

Research Progress and Hot Topics of Agricultural Products E-commerce in China

-- A Visual Analysis Based on CNKI

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Abstract: E-commerce of agricultural products is an important way for transforming the mode of agricultural development, adjusting agricultural structure, and increasing farmers' income. To grasp the research hotspots and development trends of agricultural products e-commerce, this article uses the CNKI database as the data source, retrieves 2238 literatures with the title of "e-commerce of agricultural products" or "agricultural products e-commerce" as the analysis sample, and adopts research methods such as literature metrology, content analysis, and visualization to reveal the research reviews, hot topics, and development frontiers of agricultural products e-commerce. The results show that the research on e-commerce of agricultural products has entered a relatively mature period, and its research hotspots mainly revolve around "the supply chain of e-commerce of agricultural products", "the development issues of e-commerce of agricultural products", "the development models of e-commerce of agricultural products", "the marketing of e-commerce of agricultural products", and "the platforms of e-commerce of agricultural products". In recent years, scholars have focused on research frontiers such as "precision poverty alleviation", "influence factors", "rural revitalization", and "big data".

Keywords: Agricultural products E-commerce; Visualization; Hot topics; Development frontier.

1. Introduction

With the continuous development of Internet technology, e-commerce has become increasingly common in social and economic activities as well as people's daily lives. In the agricultural sector, e-commerce of agricultural products has also emerged. Since the No. 1 central document in 2012 clearly proposed the development of e-commerce of agricultural products, subsequent the No. 1 central documents over the years have mentioned the important role of e-commerce in agriculture. In the No.1 central document of 2023, it is proposed to implement the "digital commerce promoting agriculture" and the "Internet+" agricultural products out of the village and into the city project, fully reflecting the Party Central Committee's high recognition of the important role of e-commerce in implementing the rural revitalization strategy, building digital villages, solving the "three rural" issues, and realizing common prosperity. E-commerce of agricultural products refers to an e-commerce method that relies on information technology and network systems, and uses various Internet platforms to directly sell agricultural products from farmers to consumers. It not only helps farmers directly participate in market competition but also facilitates consumers to purchase high-quality agricultural products. With the increasingly improved rural logistics and network infrastructure, the rapid growth of Internet penetration rate and the scale of netizens, as well as the rise of third-party e-commerce platforms, e-commerce of agricultural products has seen vigorous and rapid development and has become an important means of promoting the circulation and marketing of agricultural products, as well as an important part of China's new economy and new formats. With the rapid development of e-commerce in agricultural products, many locally produced agricultural products are now reaching the national market.

This is mainly due to the online platforms providing low-cost information promotion and sales channels for agricultural products, solving the problem of information asymmetry and high transaction costs between the traditional production and sales ends of agricultural products (Cui, Kai et al., 2018; Wang, Yang Yang et al., 2023). Obviously, e-commerce of agricultural products has become a major transformation in the current agricultural production and sales model. How to better promote the sustained and healthy development of e-commerce in agricultural products has become the focus of attention of governments in various regions, as well as a hot topic for academic research and exploration. Scholars such as Lv Dan (2021) and Song Ying (2022) have explored the impact of e-commerce in agricultural products on farmers' incomes from different perspectives, fully affirming the positive role of e-commerce in increasing farmers' incomes. Scholars such as Huang Rui (2021) and Tan Xuelin (2023) have focused on the development models of e-commerce in agricultural products, deeply exploring the implementation paths and efficiency of models such as "farmers + e-commerce markets," "farmers + purchasers," "farmers + e-commerce enterprises," and "farmers + government-appointed purchasers." Scholars such as Hu Yueli (2021) and Yan Beibei (2022) have conducted empirical analyses using micro survey data, examining the influencing factors of farmers' adoption of e-commerce behavior in agricultural products from different perspectives, providing theoretical basis for the government to adjust and formulate relevant support policies.

As a new technological and economic paradigm that combines information technology and business practices, e-commerce of agricultural products is undergoing dynamic evolution in both theoretical research and practical scenarios. Scholars have used different methods and perspectives to conduct research on e-commerce of agricultural products.

