



Visualization Analysis of Chinese Cross-Border E-Commerce Research Based on CNKI Literature Database

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Abstract. In this paper, 1181 literatures with the theme of “cross-border e-commerce” collected by CNKI are used as research samples. CiteSpace software is used in combination with bibliometric method and content analysis method to conduct a visual analysis on the research status of domestic cross-border e-commerce. Based on the preliminary mapping of the annual distribution of sample literature, the distribution of major journals, the distribution of authors and the distribution of major disciplines, this paper first reveals the overall development vein and specific distribution characteristics of research, including literature growth conforms to logic price curve, the scattered forces and research involves regional distribution and subject distribution is relatively concentrated, etc. Then, by sketching the keyword cluster diagram, several hot topics of research in China are summarized: trade mode, cross-border logistics, talent training, etc. Finally, some improvement measures are proposed for the future in-depth research, such as enriching research methods and encouraging the integration of disciplines, in order to broaden the road of academic research on domestic cross-border e-commerce.

Keywords: Cross-border e-commerce · Visualization · Bibliometric analysis · Content analysis

1 Introduction

“Cross-border e-commerce” is a new type of international commercial activity in which the trading entities under different customs conditions take the e-commerce platform as the main channel to complete negotiation, transaction, settlement and other processes, and finally transport commodities through cross-border logistics. Especially in the general environment of the COVID-19 epidemic sweeping the world, the total volume of transactions continued to rise. In 2020, the import and export lists released through the cross-border electronic commerce Administration Platform of the Customs reached 2.45 billion votes, representing an increase of 63.3% year-on-year. It can be seen that cross-border e-commerce has become the mainstay of China’s foreign trade development. At the same time, it has also become a hot research field for domestic scholars, and the related research on radiation is increasingly extensive.

Many academic teams have been formed to conduct research. For example, Zhang Xiaoheng [6] and his team have focused on analyzing cross-border e-commerce logistics

mode for many years. Yang Jianzheng [5] focused on the factors influencing the development of cross-border e-commerce industry. Clarifying the research context in domestic academic circles is an important basis for macro-grasping the research progress and aiming at the research trend.

In order to realize “macro-control”, the “visual” analysis commonly used in the field of knowledge management is a powerful tool, which can sort out the research literature clearly and concisely, and intuitively grasp the beginning and end of the research and development of cross-border e-commerce.

“Knowledge management” was first proposed by foreign scholar K. Wiig, aiming at extracting and integrating key information to form specialized knowledge point on a certain issue. “Visualization” is the main means to achieve information dissemination. In view of this, we select sample literature, use Cite Space, make a simple analysis and review of the relevant literature, summarize the characteristics and shortcomings of the current research, predict the future frontiers and trends of cross-border e-commerce in China, and provide a reference for other scholars’ research.

2 Data Source and Research Methods

2.1 Data Sources

As a national knowledge infrastructure, CNKI has collected a number of authoritative journals which is vast and detailed. Therefore, it finally chooses CNKI as the journal statistical source, and sets the retrieval condition as “Subject or Title = Cross-border E-commerce” or “Subject or Title = cross-border electronic commerce” in its advanced retrieval, the period is set as 2014–2020, the sources of statistical journals are limited to SCI, CSSCI, EI and core journals, and 1181 relevant documents are finally obtained after accurate matching retrieval.

2.2 Research Methods

The visual analysis framework is elaborated by bibliometric method and content analysis method. Firstly, we use the visual analysis function of CNKI to conduct bibliometric analysis from the perspectives of publication year, journal distribution, authors and institutions, etc. The content analysis method is a combination of quantitative and qualitative analysis, which needs the help of mathematical and statistical methods. In this regard, we will capture the high-frequency words of the selected sample literature, describe the knowledge map, and carry out cluster analysis to roughly describe the characteristics of the cross-border e-commerce problem in domestic academia. Finally, combining the above conclusions, the paper summarizes the inadequacies of the existing domestic research, and puts forward the corresponding suggestions and future research prospects.

