

The Present Situation and Trend of China's Cross-border E-commerce Development Research—Visual Analysis Based on CiteSpace

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Abstract: With the rapid development of cross-border e-commerce, the quantity and quality of cross-border e-commerce research are increasing year by year. Based on the CNKI database, the paper analyzes the current status of China's cross-border e-commerce research based on the CiteSpace visualization analysis method, and explores the current hotspots and research trends of China's cross-border e-commerce research. The results show that although more and more scholars pay attention to the research of cross-border e-commerce, the research of cross-border e-commerce in China hasn't matched its actual development. At present, the main researches include cross-border e-commerce development research, model research, foreign development research, pilot regional experience research, cross-border e-commerce and foreign trade relationship research, cross-border e-commerce logistics development and its relationship with cross-border e-commerce research. The analysis results shows that cross-border e-commerce policy recommendations, cross-border e-commerce logistics, cross-border e-commerce and cross-border logistics collaborative research, cross-border e-commerce research in the context of new technologies and new concepts, and cross-border e-commerce ecosystems are the most cutting-edge research trends.

1. Introduction

Cross-border e-commerce is an international business activity that involves transaction entities in different countries or regions, completes transaction activities through Internet platforms, and completes goods delivery through cross-border logistics. In order to make a systematic and comprehensive review of the existing cross-border e-commerce research, and analyze its research status and research trends. Based on the CNKI database, this article retrieves relevant literature on cross-border e-commerce topics. CiteSpace software was used for literature metrology and visual analysis of map of scientific knowledge, to sort out the current progress and current status of scholars' research and to analyze the hotspots and trends of cross-border e-commerce theoretical research in China, in order to provide valuable suggestions [1-3].

2. Data Collection and Processing

Use the words "cross-border e-commerce" and "cross-border e-commerce" to search the CNKI database. The source of the literature is "core journal" and "CSSCI". The search method is "precise". The retrieval date is November 14, 2019, a total of 1111 related articles were retrieved, then carry on the manual screening, eliminates the news report, the solicitation notice, the meeting notice, the periodical summary and so on irrelevant and invalid literature [4-6]. Finally, a total of 1031 valid documents were obtained.

3. Method

CiteSpace combines functions of co-citation, high frequency, and clustering. It is a visualization analysis software mainly used to predict the evolution and trends of the frontiers of scientific development. It is one of the most widely used knowledge map analysis software by scholars today.

The paper uses CiteSpace to research 1031 sample documents, draw a knowledge map of authors, keywords co-occurrence in the cross-border e-commerce field in China, and then analyze the research status, research hotspots, research frontiers and trends in the cross-border e-commerce field. It is hoped to be able to show the current academic research hotspots and future research trends in the field of cross-border e-commerce more comprehensively and visually.

4. Analysis of Research Status

4.1 Development Trend Analysis



Figure 1 Number of papers published on cross-border e-commerce each year.

As shown in Figure 1, through a review of the literature, we can see from 2001 to 2014, China's cross-border e-commerce has been in a steady incubation period, and began to develop rapidly in 2014. Since 2014, the state has successively introduced policies to support and encourage the development of cross-border e-commerce. In the same year, scholars Lai Youwei, Wang Kaiqian, E Libin, and Huang Yongwen published several influential cross-border e-commerce related research articles, opening the door to cross-border e-commerce research in China.

4.2 Development Stage Analysis

According to the distribution of the annual publication volume of the literature, China's cross-border e-commerce research and development is divided into three stages, namely the foundation laying stage, the development exploration stage, and the second explosion stage.

The foundation laying stage was from 2001 to 2013, and the number of high-quality papers was not huge. However, the research in these years is the basis of cross-border e-commerce research, and the research scope is constantly expanding. Each document has been cited many times.

The development exploration stage from 2014 to 2018, the number of documents at this stage increased significantly, showing a good momentum of vigorous development as a whole. In 2014, the e-commerce giant Alibaba went public, and the national e-commerce industry has seen more rapid development. In 2015, China's relevant encouraging policies were introduced, reforming foreign trade supervision methods, approving cross-border e-commerce pilot cities, launching new customs supervision codes, and agreeing to establish Hangzhou Cross-border E-commerce Comprehensive Pilot Area; In 2016, 12 cities including Tianjin and Shanghai established cross-border e-commerce comprehensive Pilot areas. China's cross-border e-commerce development presents a new picture.

