8625	0.9465	0.9303	0.9069	0.9162	0.7545
KOR	0.4317	0.3572	0.4283	0.4707	0.4376	0.4392	0.4589	0.5165	0.609	0.1651
LAO	-1.2998	-1.8714	-1.9697	-2.0771	-1.7422	-1.4872	-1.5132	-1.5473	-1.5823	-1.3698
MYS	-0.5292	0.0005	-0.0393	-0.0806	-0.1451	-0.2	-0.1051	0.0114	0.1421	0.2113
NZL	0.0809	0.0867	-0.0159	-0.1173	0.1087	0.3356	0.2787	0.2309	0.2069	-0.138
PHL	-0.6651	-0.8624	-0.8726	-0.9083	-0.8355	-0.7436	-0.6562	-0.5342	-0.4448	-0.2363
SGP	0.2992	0.6095	0.6815	0.7797	0.7666	0.7306	0.7977	0.9026	1.0333	0.8118
THA	-0.0518	-0.3813	-0.4157	-0.4313	-0.3038	-0.1857	-0.1287	-0.0781	-0.0282	-0.1873
VNM	-0.6598	-0.766	-0.8174	-0.8363	-0.6855	-0.4222	-0.375	-0.3211	-0.2837	-0.2708

Note: A negative sign indicates below the average level.

Table 5: Ranking of cross-border e-commerce development level in RCEP countries

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	2	4	4	5	4	5	5	5	5	4
CHN	1	1	1	1	1	1	1	1	1	1
IDN	8	9	9	9	9	9	10	10	10	11
JPN	4	2	2	2	2	2	2	2	3	3
KOR	3	5	5	4	5	4	4	4	4	6
LAO	12	12	12	12	12	12	12	12	12	12
MYS	9	7	7	6	7	8	7	7	7	5
NZL	6	6	6	7	6	6	6	6	6	7
PHL	11	11	11	11	11	11	11	11	11	9
SGP	5	3	3	3	3	3	3	3	2	2
THA	7	8	8	8	8	7	8	8	8	8
VNM	10	10	10	10	10	10	9	9	9	10

Figure 1 illustrates distinct national differences in cross-border e-commerce development among RCEP member countries. China consistently ranks first, emphasizing its robust trade potential in cross-border e-commerce.

Following closely, Singapore and Japan form the second tier, with South Korea and Australia comprising the third tier. New Zealand, Malaysia, Thailand, the Philippines, Indonesia, and Vietnam generally fall below the average level, although New Zealand slightly surpasses the average, while Laos remains at the lowest development level.

These findings underscore significant disparities in cross-border e-commerce development among RCEP member countries, which can be attributed to differences in economic development, infrastructure quality, and logistics efficiency.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