3 Visual Analysis of Chinese Cross-Border E-Commerce Research Based on Bibliometrics

3.1 The Annual Distribution of Domestic Literature

This reflect the theoretical development level and overall development speed of research. In January 2014, the Ministry of Finance and State Taxation Administration of The People’s Republic of China jointly released the <Notice on the Tax Policy on Retail Exports in cross-border electronic commerce>. This promoted the development of industry and attracted scholars to focus on it. A graph of the annual number of published articles is made as shown below.

In Fig. 1, the number of posts posted generally shows a curve as an “S” shape, which is in line with Price’s logic curve changing patterns. Based on this, the development of domestic research is divided into the following three stages:

- Growth Period: 2014–2016

Figure 1 shows that the volume literature has increased in multiples during this period, with 44, 105 and 233 articles published each year. The growth curve is very steep, laying a solid theoretical foundation for the research field. China’s foreign trade situation was severe and abnormal in 2015–2016. And cross-border e-commerce was an emerging industry, which was bound to face many difficulties in the early development.

- Cooling-off Period: 2017–2018

Since 2017 the number of articles has decreased. The irregular fluctuation of literature quantity in development is normal. From the Turkish currency crisis, Sino-US trade frictions, to the withdrawal of the United States from the UPU, the increase of VAT taxes by various countries, the cross-border market encountered many obstacles. Meanwhile, many problems in trading process, such as the increasingly strict customs clearance procedures, the package specification review system, and the increase in postage existed. The cool-headed “cooling down” of research at this time is more like a necessary accumulation.

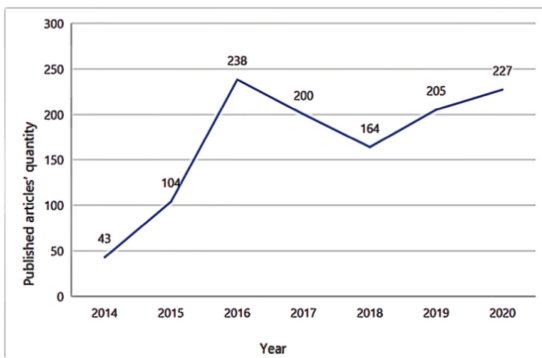


Fig. 1. Annual Publications

- Development Period: 2019–2020

Starting from 2019, academic community amount shown a new round of growth. There was even a peak in the number of domestic historical articles published in 2020.

It can be judged that the industry has unlimited development potential and the academic field can be opened up with boundless space. Moreover, judging from the amount of relevant literature published in 2021, “cross-border e-commerce” has returned to the research focus, and the number of published articles is likely to reach a new peak.

3.2 The Distribution of Major Journals of Domestic Literature

The distribution of source journals of documents is an important basis for judging whether there is a core journal group in a certain field and observing the spatial distribution characteristics of documents (Fig. 2).

Journal of Zhejiang University has the highest articles published, accounting for 26.67%, including more than a quarter of all. The number of articles published by Reform, which only reached the first half, accounting for about 13.33%. The four major journals, Law, Zhejiang Social Science, Contemporary Law and China Soft Science, all account for about 10%. The remaining top ten journals account for a relatively small proportion. It is not difficult to find the following characteristics:

First, in terms of spatial distribution, “Zhejiang” has appeared many times. In fact, Zhejiang is not only the first province in the country to set up a comprehensive cross-border e-commerce pilot zone, but also has the highest cross-border online retail sales.

Secondly, “Law” journals are bright in the filed.

How to scientifically design, adjust and implement a series of measures to achieve the ultimate goal of boosting healthy development inevitably require “professionals”. And the legal issues arising from the actual operation process are increasingly novel and complicated. In addition, other journals are mostly related to the industry attributes.



Fig. 2. Periodicals in the top 10 of Chinese Cross-border E-commerce Research Papers

3.3 The Distribution of Authors and Institutions of Domestic Documents

General research on core authors and institutions is not only convenient to explore the breadth and depth of scientific research activities, but also beneficial to actively guide, organize, manage and coordinate future scientific research activities.