However, existing research results are valuable from a certain perspective, but cannot objectively reveal the whole picture of e-commerce for agricultural products. Furthermore, existing literature lacks a comprehensive review of the development of e-commerce for agricultural products in China over the past few decades. In order to accurately grasp the dynamic development law of research on e-commerce for agricultural products, it is necessary to systematically describe and analyze relevant research literature. Based on this, this paper comprehensively reviews the literature on e-commerce of agricultural products, presenting visual analysis results from five aspects: publication timeline, disciplinary types, author cooperation networks and publication numbers, research institutions, and journal distribution. The paper summarizes the hot topics and themes of research on agricultural products e-commerce and highlights research frontiers through keyword emphasis, in order to provide reference and guidance for researchers of agricultural products e-commerce.

2. Data Collection and Research Method

This paper summarizes the research progress and frontier trends of agricultural products e-commerce through the collection, sorting, and quantitative analysis of relevant literature. The literature sources were selected from the China National Knowledge Infrastructure (CNKI) database, with the search condition of "E-commerce of agricultural products" or "Agricultural products e-commerce" in the article title, and the search range limited to journals from the years 2000 to 2022. A total of 2,323 literature records were obtained after the search, which included title, publication year, author, institution, source journal, and reference. After manually excluding literature with missing information on authors, keywords, and journals, as well as conference notices, news reports, etc., 2,238 literature records were finally obtained. This paper uses bibliometrics as the analysis method and employs CiteSpace software for scientific knowledge mapping analysis, in order to present a systematic overview of research on e-commerce in agricultural products.

3. Review of Agricultural Products E-commerce

3.1. Documents Quantity

The changes and temporal characteristics of the annual publication volume of literature can reflect the dynamic distribution characteristics and changing laws of agricultural products e-commerce research, which can help understand the origin and development process of agricultural products e-commerce and the degree of attention paid by scholars. As shown in Figure 1, the evolution of annual literature publications on agricultural products e-commerce has obvious stages and can be roughly divided into three periods. The first period is from 2000 to 2009. During this period, agricultural products e-commerce was mainly limited to bulk transactions, and fresh agricultural products e-commerce had just started. The literature on agricultural products e-commerce was relatively scarce and grew very slowly. The total number of publications during this period was only 43, indicating a relatively small research effort. The second period was from 2010 to 2016. During this period, the annual publication volume of literature on agricultural products e-

commerce began to rise significantly, especially after 2012. The annual publication volume of literature on agricultural products e-commerce showed a high-speed growth trend, with an average of 161 articles published per year. The number of publications in 2016, 284, was 23.7 times that of 2009 (12 articles), indicating that agricultural e-commerce has received widespread attention. The main reason for this is that during this period, the scale of Internet users, the number of websites, and the Internet penetration rate grew rapidly. Advanced information technologies such as the new generation of the Internet, the Internet of Things, big data, cloud computing, and blockchain were introduced into agricultural products e-commerce. More and more agricultural operators and farmers began to use e-commerce platforms and channels to open online stores and engage in agricultural products e-commerce activities. The third period is from 2017 to 2022. Although the number of literature publications on agricultural products e-commerce has fallen slightly during this period, the overall situation is relatively stable, with an annual average publication volume of over 200 articles. This also reflects that agricultural products e-commerce has entered a stage of scaled and professionalized development. With the improvement of various supporting infrastructure in rural areas, the accelerated growth of enterprises in the Internet and e-commerce fields, continuous technological innovation in the Internet, continuous improvement of national policy support systems, and the continuous increase of residents' income levels and consumption levels, agricultural products e-commerce will have broad development space.