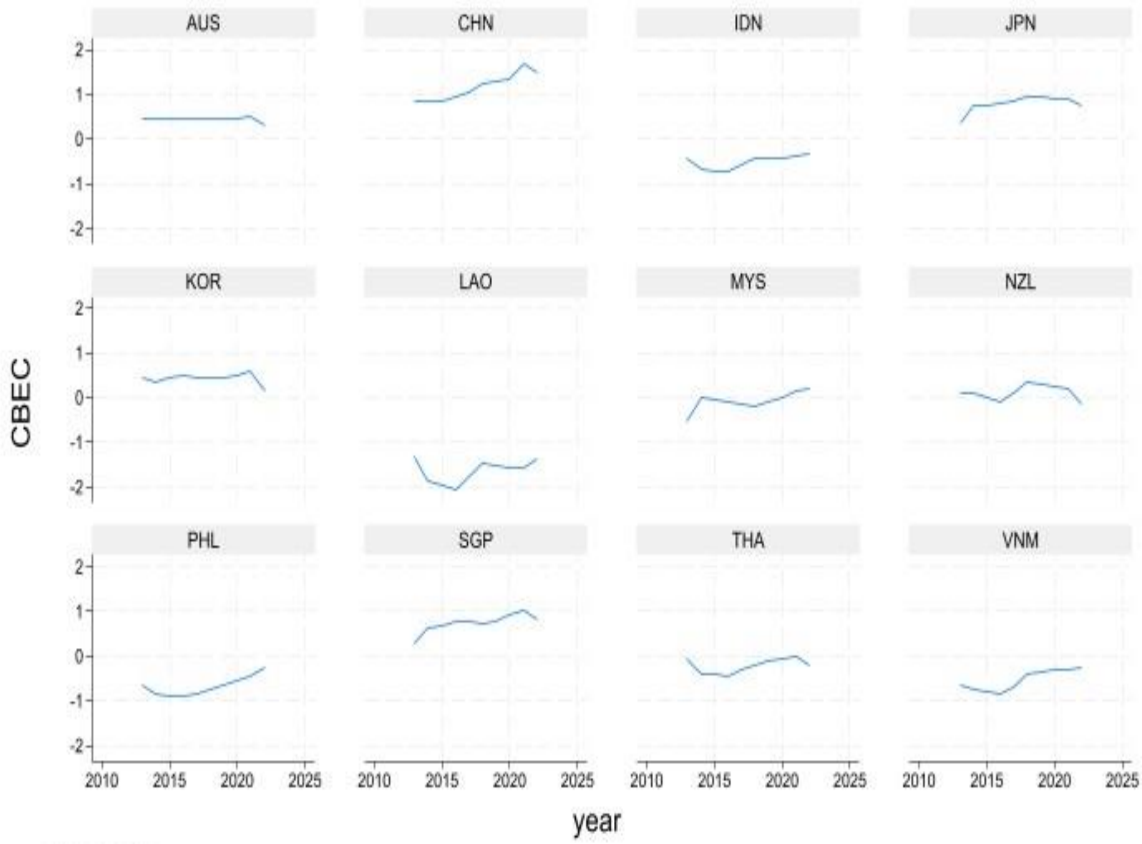

Figure 1: Trends in Cross-Border E-Commerce Development Levels in RCEP Countries

The time trend analysis presented in Figure 1 reveals that from 2013 to 2022, the cross-border e-commerce development levels among RCEP member countries exhibited a general upward trajectory.

China's performance was notably exceptional, consistently leading in cross-border e-commerce development and demonstrating a year-on-year growth rate.

Singapore, the most economically advanced nation within the RCEP, maintained a prominent position both in terms of level and ranking of cross-border e-commerce development. While Japan, South Korea, and Australia experienced slower growth rates, their overall development levels remained significantly high.

Despite a slight decline in 2022 compared to 2021, it is crucial to note that countries with previously lower levels of cross-border e-commerce development, such as Malaysia, the Philippines, Indonesia, Vietnam, and Laos, showed varying degrees of improvement throughout this period, indicating substantial potential for future growth.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

4.2 Empirical Analysis

The results of the estimation are presented in Table 6.

Table 6: Two-Step System GMM Estimation Results for Cross-Border E-Commerce Total Trade Potential

Variable	Coefficient	Std. Error	T-value	P-value	95% Confidence Interval
$\ln Tre_{ij}$ (Lagged)	1.1264***	0.2276	4.95	0.001	[0.6193, 1.6335]
$\ln CBEC_i$	-1.7571**	0.7037	-2.50	0.032	[-3.3250, -0.1891]
$\ln CBEC_j$	0.2040***	0.0364	5.60	0.000	[0.1228, 0.2851]
$\ln PGDP_j$	-0.1810	0.1467	-1.23	0.246	[-0.5079, 0.1459]
$\ln PGDP_i$	1.4562***	0.4492	3.24	0.009	[0.4554, 2.4570]
lnDistoil	-0.1729*	0.0888	-1.95	0.080	[-0.3707, 0.0250]
Constant	-11.8955*	5.9150	-2.01	0.072	[-25.0750, 1.2839]
AR(1) p-value	0.090				
AR(2) p-value	0.343				
Hansen J-test p-value	0.482				
Sargan test p-value	0.293				

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 6 summarizes the results of the baseline model estimating cross-border e-commerce total trade potential using the two-step system GMM method. The coefficients for the lagged dependent variable ($\ln Tre_{ij}$) and China's per capita GDP ($\ln PGDP_i$) are significant at the 1% level, indicating strong persistence in total trade volumes and a significant positive effect of China's economic status on cross-border e-commerce total trade.