3.3.1 Author Distribution of Cross-Border E-Commerce Research

According to Price’s law, the number of core authors $m = 0.749 * \sqrt{n_{max}}$, n_{max} represents the highest number of publications of the authors counted (Fig. 3).

Roughly speaking, high-yielding authors are mainly from universities in Shanghai, Henan, Zhejiang and Beijing. With the exception of Zhang Xiaheng, whose literature volume is as high as 15, the other have published in single digits.

When the number of papers published by authors reaches 50% or more of, it can be determined that there is a core group of authors. The core author group is an important reference dimension to measure whether a discipline is mature or not.

According to Cite Space, among the 263 authors, with the most articles is Professor Zhang Xiaheng of 19 articles, and the corresponding number of core authors is about 3.37. Based on this, the authors with 3 or more papers were regarded as the core authors. Finally, 24 of them met the criteria, and 123 papers were issued, accounting for only 10.4% of the research literature. It was concluded that there was no core group of authors in the domestic cross-border e-commerce category.

Secondly, according to Lotca’s law, the ideal ratio of authors with only one article is 60.79%. The more evenly the authors are distributed in the field, the smaller the contribution of high-yielding authors and the greater the contribution of low-yielding authors. In the sample, there are 138 authors who published a paper, accounting for 52.47%, which is slightly lower than the theoretical. This shows that the domestic researchers

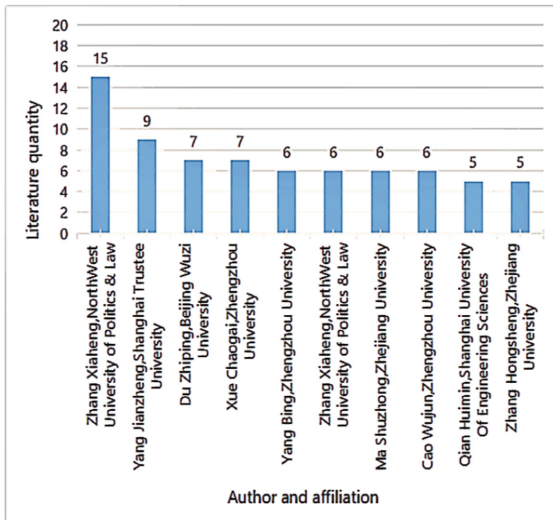


Fig. 3. Distribution of authors in the top 10 of cross-border e-commerce research papers published

are still scattered and have not yet gathered into a powerful research team. Therefore, in the future, the existing research team needs to strengthen cooperation and take the initiative to communicate and learn while ensuring their own stable development, so as to promote the whole research field to stride forward.

3.3.2 Institutional Distribution of Cross-Border E-Commerce Research

Among them, the institution with the highest articles published is university of international business and economics, with a total of 36 articles, accounting for 21.69% (Fig. 4).

The second is Zhengzhou University, with 25 articles, accounting for about 15.06%. In addition, among the top 10 institutions, only the International Trade and Economic Cooperation Research Institute of the Ministry of Commerce of China is a social science research and consultancy institution, indicating that universities are an important research force, and more attention should be paid to there in the future.

Judging from the regional characteristics, research institutions are mainly concentrated in Shanghai, Beijing and Zhejiang, all of which are regions with strong economic strength, scientific research capability and rapid development of related industry. “Building” of superstructure cannot be separated from the solid economic foundation.

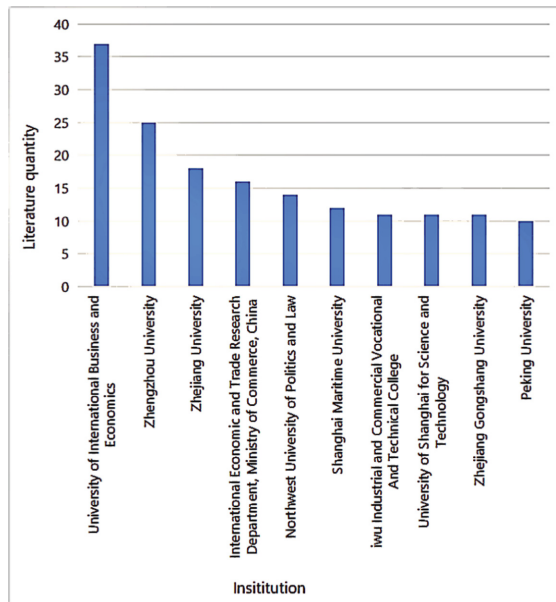


Fig. 4. Distribution of top 10 institutions in cross-border e-commerce research in China