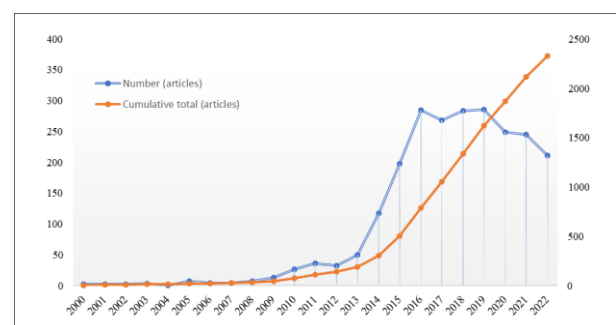


Figure 1. Annual publication of literature on e-commerce in agricultural products

3.2. Analysis of discipline types

Table 1 presents the top 10 disciplinary categories in terms of the number of publications in the field of agricultural products e-commerce. The results show that research on agricultural products e-commerce is relatively concentrated within a few disciplinary areas, with the top three being trade economics (2249 articles), agricultural economics (2092 articles), and market research and information (1709 articles). The number of publications in these three areas is significantly higher than in other disciplines, indicating that agricultural products e-commerce has received significant attention in these fields. It is worth noting that all three of these disciplines belong to the first-level discipline of economics and management, indicating that scholars have primarily conducted speculative research based on the theoretical foundation of economic management. This research tends to focus on policy and industry research, with less emphasis on the technical aspects of e-commerce. However, big data, cloud computing, and the Internet of Things are fundamental to the development of agricultural e-

commerce, therefore, more research on the technical aspects of e-commerce should be conducted in the field of agricultural e-commerce.

Table 1. Top 10 disciplines in terms of volume of literature published on agricultural products e-commerce

Discipline category	Number of publications (articles)
Trade Economy	2249
Agricultural Economics	2092
Market Research and Information	1709
Computer Software and Computer Applications	76
Macroeconomic Management and Sustainable Development	62
Business Economics	41
Economic Law	23
Vocational Education	23
Finance	20
Internet Technology	19

3.3. Analysis of author collaboration networks and number of author publications

A visual analysis was conducted on the collaboration network of authors in the field of agricultural products e-commerce, resulting in 514 nodes and 183 connections, with a density of 0.0014. The results indicate that the level of collaboration among authors is not particularly high. Figure 2 shows several distinct author collaboration groups, with the largest group consisting of scholars such as Li Yujun, Sheng Yuan, Zhang Feng, Sheng Xia, Li Weixi, Xu Congcong, Wu Xueying, and Gao Yanhao. This group mainly focuses on researching agricultural e-commerce platforms, analyzing the seed market and organic vegetable market as examples, and identifying issues such as product trust, vicious competition, and inadequate regulation faced by agricultural e-commerce platforms (Zhang et al., 2016). In addition, scholars such as Lin Jiabao, Li Ting and Li Lei, Lu Zhaoyang and Liao Shanshan, Hong Tao and Li Chunxiao, Chen Min and Li Zhigang have formed their own collaboration teams and made positive contributions to promoting research on agricultural products e-commerce.



Figure 2. Author Collaboration Networks of Agricultural Products E-commerce

The number of articles published by an author can reflect their contribution to the research in the field. According to Table 2, Hong Tao has the highest number of publications. He has been devoted to the development of the e-commerce model for agricultural products in China for a long time,

continuously publishing reports on the development of e-commerce for Chinese agricultural products. He has also pointed out various problems that still exist, such as the impact of the epidemic on e-commerce, slowing e-commerce growth, increasing losses, homogeneous competition, lack of cultural development that can lead the market, and lagging theoretical research (Hong Tao, 2022).Lu Zhaoyang, ranked second, conducts empirical research on cross-border e-commerce for agricultural products, fresh agricultural products e-commerce, and e-commerce policies for agricultural products, exploring the factors that drive the development of e-commerce for agricultural products. Lin Jiabao, ranked third, constructs a model of the influencing factors of agricultural products e-commerce adoption from the perspective of institutional theory. He analyzes the impact mechanism of institutional pressure on the adoption of e-commerce by agricultural enterprises (Lin Jiabao et al., 2019). Zhu Zhanfeng, ranked fourth, mainly researches logistics and supply chain management for e-commerce of agricultural products. He and Zhu Yiqing, ranked eighth, form a cooperative team and study the supply chain composed of three major nodes: agricultural product suppliers, e-commerce platforms, and logistics providers from the perspective of ecology, and analyze the problem of profit distribution (Zhu Yiqing et al., 2021). Ranked fifth is Zhou Ming, who discusses the development of e-commerce marketing platforms for agricultural products in the era of big data.