From 2018 to the present, this is the second explosion stage. In 2018, as a "shuffle year" for cross-border e-commerce, the entire industry is flourishing. In March 2018, the United States, one of the three major export cross-border e-commerce companies in China, started a trade war against China. This move has a greater impact on China's export cross-border e-commerce. In July 2018, China added another comprehensive cross-border e-commerce pilot zone in 22 cities including Beijing, Haikou and Lanzhou [7-10]. Driven by domestic and international factors, China's research on cross-border e-commerce has seen a second surge.

4.3 Author Analysis

4.3.1 Core Author Analysis

Statistical analysis of authors of cross-border e-commerce research can identify core authors and major contributing scholars in this field. Using CiteSpace to analyze the authors, the knowledge map of research authors' publications shown in Figure 2 and the high-yielding authors shown in Table 1 were obtained. It can be seen that the representative authors in the field of cross-border e-commerce research are Zhang Xiaoheng and Yang Jianzheng.

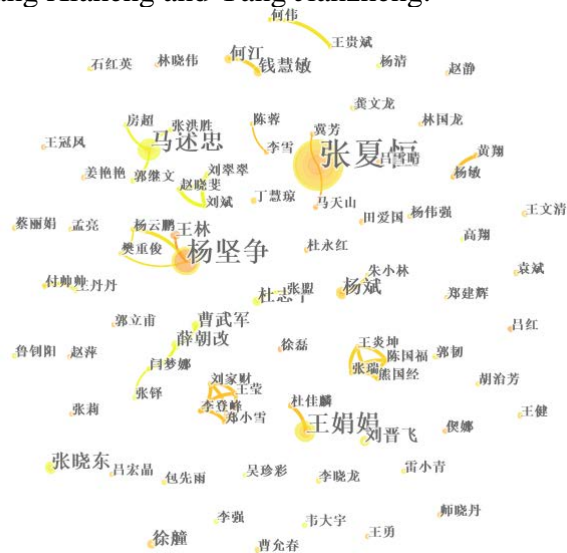


Figure 2 Cross-border e-commerce research author knowledge map.

The core author refers to a representative author in a certain research field. The determination of the core author can refer to Price Law: In the same topic, half of the papers are written by a group of prolific authors. The number is approximately equal to the square root of the total number of authors. The relationship between the minimum number of core authors and the maximum number of authors is as follows:

$$Mp = 0.749\sqrt{N_p \max}.$$

Table 1 Prolific authors of core literatures on cross-border e-commerce.

SN	Author	Count	Year	SN	Author	Count	Year
1	Zhang Xiaoheng	16	2015	8	Xue Chaogai	3	2019
2	Yang Jianzheng	9	2014	9	He Jiang	3	2017
3	Ma Shuzhong	7	2018	10	Cao Wujun	3	2019
4	Wang Juanjuan	7	2016	11	Xu Tong	3	2016
5	Yang Bin	4	2016	12	Liu Jinfei	3	2018
6	Zhang Xiaodong	4	2016	13	Du Zhiping	3	2019
7	Qian Huimin	3	2017	14	Wang Lin	3	2014

Statistical analysis of core authors in the field of cross-border e-commerce in China. The most prolific author Zhang Xiaoheng published 16 papers. According to the rounding principle, the authors who published 3 or more papers were the core authors, totaling 14 people. 71 papers, accounting for 6.9%, far less than 50%, which is inconsistent with Price's law. Therefore, China's cross-border e-commerce research has not yet formed a core author group.

4.3.2 High-yielding Authors Analysis

It can be seen from Figure 2 that the nodes are scattered and less connected. Only Zhang Xiaoheng, Yang Jianzheng, and Ma Shuzhong have more cooperation with other authors, and most scholars are in their own research. The most productive author in this field is Zhang Xiaoheng, followed by Yang Jianzheng, Ma Shuzhong, and Yang Juanjuan. Their number of articles on cross-border e-commerce research exceeds 50% of the total number of core authors.

