



A Review and Outlook of Agricultural Electronic Commerce Research - A Visual Econometric Analysis Based on CiteSpace

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Abstract. As the Internet becomes more popular, electronic commerce and agricultural products are deeply integrated. The convenience and low cost brought by electronic commerce and its huge market demand help agricultural products get rid of the original difficulties of narrow sales channels and high time costs. The development of electronic commerce provides an opportunity to increase the sales of agricultural products and has achieved huge economic benefits in helping farmers to increase their income. This paper starts from the recent research hotspots of agricultural products and electronic commerce. Firstly, with the help of CiteSpace software, we conduct a visual analysis of the literature related to agricultural products electronic commerce and use the network knowledge map to show the research hotspots and evolution process in this field in recent years and summarise the changing characteristics of research topics and research methods in the field. The study finds that (1) around 2017, agricultural products electronic commerce research began to receive domestic and foreign The research trend is significantly influenced by the development of national policies and technologies; (2) the research hotspots mainly focus on three aspects: electronic commerce marketing model study for agricultural products, research on technical support for agricultural products electronic commerce, and research on the future development of electronic commerce for agriculture products, and then provides an overview of the main marketing model, technical support, and future growth of electronic commerce for agricultural products, and finally points out the shortcomings of the current research and proposes directions for future research.

Keywords: electronic commerce for agricultural products, products for agriculture, online marketing, rural revitalization

1 Introduction

With the advent of the Internet era, e-commerce has been developing along with the times. "E-commerce+" is an innovative development model that combines e-commerce with different industries, which not only digs deeply into the integration of e-commerce but also provides a new marketing model and development ideas for the traditional industries with which it is integrated. At present, "e-commerce +" is already playing an essential role in the development of many industries, including the traditional industry of agriculture. In the process of modernizing the agricultural industry, the depth of integration between e-commerce and the traditional agricultural industry has promoted agricultural industrialization and modernization. Among them, the arrival of e-commerce has broadened the sales channels of agricultural products, changed the traditional sales concept and sales model of agricultural products, and further cracked the problems such as stagnant agricultural products. Meanwhile, to better facilitate the integration of e-business and farm products, the State Council issued the "Strategic Plan for Rural Revitalization (2018-2022)", which points out that it is necessary to build an extensive infrastructure for the development of rural e-commerce and accelerate the establishment of a sound standard system adapted to the e-commerce growth for agricultural products. The policy support has also greatly promoted the development of agricultural modernization and brought new development opportunities for the optimization of the agricultural products marketing model. Therefore, this paper provides a systematic review of the evolution of e-commerce for agricultural products, and visualizes the knowledge map with the help of Cite Space software, focusing on the analysis of its research hotspots and key contents to lay a solid theoretical basis for the research related to agricultural products e-commerce marketing, to offer new thoughts for the optimization of agricultural products marketing model as well as helping farmers to increase their income.

2 General description of agricultural electronic commerce research

2.1 Analysis of data sources

In this paper, the main data sources were Zhiwang Literature and the Web Of Science. To ensure the relevance of the cited literature to the research topic of this paper, the Chinese literature search set "e-commerce agricultural products, Internet agricultural products, e-commerce agricultural products marketing" as the search term to search for topics, keywords, and titles, and the English literature search was conducted by the topic "agricultural products e-commerce" + the topic "online marketing of agricultural products". To ensure timeliness, the data sources were selected from 2010 to 2023. To ensure the authority, the data were cited from "Peking University Core, SCI, SSCI, CSSCI, EI". After the search and elimination of ineligible literature, a total of 190 Chinese literature and 206 English literature were obtained as the research sample.

2.2 Literature time distribution and authorship mapping

To explore and grasp the publication situation of agricultural products e-commerce from 2010 to 2023, we use Cite Space software to convert the literature on the Internet into WOS format and carry out the operation of removing duplicates, which can get the literature time distribution data, and according to the data, we can get the distribution chart of the number of related literature in time sequence. From the data in the figure, we can see that the number of domestic literature published in recent years has shown a fluctuating upward trend, and the number of foreign scholars published after 2015 has increased significantly, indicating that domestic and foreign scholars pay more attention to agricultural products e-commerce and have a gradual warming trend.