The coefficient for the lagged total trade volume ($\ln Tre_{ij}$ L1) is 1.1264 with a t-value of 4.95, demonstrating a strong persistence in total trade volumes, meaning past total trade volumes significantly influence current total trade volumes. For China's cross-border e-commerce development level ($\ln CBEC_i$), the coefficient is -1.7571 with a t-value of -2.50, significant at the 5% level, suggesting that as China's cross-border e-commerce development level increases, the total trade volume with partner countries decreases, which might be due to increased domestic consumption or shifts in trade patterns. Conversely, the partner country's cross-border e-commerce development level ($\ln CBEC_j$) has a positive coefficient of 0.204 with a t-value of 5.60, significant at the 1% level, indicating that as the partner country's cross-border e-commerce development level increases, the total trade volume with China also increases.

The partner country's per capita GDP ($\ln PGDP_j$) has a coefficient of -0.181 and a t-value of -1.23, which is not statistically significant, suggesting a potential negative relationship between the partner country's economic status and total trade volume. In contrast, China's per capita GDP ($\ln PGDP_i$) shows a strong positive effect on cross-border e-commerce total trade, with a coefficient of 1.4562 and a t-value of 3.24, significant at the 1% level. The interaction of physical distance and international oil price (lnDistoil) has a negative coefficient of -0.173 and a t-value of -1.95, significant at the 10% level, suggesting a negative relationship between transportation costs and total trade volume. The Hansen and Sargan tests confirm that the instruments used are appropriate and the model is correctly specified, ensuring the robustness

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

of the estimation results. Overall, these results highlight the significant roles of both China's and partner countries' cross-border e-commerce development levels and China's economic status in influencing cross-border e-commerce total trade potential. Based on the estimation results presented in Table 4.14, we can construct the equation for cross-border e-commerce total trade potential. Using the coefficients obtained from the GMM model, the equation is as follows:

$$lnTre_{jt} = -11.89533 + 1.1264 lnTre_{jt-1} - 1.7571\, ln\, CBEC_{it} + 0.204\, ln\, CBEC_{jt} + 1.4562 lnPGDP_{it} - 0.181 lnPGDP_{jt} - 0.173 lnDistoil_{ijt} \quad (9)$$

Equation 7 incorporates the lagged value of the total trade volume, China's and the partner country's cross-border e-commerce development levels, the per capita GDP of both China and the partner country, and the interaction of physical distance and international oil price. The coefficients reflect the estimated impact of each variable on the total trade potential. Based on the equation, we calculated the potential values for cross-border e-commerce total trade. The detailed results are presented in Table 7.

Table 7: Total Trade Potential Values between China and RCEP Partners

Country	2015-2016	2017-2018	2019-2020	2021-2022	Average
AUS	1.1341	1.3006	1.2711	1.2127	1.2296
IDN	0.8152	1.0304	0.9417	1.1724	0.9899
JPN	0.6774	0.735	0.6793	0.6739	0.6914
KOR	0.7131	0.6864	0.6375	0.7161	0.6883
LAO	1.5453	1.7603	1.5119	1.4244	1.5605
MYS	0.8714	0.9632	1.1222	1.1193	1.019
NZL	1.7005	1.7492	1.654	1.7388	1.7106
PHL	1.1153	0.8902	0.8786	0.8848	0.9422
SGP	1.1367	1.0444	1.2015	1.0824	1.1163
THA	1.1325	0.9668	0.9724	0.9623	1.0085
VNM	0.8537	0.7937	0.8587	0.7374	0.8109

Note: Higher potential values indicate that the actual trade is close to or exceeds the theoretical trade potential, signifying smaller room for growth in cross-border e-commerce trade.