Table 2. Author co-citation networks

Cited Authors	Author affiliation	Number of publications (articles)
Hong Tao	Beijing Technology and Business University	34
Lu Zhao Yang	Southwest University of Political Science and Law	11
Lin Jiabao	South China Agricultural University	11
Zhu Zhifeng	Ningbo University of Technology	6
Zhou Ming	Guangxi University of Finance and Economics	6
Zheng Yaqin	Anhui University of Finance and Economics	5
Samuel Liao	Chongqing Academy of Social Sciences	5
Zhu Yiqing	Zhejiang Wanli University	5
Chen Painting	Zhejiang Vocational College of Commerce	5
Sun Jian	Huazhong Agricultural University	4

3.4. Institutional distribution

The author's affiliation is an important factor in literature research, reflecting the significant role that the institution plays in the academic development and innovation of the relevant field. According to Table 3, a cluster of important institutions has emerged in the field of agricultural products e-commerce. The top-ranking institutions in terms of the number of publications include Beijing Technology and Business University, South China Agricultural University, Guizhou University, Anhui University of Finance and Economics, and Huazhong Agricultural University. From the provinces where the authors' institutions are located, it can be

seen that the top ten institutions are located in seven provinces, indirectly reflecting that most regions in China attach great importance to the development of agricultural products e-commerce.

Table 3. The top 10 author affiliations by publication count in the field of agricultural products e-commerce

Author affiliation	Province of the affiliation	Number of publications (articles)
Beijing Technology and Business University	Beijing	26
South China Agricultural University	Guangdong	21
Guizhou University	Guizhou	21
Anhui University of Finance and Economics	Anhui	18
Huazhong Agricultural University	Hubei	17
Wuhan Donghu University	Hubei	15
Southwest University of Political Science and Law	Chongqing	15
Renmin University of China	Beijing	14
China Agricultural University	Beijing	14
Henan University of Animal Husbandry and Economy	Henan	13

3.5. Journal distribution

Journals are an important channel for researchers to access and disseminate information, as well as an important criterion for evaluating research results for research institutions and universities. To identify the core journals in a field, the first thing to pay attention to is the number of articles published in the journal. According to the results in Table 4, "Rural Economy and Technology" is the most productive journal in the field of agricultural e-commerce, with 92 papers published. This is followed by "Commercial Modernization" and "Commercial Economic Research," with 63 and 62 papers published, respectively. The top three journals fully demonstrate the agricultural and commercial attributes of agricultural e-commerce.

Table 4. Top 10 journals for total number of articles in the field of agricultural products e-commerce

Journal	Number of publications (articles)	Journal	Number of publications (articles)
Rural Economy and Technology	92	China Commerce and Distribution	8
Commercial Modernization	63	Commercial Economics and Management	8
Commercial Economic Research	62	Rural Economy	7
Agricultural Economics	31	Journal of Huazhong Agricultural University (Social Sciences)	7
World Agriculture	13	Agricultural Technology Economics	5

4. Hot Topics and Frontiers in Agricultural Products E-commerce

4.1. Analysis of hot topics in agricultural products e-commerce research

The co-occurrence graph of keywords can effectively reveal and reflect the changes and trends of research hotspots in agricultural products e-commerce, as shown in Figure 3, which displays 19 clusters. Based on the co-occurrence features of keywords and related literature analysis, these 19 clusters can be further classified into 5 categories (Table 5). It can be observed that the theoretical knowledge and research hot topics of agricultural products e-commerce mainly revolve around the "supply chain of agricultural products e-commerce," "development issues of agricultural products e-commerce," "development models of agricultural products e-commerce," "marketing of agricultural products e-commerce," and "platform of agricultural products e-commerce."

