

The Dynamic Evolution and Knowledge Base of Agricultural Product Supply Chain Research: A Bibliometric Analysis Based on CNKI Literature

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Abstract: This study employs COOC bibliometric analysis, combined with a literature review, to systematically analyze the agricultural supply chain-related documents indexed in China National Knowledge Infrastructure (CNKI). The aim of the research is to reveal the developmental trajectory and current state of agricultural supply chain studies in China, as well as to identify research hotspots and the knowledge base, providing a reference for researchers in this field. The study finds that future research should enhance knowledge cooperation between universities and agricultural research institutions and expand the collaboration network with agricultural supply chain entities. It is recommended that research hotspots be accurately grasped based on national strategies, industry challenges, market demands, and the development status of the supply chain to facilitate the practical application of research outcomes.

Keywords: Agricultural Supply Chain, China National Knowledge Infrastructure (CNKI), Bibliometric Analysis.

1. Introduction

China, as a major global producer and consumer of agricultural products, plays a pivotal role in ensuring food safety, reducing operator costs, and enhancing efficiency through its agricultural supply chain. Optimizing the management of the agricultural supply chain significantly impacts the promotion of sustainable agricultural development and the satisfaction of consumer demands for healthy and green agricultural products (Yao & Li, 2015). Furthermore, the construction of the agricultural supply chain system is a key component of the Chinese government's rural revitalization strategy, which aims to stimulate rural economic development and consumer upgrading by strengthening the supply chain system (Wang, 2023). Within the field of economic management, supply chain research is a central topic, and in a populous country like China, the study of agricultural supply chains holds particular significance. Against the backdrop of global economic integration and increasingly diversified consumer demands, agricultural supply chain management is not only about food safety and the sustainability of agriculture but also encompasses environmental protection and social welfare on multiple levels (Bao, 2023). This paper, through bibliometric analysis, aims to reveal the development trajectory of agricultural supply chain research in China, clarify research hotspots and their evolutionary trends, and construct the knowledge base in this field, providing references and insights for subsequent studies.

transportation, and sales of agricultural products in China have significant implications for both enterprises and consumers (Cui, 2011), making the study of agricultural supply chains one of the focal points of societal research.

This study adheres to bibliometric principles and selects the China National Knowledge Infrastructure (CNKI) database as the platform for literature retrieval, using "agricultural supply chain" as the keyword. Between 2003 and 2024, a total of 2140 relevant journal articles (excluding dissertations) were retrieved. After screening, non-academic articles and content unrelated to agricultural supply chain research were excluded, resulting in a final sample of 1998 papers. The bibliographic information of these papers was downloaded and saved in TXT file format.

2.2. Data Processing

This study utilizes COOC bibliometric analysis software and Excel tools for data processing. The specific steps are as follows: First, merge the TXT files of the sample literature and extract fields including time, title, journal, author, first institution, and keywords; second, verify the extracted fields, unify synonyms, and perform data cleaning; then, re-extract the relevant fields from the cleaned data and create Excel spreadsheets for "Time-Journal," "Time-Author," "Time-First Institution," and "Time-Keywords"; next, analyze the publication frequency of authors, first institutions, and journals, as well as their trends over time; finally, use COOC software to explore the evolution of research topics with "Time-Keywords" as the unit of analysis.