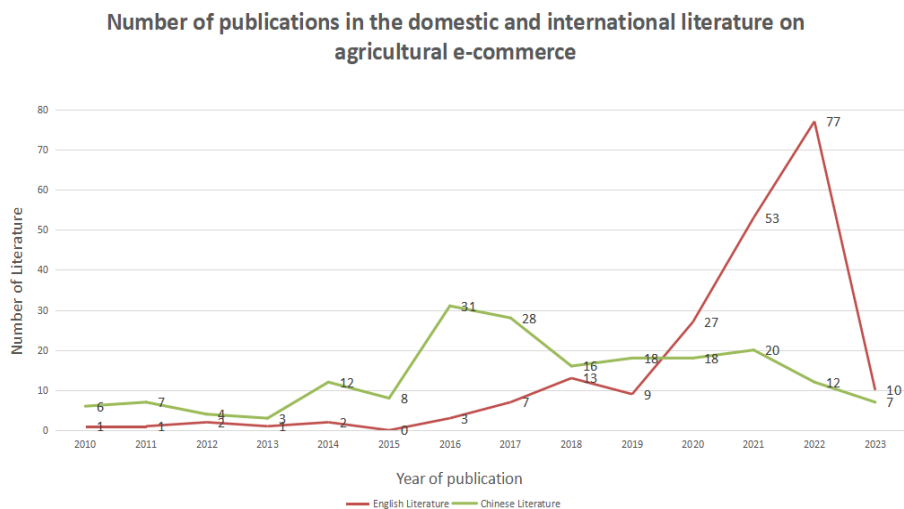


Fig. 1. Distribution of the number of domestic and foreign literature in time series

2.3 Analysis of research hot spots

2.3.1 Keyword analysis.

The Keyword is a comprehensive and concise summary of an article's topic, through which we can understand the research direction and research theme of the article. To explore the research direction and research hot spots in the area of agricultural products for e-commerce in recent years, the domestic and foreign literature was exported and set Node Types as Keyword by Cite Space software, and the time range was 2010-2023 after running to get the distribution table of highly cited keywords (see Table 1 and 2).

Table 1. Distribution of highly cited keywords in domestic literature

Keywords	Frequency	Centrality	Keywords	Frequency	Centrality
Agricultural Products	83	0.99	Rural E-Commerce	12	0.19
E-commerce	35	0.29	Rural revitalization	11	0.07
Internet Marketing	29	0.11	Strategies	8	0.01

Marketing Model	20	0.09	Countermeasures	8	0.09
Internet+	18	0.14	Current Status	6	0.03
Internet	12	0.05	E-commerce platforms	6	0.02

Table 2. Distribution of highly cited keywords in foreign literature

Keywords	Frequency	Centrality	Keywords	Frequency	Centrality
Impact	24	0.17	Model	14	0.19
Agricultural products	22	0.16	Farmers	13	0.08
e-commerce	20	0.10	Willingness to pay	12	0.24
Adoption	19	0.13	Technology	11	0.02
Information	17	0.24	Internet	11	0.14
Quality	16	0.10	Supply chain	10	0.06

2.3.2 Cluster analysis.

To further explore the evolution of research on e-commerce for agricultural products and to summarize and analyze the above keywords, we transformed the domestic and foreign literature data and eliminated the unidentifiable data, and used Cite Space software to do keyword clustering analysis on the transformed data. To better explore the temporal distribution of key phrases, the clustering analysis results were distributed according to time series to obtain the keyword temporal distribution chart. From the figure, we can see that during the period of 2010-2023, scholars at home and abroad have not reduced the number of hot spots for research on agricultural e-commerce in online marketing, cross-border e-commerce, rural revitalization, etc. The specific analysis diagrams are shown in Figures 2.

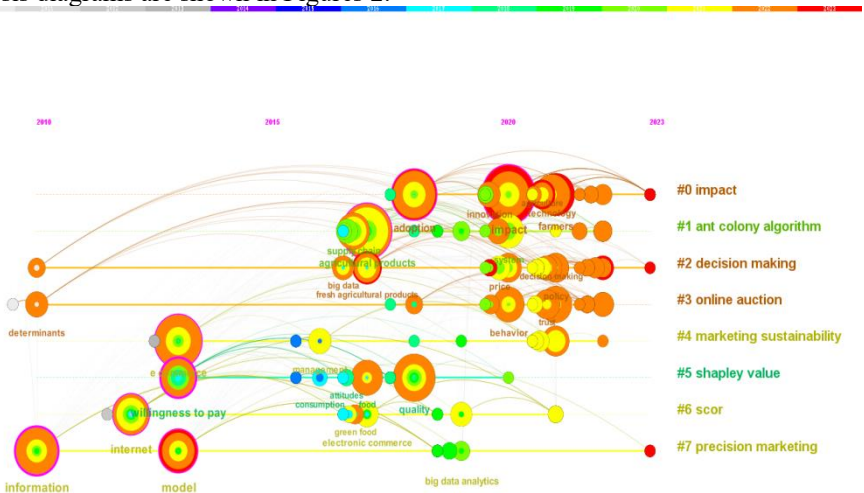


Fig. 2. Time-series distribution of keywords in foreign agricultural e-commerce literature