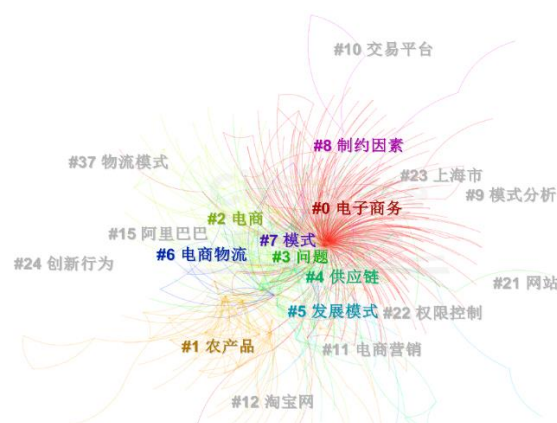


Figure 3. Key words co-occurrence map of agricultural products e-commerce

Table 5. Agricultural products e-commerce research clusters

clusters	Clustering themes
Supply Chain	#4 Supply Chain # 6 Logistics # 37 Logistics Mode # 22 Permission Control
Development Issues	#0 Electronic commerce # 1 Agricultural Products # 2 E-commerce # 3 Issues # 8 Restrictive factors
Development Model	#5 Development Model # 7 Model # 9 Model Analysis # 23 Shanghai # 24 Innovation Behavior
Marketing Platform	#11 E-commerce Marketing #10 Trading platform # 12 Taobao # 15 Alibaba # 21 website

4.1.1. Supply chain of agricultural products e-commerce

This category includes clusters #4 supply chain, #6 logistics, #37 logistics model, and #22 permission control, mainly related to the construction of the logistics system and the coordinated development of the supply chain.

The emergence of e-commerce logistics has promoted the high-quality and convenient production and operation of agricultural products, better facilitating the increase in farmers' income and promoting the rapid development of the rural economy. However, there are still problems in China's agricultural products e-commerce logistics system, such as incomplete network infrastructure, lack of specialized talents, non-standardization and branding of agricultural products, and incomplete logistics distribution system. It is necessary to further improve the understanding of e-commerce logistics

among agricultural management entities and perfect the construction of e-commerce logistics systems. The coordination between agricultural e-commerce and logistics will directly affect the circulation level of agricultural products. Hou et al. (2021) measured and analyzed the changes in the degree of coordination between China's agricultural products e-commerce and logistics from 2013 to 2018, and the results showed that the coordination between China's agricultural products e-commerce and logistics is still in the primary stage, and the symbiotic relationship is non-reciprocal symbiosis. The development of e-commerce has added online channels for fresh agricultural products, resulting in the problem of dual-channel sales and conflicts of fresh agricultural products. Fan et al. (2019) analyzed the decision-making mechanism and profit differences of dual-channel supply chains for fresh agricultural products based on the construction of a centralized decision-making and decentralized decision-making model for dual-channel supply chains of fresh agricultural products, and proposed that retailers and suppliers need to form partnerships and adopt a centralized decision-making approach to achieve the overall optimal benefits of dual-channel supply chains for fresh agricultural products.

4.1.2. Development issues of agricultural products e-commerce

This category includes clusters #0 Electronic commerce, #1 agricultural products, #2 e-commerce, #3 issues, and #8 restrictive factors, mainly related to the problems, restrictive factors, and countermeasures in the development process of agricultural products e-commerce.

The development of agricultural products e-commerce is an important way to promote modern agriculture and is of great significance for the high-quality implementation of the rural revitalization strategy. Tian et al. (2019) analyzed the characteristics, existing problems, and future development trends of agricultural e-commerce from the aspects of policies, categories, regions, flows, entities, and infrastructure, and proposed policy recommendations. The development of agricultural products e-commerce has driven the transformation of China's traditional agricultural product market economy model, promoted the rapid development of the agricultural economy. However, due to the influence of factors such as regional policies, quality standards, talents, and finance, there are still many limitations in the development of agricultural e-commerce in China, such as the imperfect quality standard system of agricultural products, the adaptability problem of the agricultural products e-commerce logistics supply chain, the inability to reflect the scale effect of agricultural products e-commerce, and the problem of the connection between agricultural products e-commerce and network financial services. Therefore, it is urgent to deepen the integration of agricultural products and e-commerce, and promote the healthy and sustainable development of e-commerce for agricultural products (Lv, Xiaoyong, 2021).