2. Data Sources and Processing

2.1. Data Sources

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3. Results and Analysis

3.1. Analysis of Annual Publication Volume

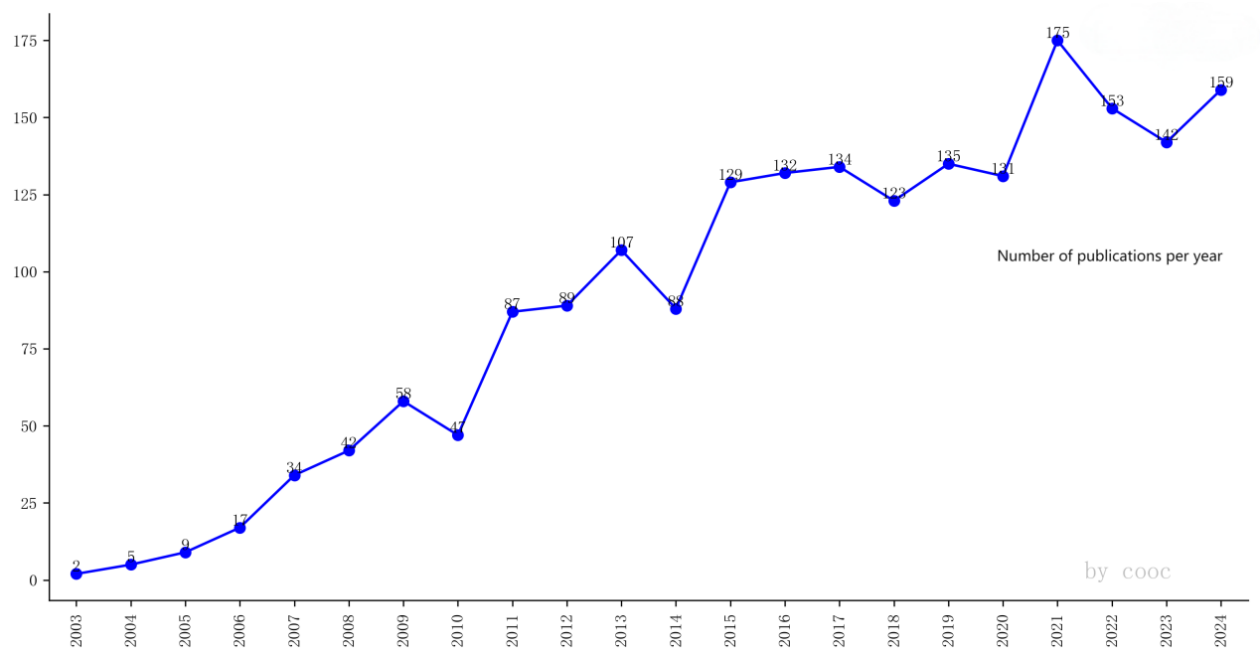


Figure 1. Temporal Distribution of Publication Volume

Through a bibliometric and visual analysis of the annual distribution of 1998 sample documents, the results indicate that from 2003 to 2024, the number of agricultural supply chain research papers included in the China National Knowledge Infrastructure (CNKI) database has shown a year-by-year increasing trend. Particularly in 2021, the number of papers in this field reached 175, setting a historical record. This phenomenon reflects that since the beginning of the 21st century, with the rapid development of China's agricultural supply chain, the academic community has paid increasing attention to the theoretical and practical issues of agricultural

supply chains. The field of research is in a stage of rapid development, with a continuous emergence of high-level research outcomes. Although there was a decline in the number of papers in 2023, as of December 2024, the number of publications for that year still reached 159, demonstrating that Chinese scholars maintain a high level of interest in the study of agricultural supply chains.

3.2. Analysis of Journals Publishing the Documents

Table 1. Statistics of the Top 20 Publishing Journals by Publication Volume

Journal Name	Publication Volume	Journal Name	Publication Volume
Logistics Sci-Tech	78	Journal of Anhui Agricultural Sciences	27
Journal of Commercial Economics Journal of Commercial Economics	75	Rural Economy	24
Logistics Technology	62	China Market	24
Logistics Engineering and Management	54	China Circulation Economy	23
Agricultural Economy	38	China Business and Market	22
Market Modernization	36	Industrial Engineering Journal	19
Modern Business	31	Price: Theory & Practice	17
Rural Economy and Science-Technology	31	China Logistics & Purchasing	17
Chinese Journal of Management Science	29	Shanxi Agricultural Economy	17
Jiangsu Agricultural Sciences	28	Operations Research and Management Science	15

Upon analyzing the journal data, we identified a total of 587 journals indexed by China National Knowledge Infrastructure (CNKI) that have published research findings in the field of agricultural supply chains. As illustrated in the table 1, the top three journals in terms of publication volume are "Logistics Technology," "Business Economic Research,"

and "Logistics Technology." Among the 20 journals with more than 15 publications, six are categorized as agricultural journals, while the rest are primarily management or business-oriented journals. This distribution aligns with the main disciplinary areas involved in agricultural supply chain research.