3 Review of research hot spots

After the above keyword cluster analysis and combined with Table1 and Table2 keyword distribution table, the clustering analysis results were summarized and summarized, while the keyword clusters that differed greatly from the topic of this paper, such as logistics system, regional differences, etc., were deleted. Three keyword clusters with high relevance to this paper were summarized: marketing model, technical support, and future development strategy. In other words, domestic scholars mainly focus on the research of marketing mode of agricultural products e-commerce, technical support of agricultural products e-commerce, and future development of agricultural products e-commerce.

3.1 Research on agricultural products electronic commerce marketing model

In terms of the current development of e-commerce of agricultural products in China, its marketing mode can be divided into C2B community group purchase mode, B2B mode.

3.1.1 Community group buying model.

The C2B community group purchase model mainly refers to the consumer-to-business group purchase model based on the community economy. The platform provided by e-commerce and the Internet achieves the purpose of linking with customers so that consumers buy agricultural products in the form of group purchases. The merchant advertises the agricultural products in the marketing media with the community economy model, and the customer buys the agricultural products at the group purchase price, which can sell more products for the merchant and get lower prices for the consumer (JI Lianggang, 2020)^[1]. This sales model is especially suitable for agricultural products with high storage costs and high transportation losses, such as fresh produce, which can be sold in large quantities in a short period of time through the C2B model, while the lower group purchase price can also stimulate consumers' shopping desire, thus achieving a win-win outcome. This C2B community group buying model is mainly based on the acquaintance effect, and for companies with a good reputation and high recognition, it will form a word-of-mouth effect among customers to achieve their group sales more easily; however, if the company has problems with the quality of agricultural products, it will affect its image in consumers' minds, resulting in lower sales (Minhui Liao, 2019)^[2].

3.1.2 Business-to-business marketing model.

The B2B marketing model mainly refers to various marketing activities that occur between enterprises and businesses. B2B marketing mode mainly refers to the bulk commodity trading platform for producers, processors, and sellers (Ji, 2020). The B2B marketing model aims to build trading scenarios for enterprises, which is more beneficial to the circulation of agricultural products than the traditional offline order signing

trading model, as it is free from time and space constraints and improves trading efficiency.

3.2 Research on technical support for agricultural electronic commerce

Agricultural products e-commerce is the product of the combination of traditional industry and the Internet, and its rapid development cannot be separated from the corresponding technical support. The current technical support for the rapid growth of agricultural products e-commerce is mainly reflected in market data processing and analysis, customer experience enhancement, and expansion of import and export trade scale.

3.2.1 Market data processing analysis.

Data extraction and analysis is an essential way to help farmers make better marketing decisions and help the rapid growth of the e-commerce model for agricultural products. Merchants can pinpoint the market based on big data technology, and establish a model of consumer characteristics and agricultural product characteristics through the marketing data provided by the platform to achieve precise positioning of target groups (Ren, Juxiang, 2020)^[3]. Meanwhile, big data technology can also predict consumer demand based on marketing data and provide certain indications for the future product direction of agricultural products. Similarly using big data technology, merchants can analyze the share of different agricultural products in the market and make dynamic adjustments to the prices of agricultural products by combining the predicted future consumer demand (Zhang Ju, 2019)^[4]. It helps to reduce merchants reduce marketing costs, avoid production blindness, and solve problems such as undersupply or oversupply (Miocevic Dario, 2021)^[5].

3.2.2 Customer experience enhancement.

The diversified communication media created by the new age of media has enriched the network resources, and the communication methods in the form of scene-based live broadcasts and supply chain-based live broadcasts have not only promoted the innovation of agricultural products e-commerce marketing methods but also increased the openness and inclusiveness of marketing channels. As a major marketing channel in the new media era, the anchor usually considers the customer's perspective when selling agricultural products live, and uses multi-dimensional marketing tools such as live scene arrangement and live interaction to enhance consumers' sense of shopping experience (Ma Huamin, 2021)^[6]. The visualization of live-streaming marketing allows consumers to feel more intuitively the growing environment of the origin of agricultural products, and the dynamic images of real-time live-streaming in fields and vegetable greenhouses bring greater impact to consumers than static pictures of agricultural products on display (Wang, Yuxia, 2021)^[7]. Live streaming can meet customers' needs for high-quality information, thus increasing customer experience and loyalty (Zan Mengying, 2020)^[8].