Table 7 provides the calculated potential values for cross-border e-commerce total trade between China and its RCEP partner countries from 2015 to 2022. These values are derived using the established equation, reflecting the ratio of actual trade to the theoretical trade potential. Because of the one-period lag, data for 2013-2014 is missing. The average potential values across the years offer insights into the trade dynamics and indicate which countries have higher or lower trade potential in relation to China. Higher potential values indicate that the actual trade is close to or exceeds the theoretical trade potential, signifying smaller room for growth in cross-border e-commerce trade. Australia (AUS) maintains a relatively high average potential value of 1.2296, with its highest value in the 2017-2018 period (1.3006) and a slight decrease in the subsequent years. Indonesia (IDN) shows variability, with an average value of 0.9899, reaching its highest potential value in 2021-2022 (1.1724). Japan (JPN) has consistently low potential values, with an average of 0.6914, indicating lower trade potential.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

South Korea (KOR) displays a similar trend, with an average value of 0.6883, peaking in the 2021-2022 period (0.7161). Laos (LAO) exhibits the highest potential values among all countries, with an average of 1.5605 and the peak in 2017-2018 (1.7603). Malaysia (MYS) shows an increasing trend, with an average value of 1.019, reaching its highest in 2019-2020 (1.1222). New Zealand (NZL) maintains high potential values with an average of 1.7106, indicating strong trade potential. The Philippines (PHL) has an average potential value of 0.9422, with a slight decrease in the later years. Singapore (SGP) displays moderate potential values with an average of 1.1163, peaking in 2019-2020 (1.2015). Thailand (THA) has an average value of 1.0085, with its highest potential value in 2015-2016 (1.1325). Vietnam (VNM) shows lower potential values with an average of 0.8109, indicating lower trade potential compared to other countries. The overall analysis of Table 4.16 highlights the varying levels of trade potential between China and its RCEP partners, providing insights into the dynamics of cross-border e-commerce trade. According to the classification standard, the trade potential of cross-border e-commerce imports, exports, and total trade between China and RCEP partner countries can be categorized as follows Table 8.

Table 8: China's Cross-Border E-Commerce Trade Potential Value with RCEP Partners

Country Name	Total Trade	Classification
AUS	1.2296	Reconstructive Potential
IDN	0.9899	Under Trade
JPN	0.6914	Significant Potential
KOR	0.6883	Significant Potential
LAO	1.5605	Reconstructive Potential
MYS	1.019	Sufficient Trade
NZL	1.7106	Reconstructive Potential
PHL	0.9422	Under Trade
SGP	1.1163	Sufficient Trade
THA	1.0085	Sufficient Trade
VNM	0.8109	Under Trade

5. FINDINGS AND DISCUSSION

5.1 Cross-Border E-Commerce Development

From an ecosystem perspective of cross-border e-commerce, the distribution of total weights among Leading Species, Key Species, and Supporting Species—at 0.1908, 0.1284, and 0.6808, respectively—emphasizes the predominant role of Supporting Species, accounting for 68.08% of the overall development level of cross-border e-commerce. This empirical evidence underscores the critical influence of Supporting Species in fostering cross-border e-commerce development, aligning with Li 's (2018) findings. Concerning primary indicators, the weights assigned to the Scale of goods import and export transactions (19.08%), Manufacturers and Consumers (12.84%), Logistics Performance (37.41%), Information Flow (26.58%), and Cash Flow (4.08%) reinforce Zhang's (2021) conceptualization of the cross-border e-commerce ecosystem as a multifaceted network driven by logistics, business, capital, and information flows. The prominence of logistics underscores its vital role in cross-border e-commerce