4.1.3. Development Model of Agricultural Products E-commerce

This category includes #5 development model, #7 model, #9 model analysis, #23 Shanghai, #24 innovation behavior, mainly involving Internet+, specific development models, and value chains.

With the comprehensive development of the "Internet+" era, live streaming e-commerce of agricultural products has become a new sales model for agricultural products, which has achieved significant economic and social benefits in

helping farmers increase their income and promoting rural economic development. To verify the driving mechanism of online live streaming on the development of fresh agricultural products e-commerce, Lu Zhaoyang (2020) concluded that online live streaming drives the development of fresh agricultural products e-commerce by reducing transaction costs between supply and demand sides of e-commerce stores, improving the conversion rate of e-commerce stores, and cultivating e-commerce stores' own brands. However, the development of agricultural product live streaming sales models in China is still in the early stages and urgently needs to be achieved through comprehensive coordination of action entities, differentiated operation of live streaming content, and scene-based expansion of user entry points to achieve sustainable development (Lv Yongjie, 2021). Farmers, agricultural production bases, processing companies, distributors, logistics companies, online platforms, payment platforms, certification agencies, regulatory agencies, and consumers constitute the value chain entities of agricultural products e-commerce. In the same industry value chain system, the interaction of each entity creates greater synergies and value. Xiao Ting (2018) conducted research on the transformation of agricultural wholesale markets to "e-commerce," focusing on value chain integration and proposing specific strategies such as building a supply-side information platform for agricultural products in the upstream, restructuring the value chain of agricultural product circulation systems in the middle, and innovating new forms of agricultural e-commerce operations in the downstream.

4.1.4. Marketing of Agricultural Products E-commerce

This category includes #11 e-commerce marketing, mainly involving marketing strategies, brand building, precision marketing, etc.

Under the influence of e-commerce, the agricultural product market is gradually developing towards scale and networkization. To address the problems and reasons for agricultural product online marketing in China, Li Jian (2018) proposed suggestions such as building regional characteristic agricultural product brands, strengthening rural infrastructure construction, and creating regional characteristic agricultural product brands. In recent years, with the popularity of short video platforms, live streaming e-commerce marketing has become a new channel for e-commerce product marketing. Zhao Caixia et al. (2022) constructed the marketing process and model of agricultural products under the promotion of live streaming e-commerce and proposed optimization strategies from the aspects of restructuring the live streaming marketing system, planning overall marketing plans, and building a live streaming marketing ecosystem. The "Internet celebrity" marketing of agricultural products under the background of e-commerce assistance is a new opportunity for the proliferation of agricultural product marketing. However, agricultural product "Internet celebrity" live streaming marketing still faces problems such as e-commerce talent and "Internet celebrity" training, infrastructure system, government-"Internet celebrity"-farmer triple responsibility, agricultural and sideline product quality supervision, market order maintenance, "Internet celebrity" live streaming frequency and traffic (Zhang Xiaoyan, 2023). Kong Xiangkun (2021) analyzed the brand marketing strategy of fresh agricultural products and believed that the choice of brand marketing path for fresh agricultural products should start from the perspectives of positioning-communication-innovation, and actively expand network marketing channels

by leveraging fresh e-commerce platforms to establish brand carriers and rely on them, implementing a diversified brand marketing combination strategy.

4.1.5. Platform of Agricultural Products E-commerce

This category includes #10 trading platforms, #12 Taobao, #15 Alibaba, and #21 website, mainly involving the current status and existing problems of agricultural products e-commerce platforms, operational mechanisms, business strategies, business processes, usage intentions, and other content.