4.4 Research Institution Analysis

The Excel was used to summarize the research information of the core literature. The results are shown in Figure 3 below. The institution with the largest number of papers is the University of International Business and Economics (17 papers). The top 10 institutions with papers are listed in Table 2 show.

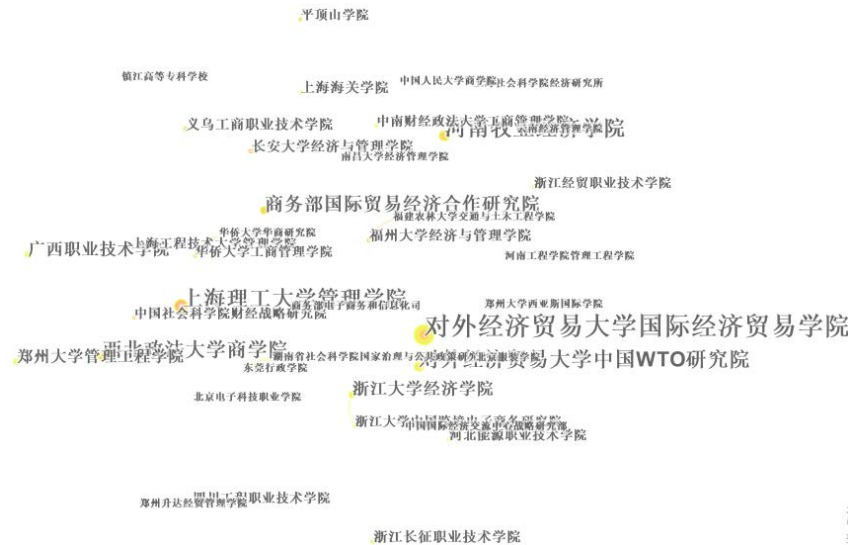


Figure 3 Knowledge map of cross-border e-commerce research institutions.

Table 2 Top 10 institutions for cross-border e-commerce research.

SN	Institution	Count	Year
1	University of International Business and Economics	17	2014
2	Business School, University of Shanghai for Science and Technology	11	2014
3	Henan University of Animal Husbandry and Economy	10	2014
4	University of International Business and Economics	9	2016
5	NorthWest University of Politics and Law Business School	8	2016
6	Chinese Academy of International Trade and Economic Cooperation, MOFCOM	7	2016
7	Guangxi Vocational & Technical College	6	2016
8	School of Economics Zhejiang University	6	2018
9	Zhengzhou University Administrative Engineering College	5	2019
10	Yiwu Industrial and Commercial College	4	2017

5. Research Hotspots and Trend Analysis

Keywords are the abstract of the main content of the literature, can summarize the core problems of a paper, fully reflect the author's understanding of research issues. This article mainly uses the keyword visual analysis of the article to study the research hotspots and research trends of

cross-border e-commerce. First, the keywords with similar meanings are combined, and then the keywords of related documents of cross-border e-commerce are analyzed by using CiteSpace to generate a keyword map as shown in Figure 4. Nodes in the knowledge graph represent the frequency of occurrence, the size of the nodes is proportional to the number of times; the degree of correlation between the thickness of the keywords connecting the keywords is directly proportional to the co-occurrence frequency. In addition to "cross-border e-commerce" and "cross-border e-commerce", it is obvious that high-frequency keywords include "e-commerce", "Belt and Road", "cross-border e-commerce logistics", "international trade". Chinese scholars' current research on cross-border e-commerce mainly focuses on these areas. Keywords such as "ecosystem", "blockchain", and "digital trade" are generally one-way linked with other keywords. They are at the edge of the keyword network and belong to less research. There is a lack of research issues related to other fields. May represent future research trends.

Figure 4 Key words map of cross-border e-commerce research.

Using CiteSpace software to analyze keywords, run the results, and fine-tune the graphics to obtain the keyword co-occurrence knowledge network. These high-frequency keywords shown in Figure 4 represent the research hotspots in the cross-border e-commerce field in recent years and the correlation between the hotspots. Among them, "cross-border e-commerce" and "cross-border e-commerce" have the highest frequency and the largest nodes, covering the entire time of the study. "As the search term, the two keywords will need to be eliminated here. After the deletion, the top ten keywords are selected and sorted according to the two indexes of keyword frequency and center coefficient. The results are shown in Table 3 and Table 4 shown.