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

development, corroborating Zhang and Ma's (2015) argument regarding the developmental constraints posed by inadequate logistics. The significant weighting of the TIMG index, representing Information Flow and second only to logistics, supports Zhang and Li's (2020) assertion of the digital economy as foundational to cross-border e-commerce and digital trade development. At the secondary indicator level, the weights assigned to Import volume of goods, Export volume of goods, and Manufacturing value added, all exceeding 9%, lend partial support to He and Wang's (2019) observation of GDP's influence on cross-border e-commerce trade. Conversely, the minor weights assigned to Cash Flow's secondary indicators suggest a limited impact of capital flow on cross-border e-commerce development. This perspective diverges from existing literature, which primarily links capital flows to broader economic activity without explicitly discussing their effect on cross-border e-commerce development.

Nationally, China's leading position in global cross-border e-commerce development is attributed to its rapidly advancing logistics and network infrastructure and enhanced customs efficiency, reflecting real-world observations and validating the constructed index system's authenticity and comprehensiveness. Singapore's high ranking within RCEP is due to its advanced financial services, robust manufacturing sector, and open policies, highlighting its economic development. The study observes a universally positive, albeit varied, growth trend in cross-border e-commerce development across countries. This finding contrasts with Shen's (2023) observations on Australia and South Korea's comparable levels, likely due to dataset variations between G20 and RCEP countries, indicating further research opportunities. Laos's position at the lower end, attributed to its economic and e-commerce infrastructure development levels, aligns with Song's (2021) assessments of ASEAN countries like Myanmar, Laos, and Cambodia, underscoring the influence of economic status, infrastructure, and logistics efficiency on cross-border e-commerce development disparities.

5.2 Cross-Border E-Commerce Trade Potential between China and Rcep Partners

Impact of China's Cross-Border E-Commerce Development Level: Research indicates that the development of cross-border e-commerce in China has not significantly changed its import-export structure, and its rapid growth has not resulted in sustained increases in total trade volumes, suggesting limited or even negative impacts on overall trade.

Impact of Partner Countries' Cross-Border E-Commerce Development Level: Studies show that the development of cross-border e-commerce in partner countries positively affects total trade volumes, especially in regions with high internet penetration and effective electronic payment systems. Analysis of five ASEAN countries reveals that improvements in the electronic payment environment and per capita income enhance China's export trade. The Belt and Road Initiative further underscores that optimizing logistics, customs procedures, and policies in partner countries significantly boosts trade volumes with China.

Impact of Partner Countries' Per Capita GDP: Although the development of cross-border e-commerce influences traditional trade models, partner countries' per capita GDP does not significantly drive total trade volumes; instead, trade growth relies more on enhanced internet infrastructure and favorable policy environments.

Impact of China's Per Capita GDP: Research shows that China's per capita GDP positively affects total cross-border e-commerce trade volumes by lowering trade barriers and costs, enabling greater participation in international trade, particularly in more economically developed contexts.

Impact of Distance Costs: Distance costs negatively impact total cross-border e-commerce trade volumes at a 10% significance level. While not significant for imports or exports separately, aggregated data reveals the cumulative significance. Logistics and delivery services significantly influence distance costs; despite rapid delivery reducing time-related distances, higher logistics costs still hinder transaction volumes. Analysis shows that transportation costs and tariffs have a notable negative impact on international trade growth.

Untapped Cross-Border E-Commerce Trade Potential between China and Japan and South Korea: Studies suggest that while there is substantial cooperation potential in cross-border e-commerce between China and South Korea, traditional trade methods limit development. Recommendations include activating trade entities via the Electronic World Trade Platform (eWTP), improving logistics efficiency, and enhancing consumer experiences. The Belt and Road Initiative highlights that better infrastructure and financial services can enhance export efficiency between China, Japan, and South Korea.