Through e-commerce platforms, the sales of agricultural products have developed unprecedentedly. Luo Sheng et al. (2020) conducted a study on "intention to choose e-commerce platforms" through the mediating effect of "usage attitude" based on four independent variables: perceived usefulness, perceived ease of use, perceived cost, and government support. Li Yan et al. (2020) constructed a measurement system for agricultural product e-commerce platforms and analyzed the impact of pre-purchase expectations, product perception, logistics and distribution efficiency, website design, and after-sales service on the optimization of agricultural products e-commerce platforms. They proposed countermeasures such as improving logistics and distribution efficiency, reasonably controlling consumers' pre-purchase expectations, strengthening the construction of agricultural product standardization, optimizing the website design of e-commerce platforms, and improving after-sales service management. Lin Hai et al. (2021) conducted a study on the factors affecting the sales of fresh e-commerce platforms based on data from Taobao platform. The results showed that characteristics of comments, transactions, stores, services, and products would have different degrees of impact on product sales, among which the impact of comments was the most significant.

4.2. Analysis of the Frontiers of Research on Agricultural Products E-commerce

By using the burst word detection function of CiteSpace, the strength and time distribution of keyword bursts in research on agricultural products e-commerce were examined (Figure 4), with the thick line representing the time period during which the main topics burst. From the perspective of keyword burst strength, the top keywords are "rural revitalization", "e-commerce poverty alleviation", "precision poverty alleviation", "big data", and "influencing factors". Looking at the starting year of the keyword bursts, "Alibaba" first appeared in 2013, followed by "status quo" (2014) and "Internet+" (2016). The most recent emerging keywords are "rural revitalization", "big data", and "e-commerce" (2020), while "precision poverty alleviation" and "influencing factors" have been in a burst state since their appearance, indicating that these keywords represent the latest frontier in research on agricultural e-commerce.

A comprehensive analysis of the burst graph and related academic literature reveals significant differences in research focus at different stages of agricultural products e-commerce. In the blue ocean of the agricultural market, e-commerce companies such as Alibaba have entered rural areas one after another, initially building the agricultural e-commerce industry chain and opening up the online sales market for agricultural products. With the popularization of the Internet and strong support from national policies, some groups such as migrant workers, veterans, and college students have returned to their hometowns for employment and

entrepreneurship, and the poverty alleviation effect of e-commerce has begun to emerge. These new farmers actively responded to the national call and used the "Internet+" model to assist precision poverty alleviation. Under the background of "Internet+", the development problems of agricultural products e-commerce mainly involve the obstacles of marketing, development, and logistics modes. Since 2018, scholars have shifted their research focus to precision marketing, influencing factors, and logistics distribution, and have conducted research on spatial influence, user groups, and empowerment paths based on the production and operation practice of agricultural products e-commerce. At this stage, research on agricultural products e-commerce became more in-depth and detailed, with more profound research on industrial forms and spatial distribution, and research methods shifted from early single qualitative research to qualitative and quantitative combined research and theoretical model research, mainly through case studies or questionnaire surveys to model the agricultural products e-commerce ecosystem and conduct empirical analysis. In 2020, the keywords of agricultural products e-commerce underwent a mutation, and rural revitalization and big data became the latest keywords and topics that scholars focused on. Agricultural products e-commerce is an important lever to implement the rural revitalization strategy. Farmers are not only the decisive force driving the development of agricultural products e-commerce but also the ultimate beneficiary group targeted by the rural revitalization strategy. Song Ying et al. (2022) constructed a satisfaction evaluation system for farmers' participation in agricultural products e-commerce and conducted an analysis of the influencing factors of farmers' satisfaction with participation. The results showed that farmers have a high overall satisfaction with agricultural products e-commerce, and the satisfaction of farmers who participate in e-commerce is mainly affected by individual characteristics, broadband services, and sales channel expansion. E-commerce supply chain is an innovative product of digital empowerment of traditional agricultural product supply chain. However, the knowledge structure and understanding ability of ordinary farmers cannot bear the digital technology norms. Zhu Ting et al. (2022) proposed that in order to achieve stable integration of farmers into the e-commerce supply chain of agricultural products, it is necessary to meet the elemental requirements for e-commerce supply chain organization to develop, build a symbiotic environment for farmers and organizations to collaborate, and promote farmers to share more digital dividends.