Hot keywords	Count	Centrality	Year
e-commerce	101	0.17	2014
The Belt and Road	83	0.09	2015
Cross-border e-commerce logistics	65	0.12	2015
The international trade	31	0.05	2014
Overseas warehouse	23	0.16	2015
The Internet	20	0.05	2014
The ministry of foreign trade	19	0.13	2014
The ministry of foreign trade	17	0.57	2015
Electric business platform	15	0.08	2014
b2c	14	0.16	2015

Table 4 High centrality keywords.

Hot keywords	Count	Centrality	Year
Impact	7	0.74	2016
Innovation	10	0.70	2016
Trade facilitation	17	0.70	2014
Development countermeasures	4	0.47	2015
Agricultural products	10	0.45	2016
Traditional international trade	2	0.44	2017
Shanghai free trade zone	9	0.39	2014
Internet +	12	0.38	2016
competitiveness	2	0.34	2017
Small and medium-sized enterprises	10	0.32	3016

We can see the high-frequency keywords in Tables 3 and 4, are "e-commerce", "The Belt and Road", "cross-border e-commerce logistics", "international trade", "overseas warehouses". Highly central keywords are "impact", "innovation", "trade facilitation" and "development countermeasures". High-frequency keywords are hot topics of scholars' research. However, high-frequency keywords alone cannot accurately determine research hotspots. Not all high-frequency keywords have high centrality. In the keyword visualization results of CiteSpace, keywords with high centrality ($\text{Centrality} \geq 0.1$) represent part of the research hotspots. As shown in Table 4, "impact" and "innovation" are the supporting points of the cross-border e-commerce keyword network. Followed by "trade facilitation", "development countermeasures" and "agricultural products". Therefore, the research hotspots of cross-border e-commerce are mainly focused on the impact of cross-border e-commerce, related links of cross-border e-commerce such as logistics, development issues and countermeasures of cross-border e-commerce, related policies of cross-border e-commerce, and The Belt and Road strategy.

Comprehensive keyword maps and literature analysis have classified the hotspots of cross-border e-commerce research in China into the following areas:

Research on the development of cross-border e-commerce. Research on the development status of cross-border e-commerce has always been a part of the research hotspot, including the current situation, dilemmas, countermeasures and influencing factors, involving various links and supporting systems of cross-border e-commerce. Lai Youwei (2014) summarized the development patterns, dilemmas, and countermeasures of China's cross-border e-commerce. Zhang Bin et al. (2015) believe that China's logistics industry has problems such as incomplete infrastructure, high costs, low efficiency, and poor service quality. The development speed of cross-border logistics is difficult to match the development of cross-border e-commerce, and it inhibits the development of cross-border e-commerce. This article states that this issue should be improved in conjunction with other industries. Shen Danyang (2015) used the SWOT analysis method in management to point out the problems in China's cross-border e-commerce logistics and make suggestions.

Research on the business model of cross-border e-commerce. Lv Xueqing (2016) enumerated the various existing business models of China's cross-border e-commerce and comprehensively analyzed the problems of various models, including the lack of complete industry specifications, the difficulty of guaranteeing the quality of service in the logistics link, the risk of payment links and account security And other issues, and pointed out that the cross-border e-commerce industry needs to determine feasible development models and business models as soon as possible. Zhang Xiaheng (2017) analyzed the types and operating models of cross-border e-commerce.

Research on the relationship between cross-border e-commerce and foreign trade. Including the transformation and upgrading of traditional foreign trade, cross-border e-commerce and foreign trade synergy. For example, Wang Huimin (2014) studied the differences between cross-border e-commerce and international trade, and pointed out the role of cross-border e-commerce in promoting the transformation and upgrading of foreign trade.

Research on cross-border e-commerce logistics. Including logistics development difficulties and

countermeasures, cross-border e-commerce and cross-border logistics collaborative and interactive development research. For example, Zhang Xiaoheng (2016) explored the mechanism and path of synergy between cross-border e-commerce and cross-border logistics, and Zhang Bin (2015) discussed the development status and operation mode of cross-border e-commerce logistics in China.