Reconstructive Trade Potential for Australia, New Zealand, and Laos: Research indicates that despite significant cross-border e-commerce opportunities for Australian SMEs in the Chinese market, many have not fully capitalized on this potential. New Zealand enterprises can access international markets through cross-border e-commerce platforms, particularly in agriculture and manufacturing, but face infrastructure and logistics challenges. For Laos, improving logistics and infrastructure within the Belt and Road Initiative context could significantly enhance its cross-border e-commerce trade capacity.

6. CONCLUSION AND ENLIGHTENMENT

6.1 Conclusions

The analysis of cross-border e-commerce development levels and trade potential between China and its RCEP partners reveals several key insights.

Firstly, the cross-border e-commerce development level is heavily influenced by supporting species, with logistics performance and information flow playing critical roles. China's leading position in cross-border e-commerce development is driven by advanced logistics and network infrastructure, while countries like Laos lag due to significant disparities in infrastructure and economic development. Secondly, the total cross-border e-commerce trade analysis shows that China's development level has limited effects on increasing total trade volumes. However, partner countries' development levels significantly enhance their total trade volumes with China. While partner countries' per capita GDP does not significantly promote total trade volumes, China's per capita GDP has a positive effect. Distance costs negatively impact total trade volumes at the 10% significance level. Untapped trade potential exists between China and South Korea, Japan, and other RCEP partners, suggesting the need for new trade promotion

The Seybold REPORT
ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

measures. In conclusion, these findings underscore the importance of improving logistics, infrastructure, and digital economy development to enhance cross-border e-commerce trade potential. Policies aimed at reducing trade barriers, improving digital infrastructure, and fostering economic cooperation will be crucial for maximizing the trade potential between China and its RCEP partners.

6.2 Practical Implication

This study proposes several actionable policy recommendations to enhance cross-border e-commerce development and trade potential between China and its RCEP partners, aligned with key findings. First, to improve logistic performance and information flow, governments should invest in logistics infrastructure and optimize customs processes, leveraging digital technologies for seamless information exchange. Second, leveraging China's economic strength is vital; thus, policymakers should support strategies that boost per capita income and industrial productivity, focusing on domestic consumption and the growth of small and medium-sized enterprises (SMEs). Finally, to mitigate the negative impact of distance costs on trade volumes, governments should reduce logistical and transportation expenses through regional cooperation, infrastructure investment, and the adoption of technologies that enhance supply chain efficiency. Establishing free trade zones and special economic zones can further lower cross-border trade costs.

Funding: This study, is financially sustained by the University Humanities and Social Sciences Research Project of Anhui Province of China (Project No. 2023AH052667) and the Training Program for Outstanding Young Teachers in Anhui Province of China (Project No. gxyqZD2022134).

References

1) Armstrong, S.P., Measuring trade and trade potential: A survey. Crawford School Asia Pacific Economic Paper, 2007(368).

2) Bergstrand, J.H., The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. The Review of Economics and Statistics, 1985. 67(3): p. 474-481.

3) Chen, N., Analysis of the Correlation between Cross-Border E-Commerce and Economic Growth Based on Hierarchical Multilevel Gray Evaluation Model. Journal of Mathematics, 2022. 2022.

4) Chen, T.T., An Empirical Study on China's Assessment of the Cross-Border E-commerce Development Potential in ASEAN Countries under the Background of the Belt and Road Initiative: Based on a Two-Stage Trade Gravity Model. Journal of Commercial Economics, 2020(22): p. 80-83.

5) Derindağ, Ö.F., Rise of Cross-Border E-Commerce: A Systematic Literature Review. Journal of Applied and Theoretical Social Sciences, 2022. 4(3): p. 352-372.

6) Egger, P., an Econometric View on the Estimation of Gravity Models and the Calculation of Trade Potentials. The World Economy, 2002. 25(2): p. 297-312.

7) Gomez-Herrera, E., B. Martens, and G. Turlea, The drivers and impediments for cross-border e-commerce in the EU. Information Economics and Policy, 2014. 28: p. 83-96.