3.4 The Subject Distribution of Domestic Literature

As shown, the top ten disciplines all belong to the economic category, nearly 64% of the sample belongs to it. It is clearly stated that, current research mainly involves the following three disciplines (Fig. 5).

- **Economics**
Former research focused on applied economics. A timely and clear macro-development environment will help each subject to make correct decisions and form a scientific “methodological” framework. What’s more, the special transaction form effectively helps China’s agricultural products to “go out” and becomes an opportunity for the modern agricultural economy. We need to expand the theoretical basis, such as resource allocation, rule making and other aspects.
- **Management discipline**
This kind is based on corporate perspective, such as corporate economy, market research and information. The operating entities are mainly small and medium-sized enterprises. The processes of cross-border e-commerce are interrelated, and efficient and compact cooperation is required from platform operation to customs logistics. Therefore, it is necessary to continuously improve management mechanism, the management system, the standards and norms, and create a green and stable market order.
- **Engineering**
Mainly computer software and computer application. Modern information technology almost runs through the whole process of cross-border e-commerce operation. The growth of industry forces the information technology to be updated and improved. Therefore, technical perspective is both demand-oriented and result-oriented.

To realize the in-depth development and enhance the ability of solving practical problems, interdisciplinary interaction and innovation are essential. Therefore, we

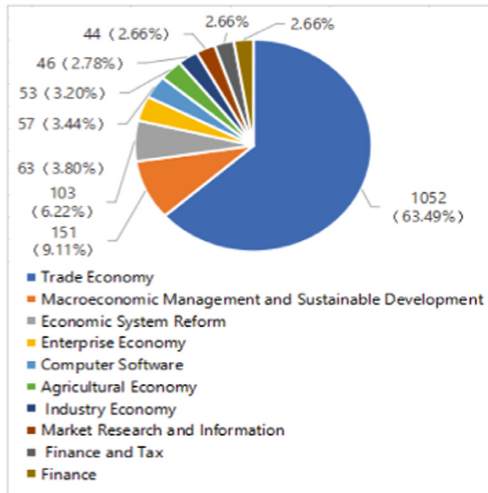


Fig. 5. Top ten cross-border e-commerce research institutes involved in disciplines

should actively introduce other disciplines into the research field, strive to break down the barriers between traditional disciplines, and explore new ideas to break through the bottlenecks.

4 Visual Analysis of Chinese Cross-Border E-Commerce Research Based on Content Analysis Method: Keyword-Centric

Key words are the re-concentration, re-simplification and re-refinement of the core content. The number, frequency and content of key words reveal the focus, dispersion and overall context of academic research. It help us to gain insight into the characteristics and connections, and sort out. Focusing on the key words in the cross-border e-commerce field, this paper will specifically analyze the following three points.

4.1 Cross-Border E-Commerce Research Keyword Co-word Analysis

Co-word analysis is the analysis of the phenomenon that several professional terms appear in the same document several times. By using the co-word network, we can judge the relationship between research topics and search for a “hidden” research paradigm. The Cite Space obtained keyword co-occurrence map is shown in Fig. 6.

The current keyword co-occurrence network connections are widely distributed, but the general structure is hazy, indicating that the domestic research network has begun to take shape. On one hand, some nodes such as “cross-border trade”, “b2c cross-border e-commerce”, “digital trade” and “internet” stand out; On the other, various high-frequency keywords also have strong or weak links, with numerous and dense connections between nodes, indicates that the research on this issues is continuously refined and deepened.