Research on pilot regional experience. For example, Xiong Li (2016) studied the dynamic mechanism and strategy of the development of Shanghai's cross-border e-commerce platform. In addition, some scholars have also studied the construction of cross-border e-commerce, cross-border e-commerce ecosystems and cross-border e-commerce ecosystems, cross-border e-commerce development prospects in the context of the Belt and Road Initiative. Marketing model, Internet + cross-border logistics, cross-border e-commerce customer experience, cross-border e-commerce finance, cross-border e-commerce logistics park, risk, supply chain, cost research, etc. For example, Zhang Lijuan (2015) empirically analyzed the influencing factors of cross-border e-commerce customer experience. Ji Chunyang et al. (2016) studied the construction of China-ASEAN cross-border e-commerce ecosystem. Zhang Li (2017) explored cross-border Operation mode of e-commerce industrial park.

5.2. Research Trend

Through statistical analysis of high-frequency keywords in each year from 2014 to 2019, high-frequency keywords in each year are obtained as shown in Table 5, which further reflects the research hotspots in each year and the trend of research hotspots in recent years.

Table 5 High frequency keywords for 2014-2019.

Year	High frequency keywords
2014	e-commerce, the international trade, apec, enterprise, electric business platform, the enterprise management, privacy protection
2015	Cross-border e-commerce logistics, e-commerce, The Belt and Road, overseas warehouse, enterprises, enterprise management, foreign trade, new normal, Shanghai free trade zone, e-commerce platform
2016	e-commerce, cross-border e-commerce logistics, The Belt and Road, international trade, Internet, overseas warehouse, cross-border, foreign trade, import
2017	The Belt and road, e-commerce, cross-border e-commerce logistics, the Internet, talent training, foreign trade, status quo, coordinated development
2018	The belt and road, cross-border e-commerce logistics, international trade, block chain, digital trade, business model, b2c, Internet, small and medium-sized enterprises, logistics model, commercial circulation industry
2019	The belt and road, cross-border e-commerce logistics, e-commerce, supply chain, agricultural products, international rules, digital trade, countermeasures, block chain, trade facilitation

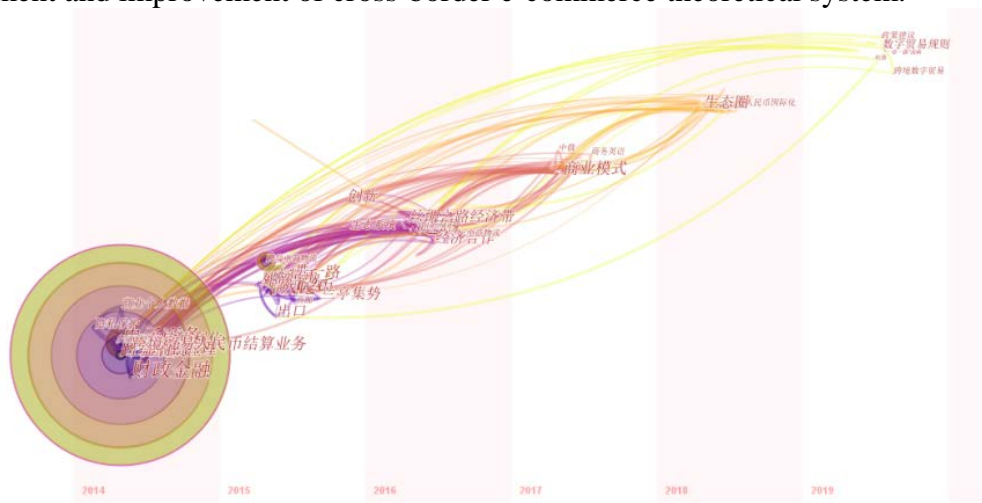
Using CiteSpace to analyze the keywords in the 1031 sample documents published from 2014 to 2019, we can get the keyword time zone map shown in Figure 5. According to the order of time development from left to right, the high-frequency keywords that appear each year are arranged in turn, and finally show the development of academic research in the field of cross-border e-commerce in China. The keywords in 2019 are the most cutting-edge and the most representative of future research. Keywords for trends. In addition, the keywords in the fringe zone in Figure 4 may also be the future research trends. The key words in Tables 3 and 4 and Figures 4 and 5 are analyzed and combined with the literature to sort out the research trends.