3.3 Research on the future development of agricultural products electronic commerce

As the main mode of today's e-commerce, the development of agricultural products e-commerce is strong, compared to traditional agricultural sales have unparalleled advantages. However, agricultural e-commerce has also encountered some obstacles in the process of development. Depending on the researcher's perspective, scholars have explored the real-life dilemmas of agricultural e-commerce in specific scenarios and put forward relevant development suggestions (Altarturi Hamza, 2023)^[9].

In the e-commerce-enabled agricultural marketing model, there has been a problem of low standardization in the selling process. Take the standardization of agricultural products as an example, especially for regions with not particularly good economic development, the degree of marketization has long been low, the market of agricultural products is not segmented, and the quality of the agricultural products sold is not strictly controlled, which leads to problems such as the difference in quality between the agricultural products chosen by consumers online and the actual ones they get (Yan Min, 2019)^[10]. At the same time, the current online market has the phenomenon of "small production and big market", and the management of online marketing is not high, and the lack of unified standardized management rules is not conducive to the standardized development of online marketing of agricultural products.

For the current situation, the government and producers need to jointly address it. Relevant departments should further improve documents such as agricultural production standards and quality testing standards, implement international quality certification systems such as ISO9000, ISO14000, and HACCP, vigorously promote standardized enterprises and implement certain incentives and support measures for them. Producers, should strictly implement relevant policies, implement whole-process quality control for agricultural products in production and processing, etc., and standardize the whole process of production and processing (Wu, Di, 2023)^[11].

4 Research conclusion and outlook

E-commerce for agricultural products is now an effective means to achieve rural revitalization and agricultural modernization, and in the era of big data, the vigorous development of agricultural products e-commerce has become inevitable. The e-commerce-enabled agricultural marketing model not only solves the problems brought by the traditional marketing model, but also creates new momentum for the overall agricultural and rural development, and combines with relevant policies to drive the boom of employment and entrepreneurship in the hometown and lay the economic foundation for the construction of beautiful countryside.

At present, academic research on the e-commerce-enabled agricultural marketing model has been quite comprehensive, with clear conclusions on the marketing model, advantages and disadvantages as well as future development direction. But for some emerging e-commerce such as live e-commerce, short video e-commerce, social new retail e-commerce, big data cloud computing-enabled e-commerce combined with agricultural marketing research is still relatively shallow, which is both an opportunity

and a challenge for industry scholars, providing ample space for future innovative research.

Through the literature review, the author believes that future research can concentrate on the below-mentioned aspects. First, on the connotation of the new era of e-commerce for agricultural products. Combining the context of the times and national relevant policy paper involving the promotion of village revitalization and agricultural modernization, the rich connotation of e-commerce in the new era is profoundly elaborated from three perspectives: macro, meso, and micro levels, the integration of e-commerce marketing and emerging technologies, the promotion of innovative e-commerce marketing model of agricultural products, and the new e-commerce model to help the structural upgrading of agricultural products. Secondly, it is about the evaluation index system. The existing evaluation index system does not fully take into account the dynamic and comprehensive nature of agricultural e-commerce development. It is suggested that future research can start from this aspect and build a scientific and operable evaluation index system by combining the connotation and characteristics of the new era of agricultural products e-commerce. Thirdly, it is about the development path of agricultural products e-commerce in the new era. In the new era of agricultural products e-commerce development direction has been specified, clear future development path has become the key target of scholars' research. From several aspects, such as improving logistics and network infrastructure construction, strengthening brand awareness, standardization of production, processing, and after-sale, and cultivating and absorbing talents in the electric business, we elaborate on the future development paths and analyze how to realize the rapid and efficient growth of e-commerce of agricultural products through the above paths. Fourthly, it is about the combination of agricultural products and the emerging e-commerce marketing model. With the evolution of the era and the increase of Internet penetration, the retail sales of online commodities are increasing, and the increase of consumer demand has stimulated the major e-commerce platforms to continuously innovate the e-commerce marketing mode, such as live e-commerce, short video e-commerce, social new retail e-commerce, and other new e-commerce marketing forms are emerging. Based on the characteristics of agricultural products, combined with the modernization of the countryside and agricultural background of the times, we propose to apply information infrastructure such as big data and cloud computing to the sales of agricultural products, and deeply integrate the sales of agricultural products with the new e-commerce marketing model.

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