Fig. 6. Keyword Co-occurrence Network Knowledge Map

3. Agglomeration of Talent Supply

Without labor, there would be no productivity. Cross-border e-commerce as a comprehensive industry demand for compound and practical talents. How to train qualified talents has attracted extensive attention, domestic scholars Chen Yong [1] have mentioned this. For example, the “higher vocational colleges” in cluster 9, mainly focuses on the discussion of appropriate basic disciplines, personnel training model, comprehensive ability improvement methods and assessment and promotion system, etc.

4. Agglomeration of Trading Products

The cluster 10 “Agricultural Products” are clear. In recent years, major domestic e-commerce platforms have successively opened cross-border agricultural trading sections. Scholars choose different entry points to analyze, or study the cost reduction of export [2], or study the optimization of cross-border logistics system, or study the characteristics and constraints in different province. Under “the belt and road initiative” strategy and the convenient logistics system, our agricultural products are bound to take the cross-border e-commerce to get out of the countryside and go to the world [7].

5. Agglomeration of Trading Platforms

Trading platforms are divided into third-party platforms, like AliExpress and Amazon, and self-built models, such as Lanting Jishi and Dunhuang. They serve as both a medium for commodity trading and exchange of information, and are crucial in business activities. There are many studies analyze the impact of platform, such as reducing trade costs and improving transaction efficiency for enterprises. Many others focus on the differences between platform models and making suggestions on platform selection [4]. The cluster on trading platforms includes “e-commerce platforms” in cluster 12 and “e-commerce” in cluster 1.

6. Agglomeration under the Background of Times

This is characterized by historical background. Including “Shanghai Free Trade Zone” of Cluster 5, “the belt and road initiative” of Cluster 14, “Big Data” of Cluster 8 and “usmca” of Cluster 11.

First, since Shanghai, Chongqing became the first batch of pilot cities for cross-border e-commerce import and export in 2012. The overall layout of Chinese cross-border e-commerce geographical location has thus achieved all-round coverage from east to west, north to south.

Secondly, in 2015–2016, “the belt and road initiative” contained more than 70 countries and regions. Long-distance and space-span economic cooperation must have higher requirements on infrastructure and logistics, thus facilitating the further development of cross-border e-commerce.

Third, big data has been deeply integrated into daily life and economic activities as a new factor of production, which enterprises must compete for.

Fourthly, in January 2020, the United States, Mexico and Canada reached the “USMA”. It is significant to analyze the core demands of the US, seize the major differences between sides, and actively participate in the formulation of global digital trade rules.

5 Conclusions of Visualization Analysis: Shortcomings and Prospects of Domestic Research

It is found that although the research on cross-border e-commerce started late, the overall attention of domestic academic circles is constantly improving, and it has gradually become a necessary topic for trade research. Professionals in various fields expand thinking from different perspectives, which has continuously added bricks and tiles to the theoretical tower in this field. The following three points should be taken into consideration in future domestic researches.

5.1 Strengthen Cooperation

The degree of cooperation is still at a low level, it is important to break the limitations of levels and regions and strive to achieve nearly unlimited and extensive exchanges within the framework of limited disciplines. Colleges and universities spontaneously and actively cater to the relevant policies, innovate the cooperation mechanism based on the principles of trust and fairness, and conduct cooperation guided by the value pursuit of the community.

5.2 Encourage Interdisciplinary Analysis

The research lacks the divergence and collision of various disciplines. The intersection of disciplines is often the new growth point and the new scientific frontier of science. It's not only beneficial to the deep integration, research and production, but also beneficial to the continuous transfer of talents with composite knowledge structure.

5.3 Expand Research Perspective

From cluster analysis, scholars should not only study the problem-driven layout, but also conduct more micro and detailed research on each specific transaction behavior. Cross-border e-commerce activity is a complete dynamic process, many practical issues involve time factor.

It also should note that the visual analysis of literature can only reveal some deficiencies, future research can be improved in the following two aspects:

Pay attention to quantitative analysis in research methods. Improve the existing macro-statistical criteria and encourage companies providing more comprehensive and accurate raw data for in-depth analysis.

Second, pay attention to the study of overseas research and development experience. The foreign development model is mature, the platform is well-known and the accepted market is vast, actively learns from advanced experience then carries out localization and innovation is needed.

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