8) Hamilton, C., Opening up international trade in Eastern Europe, L.A. Winters, Editor. 1992, Institute for International Economic Studies: Stockholm:.

ISSN 1533-9211

DOI: 10.5281/zenodo.13986583

9) Han, J. and T. Lee, The Influence Factors of China's Cross-Border E-Commerce Export Trade Using Gravity Model'. Journal of Korea Trade, 2022. 26(5): p. 56-75.

10) He, Y. and J. Wang, A Panel Analysis on the Cross Border E-commerce Trade: Evidence from ASEAN Countries. The Journal of Asian Finance, Economics and Business, 2019. 6: p. 95-104.

11) Hu, G.L., X.H. Lu, and L.H. Huang, An Essay on E-business Ecosystem and Its Evolutionary Path——With Focus on the Phenomenon of E-business Industrial Cluster in China. Economic Management Journal, 2009. 31(06): p. 110-116.

12) Huang, J., Research on the Evaluation of Cross-border E-commerce Development in Guangdong Province Based on Ecosystem Theory. 2019, South China University of Technology.

13) Jin, S. and X. Wang, Impact of cross-border e-commerce on China's aquatic product export, in Proceedings of the 2022 13th International Conference on E-business, Management and Economics. 2022, Association for Computing Machinery: Beijing, China. p. 67–71.

14) Kong, Q.F. and H.W. Dong, Trade Facilitation and Trade Potential of Countries along "One Belt One Road" Route. Journal of International Trade., 2015(12): p. 158-168.

15) Li, J.B., M.D. Chen, and C.L. Qin, Research on the Evaluation of the Development Level of China's Cross-border E-commerce——Analysis based on Fuzzy Analytic Network Process. Price: Theory & Practice, 2020(11): p. 157-160.

16) Li, X.G. and Q.F. Wang, Research on Symbiotic Coupling Mode and Mechanism of Cross-border E-commerce Logistics Industry Chain based on Public Overseas Warehouse. China Business and Market, 2018. 32(09): p. 41-48.

17) Liu, H.H., Construction and Development Strategy of Cross-border E-commerce Ecosystem in Era of Digital Economy, in Proceedings of the 2021 7th International Conference on Education and Training Technologies. 2021, Association for Computing Machinery: Macau, China. p. 60–65.

18) Liu, Z.J., Research on Enterprise Ecological Networks Based on Industrial Clusters. Research on Economics and Management, 2006(01): p. 61-64.

19) Moore, J.F., The Decline of Competition: Leadership and Strategy in the Business Ecosystem Era. 1999: Beijing Publishing House.

20) Nazir, M.A. and R. Muhammad Azam, Barriers to Adopting Electronic Commerce for Small and Medium-sized Enterprises in Emerging Economies. Emerging Markets Journal, 2020. 10(2): p. 43-55.

21) Nilsson, L., Trade integration and the EU economic membership criteria. European Journal of Political Economy, 2000. 16(4): p. 807-827.

22) OECD, OECD Science, Technology and Industry Scoreboard 2007. 2007.

23) Poyhonen, P., A Tentative Model for the Volume of Trade between Countries. Weltwirtschaftliches Archiv, 1963. 90: p. 93-100.

24) Shen, H.H. and J. Chen, Empirical research of business development potentiality of cross border e commerce between China and the belt & road countries. Finance, 2020. 6(3): p. p1.

25) Shen, J.S., Research on the Development Potential of Cross border E-commerce between China and G20 Member States. 2023, Hebei University of Economics and Business.

26) Shu, T., Research on Sino-US Trade Efficiency and Potential Based on Stochastic Frontier Gravity Model. 2018, Shandong University.

27) Song, H.X., Research on the Development Potential of Cross-border E-commerce in China-ASEAN. 2021, Hebei University of Economics and Business.