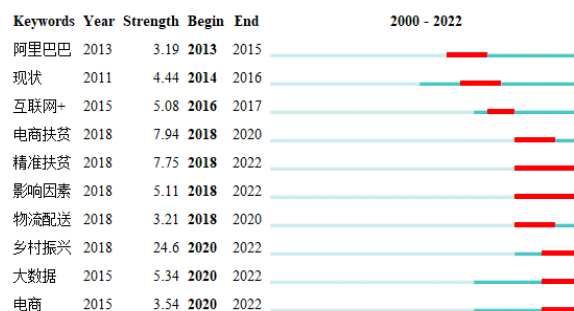


Figure 4. Burst of key words in agricultural products e-commerce

5. Conclusion and Prospect

This paper used a bibliometric analysis method to analyze

2238 articles from the CNKI database between 2000 and 2022, providing an intuitive description and systematic summary of the research dynamics, hot topics, and development trends of agricultural products e-commerce. The study found that the annual publication of agricultural products e-commerce literature has shown a high growth trend since 2012, with an average of 161 articles per year. The research field of agricultural products e-commerce is extensive, but it is most closely related to the fields of economics and management. The cooperation network analysis of authors revealed that the degree of concentration of most author cooperations is not very high, but there are several obvious cooperation groups. Hong Tao, Lu Zhaoyang, and Lin Jiabao are the top three authors in terms of publication volume. Beijing Technology and Business University has the highest number of publications, followed by South China Agricultural University and Guizhou University. In terms of journal publication volume, "Rural Economy and Technology" is the most productive journal, followed by "Commercial Modernization" and "Commercial Economic Research."

Through the analysis of keyword co-occurrence features and related literature, the hot topics of agricultural products e-commerce research mainly revolve around "supply chain of agricultural products e-commerce," "development issues of agricultural products e-commerce," "development models of agricultural products e-commerce," "marketing of agricultural products e-commerce," and "platform of agricultural products e-commerce." Using keyword burst detection to analyze the evolution trend of the research topic of agricultural products e-commerce, it was found that initially, scholars mainly focused on the technological e-commerce platform and development status level. With the development of Internet technology and the widespread application of e-commerce in agricultural trade, the research hotspot mainly focused on the level of production and operation practice, and scholars conducted research on precision marketing, influencing factors, and logistics distribution. In the context of the rapid development of digital technology and mobile networks, the role of agricultural products e-commerce in rural revitalization continues to be highlighted, becoming an important way to drive agricultural industry upgrading, rural innovation and entrepreneurship, farmer income increase, and rural economic development. "Rural revitalization," "big data," and "e-commerce" are the hot topics of agricultural products e-commerce research in recent years.

The 20th National Congress of the Communist Party of China proposed that high-quality development is the primary task for building a modern socialist country comprehensively. This not only provides direction for the development of agricultural products e-commerce in our country, but also puts forward higher requirements. In recent years, the state has planned and constructed a number of commercial and logistics hubs and cold chain bases, creating a good development environment and infrastructure for the healthy and sustainable development of agricultural e-commerce. How to improve the industry chain, optimize the supply chain, and enhance the value chain are all problems that must be solved to achieve high-quality development of agricultural products e-commerce. The digital economy is an important direction for China's economic development in the future period and a powerful driving force for the development of agricultural products e-commerce. With the continuous integration of digital technology and agricultural products e-

commerce, our country's agricultural products e-commerce will achieve greater effectiveness in rural revitalization. However, promoting the integration of the digital economy and agricultural products e-commerce is a complex and long-term process, and the limitations in development also deserve attention. Therefore, we should fully utilize the advantages of our current economic development process, continuously improve infrastructure construction and digital talent training, promote the application and innovation of digital technology, and use digital technology to promote the high-quality development of agricultural products e-commerce.

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