Cross-border e-commerce related policy recommendations. In the digital economy era, to effectively reform traditional international trade, we need to strengthen the legal system construction in all aspects of cross-border e-commerce, formulate national standards and norms for cross-border e-commerce, strengthen the construction of information systems and network platforms for cross-border e-commerce, and improve cross-border The market supervision of e-commerce places great emphasis on the training of talents.

Research on cross-border e-commerce logistics. Cross-border e-commerce logistics has always been a hot topic in cross-border e-commerce research. Future related research trends include

logistics models, logistics along the “Belt and Road”, and the application of big data in logistics.

Cross-border marketing research. With the continuous development and improvement of cross-border e-commerce trade, the marketing strategies for cross-border e-commerce also need to be developed and matured. Research on cross-border e-commerce marketing evaluation systems, marketing influencing factors, marketing strategies, and marketing effects should be taken seriously. At the same time, do more targeted research on cross-border e-commerce companies and improve their cross-border e-commerce marketing strategies based on their actual conditions.



6. Conclusion and Outlook

Firstly, China's cross-border e-commerce research field is still in a period of rapid development, and relatively few high-level research results are available. In terms of the number of studies, starting from 2016, the number of cross-border e-commerce studies has increased rapidly and continues to rise in 2019; in terms of journal distribution, the top three core journals with the most publications are business economics research (235 articles, accounting for 22.79%) foreign trade and economic practice (132 articles, accounting for 12.8%) and China's circulation economy (61 articles, accounting for 5.92%), the three accounted for 41.51% of the total number of publications; in the terms of author distribution, the author is Zhang Xiaoheng (16 articles, accounting for 1.55%).

Thirdly, the current frontier trends of cross-border e-commerce research in China mainly include: five cross-border e-commerce ecosystems, cross-border e-commerce policy recommendations,

cross-border e-commerce collaborative development, cross-border e-commerce service platforms, and cross-border digital trade. aspect.

6.2. Outlook

In summary, this article proposes the following research prospects as possible research directions for future cross-border e-commerce for domestic scholars' reference and research:

First of all, the research on cross-border e-commerce pays more and more attention to science and rigor, so the research method will focus on qualitative research combined with quantitative research. Research on cross-border e-commerce and its collaboration with cross-border logistics, such as synergistic factor, synergistic mechanisms, synergistic willingness, synergistic strategies, synergistic evaluation and its index system, etc., need to be further improved. You can try to combine game theory and dynamic evolution game models, structural equation model, grey correlation model, symbiosis model, etc. for quantitative analysis.

Secondly, cross-border e-commerce has its own ecosystem or ecosystem. Whether at the enterprise level or in the entire cross-border e-commerce field, the study of ecosystems is essential for the development and improvement of cross-border e-commerce.

Thirdly, for the state and the government, the emergence of any new thing requires legal constraints and policy guidance. The practice development of cross-border e-commerce is much faster than academic research and policy formulation, so we need to study these issues that are closely related to policies, and provide policy recommendations for the development of cross-border e-commerce by analyzing actual problems.

Fourth, another policy-related issue is that academic research should focus on the latest relevant policies. In the field of cross-border e-commerce, “the Belt and Road” is one of the most important strategic deployments in China. The study of such important national policies will not only promote the development of China's cross-border e-commerce, but also help to continuously improve related policies. Regulations.

Finally, cross-border e-commerce academic research should focus on hot frontier issues. Cross-border e-commerce in the era of big data is undergoing unprecedented changes, whether it is the improvement of international trade processes, supervision, trust and efficiency, or Data analysis, market positioning, brand strategy, etc., big data technology has profoundly affected the entire industry. Block chain, digital trade, and cross-border digital are all cutting-edge topics that are closely related to cross-border e-commerce. Scholars should focus on these areas, combine cross-border e-commerce with the latest information technology and promote the development and innovation of cross-border e-commerce.

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