3.3. Analysis of Publishing Authors

Table 2. Statistics of Authors with More than 7 Publications

Author	Publication Volume	Author	Publication Volume	Author	Publication Volume
Bin Dan	21	Tijun Fan	9	Lei Wang	7
Jun Chen	15	Gengui Zhou	8	Yuling Sun	7
Hong Huo	13	Yan Gao	8	Xiaolin Zhang	7
Zhijie Leng	12	Junmiao Deng	8	Jianhua Gou	7
Fangtao Jiang	11	Wujun Cao	8	Chanjun Zhang	7
Shengju Xu	10	Yefu Zhou	8	Haoxiong Yang	7
Weixia Yang	10	Hao Zhang	8	Ying Feng	7
Chun Feng	10	Yun Qiu	8	Hongyong Fu	7
Xujin Pu	10	Bo Yan	7		

As of December 2024, this study identified 3,049 authors from the sample literature, of which 2,533 (accounting for 83.07% of the total) have published only one paper, indicating that the majority of scholars in the field of agricultural supply chain research are not continuously engaged and have not yet established a sustained research trajectory. Statistical data in Table 2 reveal that 26 scholars have published more than seven papers each, making them the core contributors and leaders in China's agricultural supply chain research domain. Hua Ding from Henan University of Technology and Zuhui Huang from Zhejiang University were the pioneers in proposing agricultural supply chain research in China; Ding applied supply chain theory to agricultural logistics research in 2004(Ding, 2004), while Huang introduced the concept of supply chain management in the management of fresh agricultural products in supermarkets in 2005(Huang & Liu, 2005; Liu, Huang, & Wu, 2005), laying the groundwork for

early research in this field. In recent years, scholars such as Jun Chen, Shengju Xu, Hong Huo, Hongyong Fu, and Bin Dan have stood out in agricultural supply chain research, each publishing more than seven papers. Notably, Chen, Fu, and Dan are all from the College of Economics and Business Administration at Chongqing University, highlighting the institution's research prowess in this area. Their research outcomes have provided significant references for subsequent studies and have directed the development of agricultural supply chain research in China. However, the predominance of academic researchers in producing these outstanding results may limit the innovation in research content and methodological diversity, affecting the practical application of research findings.

3.4. Analysis of Publishing Institutions

Table 3. Statistics of Institutions with More than 9 Publications

Publishing Institutions	Publication Volume	Publishing Institutions	Publication Volume
Management School, Harbin University of Commerce	22	School of Finance and Economics, Qinghai University	14
School of Economics and Business Administration, Chongqing University	21	School of Business and Ministration, South China University of Technology	13
College of Economics and Management, Huazhong Agricultural University	20	School of Business Jinling Institute of Technology	12
School of Economics and Management, Heilongjiang Bayi Agricultural University	19	College of Economics & Management South China Agrieultural University	12
School of Economics and Management, Chongqing Jiaotong University	19	School of Business, and Ministration Zhongnan University of Economics and Law	12
School of Transportation and Logistics, Southwest Jiao Tong University	19	School of Economics & Management Nanjing Tech University	11
Faculty of Management and Economics, Kunming University of Technology	18	School of Management, South-central Minzu University	10
School of Business Jiangnan University	18	School of Management and Economics of UESTC	10
Beijing Wuzi University	16	School of Information Management, Jiangxi University of Finance and Economics	9
College of Economics and Management, Nanjing Forestry University	15	School of Management Engineering, Zhengzhou University	9

After consolidating various expressions of the same institution within the sample literature, a total of 1,502 publishing institutions were extracted. As shown in the table 3, 20 institutions have published 9 or more papers, while 1,120 institutions have only published a single paper, accounting for 74.57% of the total number of institutions. This indicates a relatively dispersed involvement of

institutions in agricultural supply chain research. Among these, Harbin University of Commerce, College of Economics and Business Administration at Chongqing University, and the School of Economics and Management at Huazhong Agricultural University have each published over 20 papers, demonstrating their significant position in the field of agricultural supply chain research.