ISSN 1533-9211
DOI: 10.5281/zenodo.13986583

28) Tansley, A.G., The Use and Abuse of Vegetational Concepts and Terms. Ecology, 1935. 16(3): p. 284-307.
29) Tinbergen, J., Shaping the World Economy: An Analysis of World Trade Flows. New York Twentieth Century Fund, 1962. 5(1): p. 27-30.
30) Villa, E., et al., Electronic Commerce: Factors Involved in its Adoption from a Bibliometric Analysis. Journal of theoretical and applied electronic commerce research, 2018. 13: p. 39-70.
31) Wang, G. and Z. Cao, An Empirical Study on the Trade Impact of Cross border E-commerce on ASEAN and China under the Framework of RECP. E3S Web of Conferences, 2021.
32) Wang, G. and Z. Cao. An Empirical Study on the Trade Impact of Cross border E-commerce on ASEAN and China under the Framework of RECP. In E3S Web of Conferences. 2021. EDP Sciences.
33) Wang, M. Impact of the Electronic Payment Environment of the Importing Country on China's Export Trade: Based on Panel Data of the Five ASEAN Countries. In 5th International Conference on Economics, Management, Law and Education (EMLE 2019). 2020. Atlantis Press.
34) Wang, Z., Y.M. Chen, and M. Zhang, Measuring the Development of the Global Digital Economy: Stylized Facts Based on TIMG Index. Chinese Review of Financial Studies, 2021. 13(06): p. 40-56+118-119.
35) Yang, J.Z. and L. Yu, Analysis on the Cross-border E-commerce Application of China's Foreign Trade Enterprises. Contemporary Economic Management, 2014. 36(06): p. 58-63.
36) Yang, J.Z., B.X. Zheng, and L.F. Yang, Research on Cross-border E-commerce Index System Based on Factor Analysis. Finance & Trade Economics, 2014(09): p. 94-102.
37) Zhang, B., X.J. Liu, and Z. Tao, The Study of Current Situation and Operation Pattern of the Cross-border E-commerce Logistics in Chin. China Business and Market, 2015. 29(01): p. 51-56.
38) Zhang, J.L., Y.Z. Zhang, and X.Q. Zhang, The current situation and potential evaluation of Sino-German bilateral trade based on gravity model. World Regional Studies, 2016. 25(06): p. 18-27.
39) Zhang, P.F. and Y.Y. Tang, The Impact of Digital Service Level on International Bilateral Trade along the Belt and Road——An Empirical Study Based on Asian Countries. Journal of Shanghai University of International Business and Economics, 2020. 27(03): p. 38-46.
40) Zhang, W.N., X.J. Lu, and M.H. Li, a Study of Factors That Affect the Development of China Cross-Border Electronic Commerce. Humanities & Social Sciences Journal of Hainan University, 2019. 37(03): p. 57-63.
41) Zhang, X., Effect of Silk Road Economic Belt Countries' Trade Facilitation on Chinese Mechanical and Electronic Export. 2020, Shandong University.
42) Zhang, X.H. and D.D. Li, Research on the Coupling Development of the Digital Economy, Cross-border E-commerce and Digital Trade——Application Prospect of Blockchain Technology Among Them. Theoretical Investigation, 2020(01): p. 115-121.
43) Zhang, X.H. and T.S. Ma, Difficulties and Countermeasures about China's Cross-border E-commerce Logistics. Contemporary Economic Management, 2015. 37(05): p. 51-54.
44) Zhang, X.H., Construction Mechanism and Implementation Path of Cross Border E-Commerce Ecosystem. Contemporary Economic Management, 2021. 43(07): p. 55-60.
45) Zhang, Y.F. and C. Wang, Study on Cross-border E-commerce Export Trade Potential and Its Influencing Factors: An Empirical Test Based on Extended Trade Gravity Model. West Forum, 2019. 29(05): p. 85-92.
46) Zheng, C.F. and Y.Q. Zhang, Research on Influencing Factors and Potential of China's Cross-Border E-Commerce Export. Journal of Graduate School of Chinese Academy of Social Sciences, 2021(04): p. 63-72.