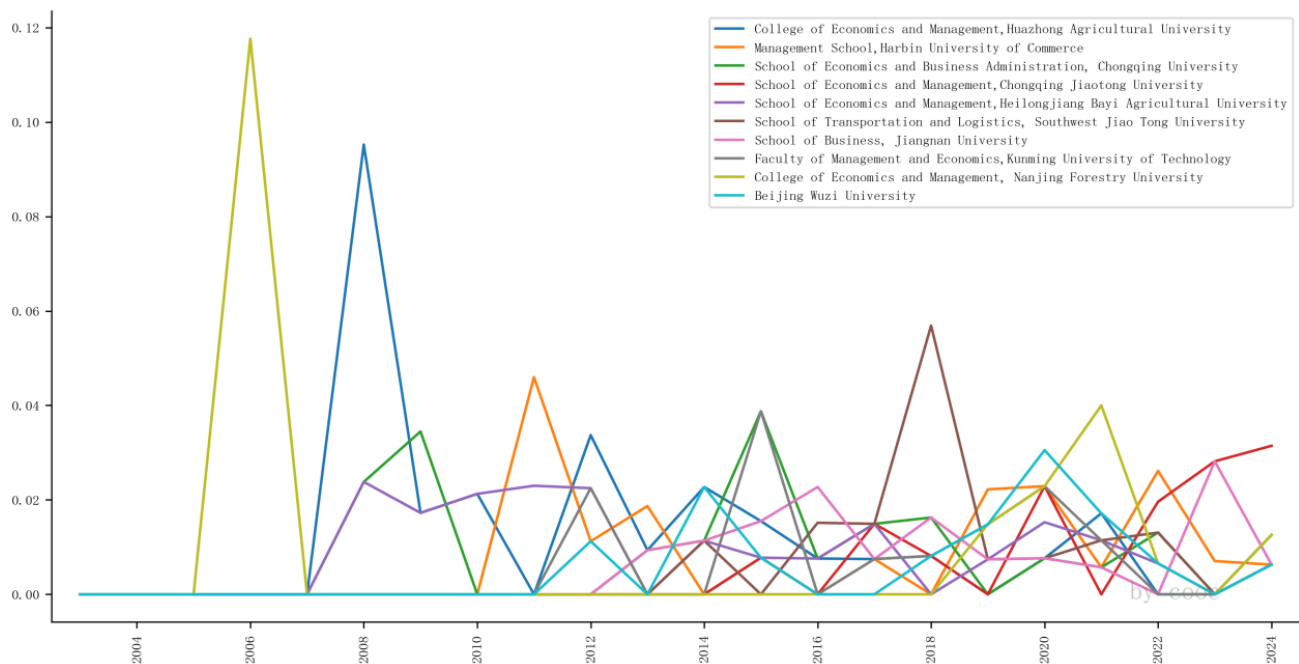


Figure 2. Annual Trend of Publishing Institutions in Literature Publication

In the field of agricultural supply chain research, the evolution of publication volumes among the top 10 institutions over time is in Figure 2. According to records from the China National Knowledge Infrastructure (CNKI) database, from the early stages, Nanjing Forestry University, Huazhong Agricultural University, and Chongqing University have been prolific in producing research outcomes. Research data indicates that in the last five years, Chongqing Jiaotong University, Jiangnan University, and Harbin University of Commerce have also emerged as significant contributors to the literature in this field. Observing publication volumes from 2004 to 2024, some institutions have experienced intermittent research stagnation in agricultural supply chain research, failing to maintain a continuous output of results. For instance, Heilongjiang Bayi Agricultural University and Nanjing Forestry University have not published relevant literature in the primary journals indexed by CNKI for several years.

3.5. Analysis of Keywords

Table 4. Keyword Frequency Statistics

Keywords	Frequency	Keywords	Frequency
Agricultural product supply chain	1712	Internet of Things (IoT)	60
Supply Chain Risk	183	Supply Chain Coordination	47
Internet Plus	118	Collaboration	45
Game Theory	118	Supply Chain Model	37
Agricultural Product Quality and Safety	109	Rural Revitalization	33
Block chain	101	Food Safety	33
Agricultural Logistics	86	Digitalization	32
Traceability	83	Cold Chain Logistics	31
Farmer-Supermarket Direct Link	70	Government Subsidies	30
Supply Chain Management	62	Information Sharing	21

In the sample literature, a total of 2,515 keywords were

identified. After merging synonyms and eliminating non-substantive keywords such as "research" and "review," a final selection of 2,500 keywords with practical significance was filtered out. As illustrated in Table 4, in addition to the core keyword "Agricultural Supply Chain," other high-frequency keywords in the field's research literature include "Supply Chain Risk," "Internet Plus," "Game Theory," "Agricultural Product Quality and Safety," "Block chain," "Agricultural Logistics," and "Traceability." The frequent occurrence of these keywords indicates that they have garnered widespread attention from scholars in the field of agricultural supply chain research in China.

The study spans from 2003 to 2024, and to more clearly illustrate the trends in keyword evolution, this period is divided into four phases: 2003-2008, 2009-2014, 2015-2019, and 2019-2024, as shown in Figure 3. By analyzing the time series of keywords, it can be observed that the field of "Agricultural product supply chain" research exhibits an upward trend. In the domain of agricultural supply chains, "Food Safety" remains a primary research topic (King et al., 2017), with keywords "Food Safety" and "Agricultural Product Quality and Safety" both related to this issue, and other studies such as "Traceability" and "Block chain" technologies providing solutions to this problem. Among the top ten keywords, four are related to this topic, highlighting its significance.

Supply chain risk is a focal point in agricultural supply chain research. Facing intense market competition, agricultural enterprises must focus on the supply chain to mitigate risks, reduce costs, and maintain the stability and continuity of production (Cui, 2011). Consequently, this topic has become a hotbed of academic research, with scholars introducing new technologies such as "Internet Plus," "Block chain," "Internet of Things (IoT)," and "Digitalization" to address this challenge.

Game theory is widely applied in agricultural supply chain research. Since the phase of 2009-2014, game theory has become a key methodology in this field and continues to be so. Supply chains involve interactions between multiple enterprises, including both competition and cooperation (Xie, 2020). Game theory provides a tool for analyzing these

interactions, aiding in the understanding of optimal strategies under different scenarios. Among the top twenty keywords, terms such as "Supply Chain Coordination," "Collaboration," and "Information Sharing" are also related to this research theme.

In the 2019-2024 phase, the keyword "Rural Revitalization" emerged among the top ten. As a national strategy proposed by the Chinese government in 2017, rural

revitalization aims to address the issue of income growth for rural areas and farmers(Council, 2018). The production and marketing of agricultural products are closely related to the supply chain; hence, "Rural Revitalization" has become a recent research hotspot, indicating that agricultural supply chain research positively impacts regional economic development.



Figure 3. Keyword Timeline Bubble Chart

4. Conclusion

At present, there is a relative scarcity of high-level agricultural supply chain research papers indexed in China National Knowledge Infrastructure (CNKI), which underscores the urgent need to enhance theoretical research on agricultural supply chains to meet the high-quality demands of China's consumer market for agricultural products. Research papers on agricultural supply chains, primarily published in CNKI main source journals, are found in economic management or agricultural journals; however, there is no dedicated and authoritative journal specifically for "Agricultural Supply Chain" theory within the country. A small number of core authors have made significant contributions to the high-quality research outcomes in China's agricultural supply chain, playing a crucial role in advancing the dissemination of knowledge in this field. These core authors are predominantly based in comprehensive or agricultural universities, with a relative dearth of papers from enterprises and research institutions, which to some extent limits the depth and breadth of agricultural supply chain research and affects the application and transformation of research findings. Moving forward, it is essential to strengthen collaboration between universities and research institutions to leverage their respective professional strengths and promote the research to higher levels of development. Concurrently, expanding the cooperation network between universities and entities within the agricultural supply chain will facilitate the practical application of research outcomes.

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