Research Progress, Hot Spots, and Prospects of Internet Plus Specialty Fruits

-- Visualization Analysis based on CiteSpace

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Abstract: Based on the 627 journal articles collected in CNKI database from 2011 to 2022, this paper analyzes the research progress, hotspots and hot topic evolution in the field of domestic Internet plus specialty fruits by using CiteSpace visualization software, and then puts forward the research outlook. The results show that: (1) In the field of Internet Plus Specialty Fruits, the number of articles published shows a general trend of "gradual increase in the early stage and relatively flat in the later stage", the cooperation of authors shows the characteristics of "local concentration", and the cooperation of institutions shows the characteristics of "global dispersion". (2) Fresh food e-commerce, Internet plus agriculture, industrial poverty alleviation are the three major research hotspots in the field of Internet Plus specialty fruits. (3) The research hotspots of Internet Plus specialty fruits present such stage characteristics: evolving from the classic themes of fresh e-commerce, e-commerce platform and Internet plus to the emerging themes related to rural e-commerce and rural revitalization. Therefore, in the future, we should strengthen the basic theoretical research in the field of Internet plus specialty fruits, pay more attention to the hot issues such as "Internet Plus" agriculture, and focus on the training of talents in the field of "Internet Plus".

Keywords: Internet Plus Specialty Fruits; Research Hotspots; Citespace Analysis.

1. Introduction

In recent years, the rapid development of "Internet Plus" and e-commerce has had a great impact on the regional economy and even the entire social economy. As emerging industry models continue to emerge, traditional industries are in jeopardy. They urgently need self-innovation, and agriculture is no exception. At present, China's rural poverty problem has been transformed from the extensive overall poverty to the diversification of poverty problems. There are certain problems in the path of assistance under the different status quo of rural poverty in China. Internet Plus specialty agricultural industry poverty alleviation is an innovative concept of poverty alleviation, which can provide targeted assistance to the rural poor people's living conditions, so as to achieve accurate poverty alleviation. Under the background of the national vigorously implement the strategy of "Internet Plus", the integration and upgrading of the traditional fruit industry and the Internet is of great significance for promoting the transformation of old and new kinetic energy in China, promoting the upgrading of the characteristic fruit industry, and promoting the high-quality implementation of the rural revitalization strategy [1].

The traditional literature review mainly relies on reading a large number of documents and systematically commenting on them. The literature available is limited and inevitably subjective. However, bibliometric analysis with CiteSpace software can avoid these problems. In recent years, scholars have conducted a large number of literature visualization analysis on topics based on CiteSpace such as digital countryside (Li Youzhu et al., 2022), business model innovation (Zeng Yingying and Pu Zanyi, 2019), agricultural industry clusters (Deng Zhihong et al., 2022), citrus research (Xiao Chang et al., 2020), and apples response to climate change (Liu Yuan et al., 2021). However, little literature has been comprehensively and systematically organized in the field of "Internet Plus" specialty fruits. Then, what is the progress of Internet Plus specialty fruits research in China? What are the current research hotspots? What is the evolution of the related hot topics? What are the future research directions? A systematic literature review is necessary to answer these questions. Therefore, this study attempts to use CiteSpace software to visually analyze the relevant literature in the field of Internet Plus specialty fruits extracted from CNKI from 2011 to 2022, and strive to provide a basis and reference for further in-depth research on Internet plus characteristic fruits.

2. Research Design

2.1. Research Tool and Method

The analysis tool used in this study is CiteSpace, a visual analysis software designed and developed by Chen Chaomei (2003), version 5.1.R6. CiteSpace greatly reduces the subjective preference of scholars' references in the traditional literature review by embracing the literature of authors with different perspectives, schools of thought, and disciplines, thus making it more objective and reliable [2]. Therefore, the Scientific Knowledge Graph analysis method is adopted. In CiteSpace software, the time interval is selected as 2011-2022, the time slice is one year, the Node Types are set as Author, Institution, Keyword, and the Selection Criteria are set as TOP50 in turn. Then, the author cooperation graph, institution cooperation graph, keyword co-occurrence and clustering graph are drawn respectively. Further, on the basis of the keyword co-occurrence and clustering graph, Timeline and Timezone are utilized to generate keyword co-occurrence...
timeline graph and time zone graph, according to which the research progress, hotspots and its evolution of Internet Plus specialty fruits are sorted out.

2.2. Data Sources and Processing

In this study, China Knowledge Network (CNKI) was chosen as the sample source database, and the search method of "theme" was adopted, with the search terms set as "Internet plus" fruit, apple, citrus, pear, grape, banana, cherry" or "e-commerce fruit, apple, citrus, pear, grape, banana, cherry". The search time was July 27, 2022, a time span of about 12 years. After the search, in order to ensure the reasonableness of the selected papers, the data were examined article by article, and the invalid records such as irrelevant to the topic were cancelled. Finally, 627 valid documents were obtained.

3. Internet Plus Specialty Fruits Research Progress

3.1. Number of Publications

The trend of the number of publications in the field of Internet Plus Specialty Fruits from 2011 to 2022 was plotted (see Figure 1). It is analyzed that in the past 12 years, the number of publications shows the general trend of "gradual increase in the early stage and relatively flat in the later stage", and 2015 is an important turning point. The average number of publications per year before this period is about 18, and the average number of publications per year after 2015 rises to 109. "Internet Plus" specialty fruits are gradually attracting attention from scholars.

![Fig 1. Number of publications in the field of Internet plus Specialty Fruits](image)

Note: The number of articles issued in 2022 is the forecast value of China Knowledge Network.

Data source: search results from China Knowledge Network Measurement Visualization Analysis.

3.2. Analysis of Core Authors and Partnerships

Core authors reflect that the author has some influence in a certain field, while the author collaboration network can reveal the research interests of different authors in the field and their linking relationships [3]. In the author collaboration graph (threshold 2) (see Figure 2), 27 authors have 16 links to each other, which represents that there is a certain collaborative relationship between authors. According to Price's law in bibliometrics, the number of papers published by the core authors of in the field of "Internet Plus" specialty fruits was determined according to \( M=0.749(N)_{\text{max}}^{1/2} \). Among them, M is the minimum number of papers published by core authors, and N is the maximum number achieved by the number of papers published by authors from 2011-2022. Among 627 articles, the author who published the most papers are Zhao Yushan, which is 12, that is, \( N_{\text{max}} =12 \), and \( M=2.59 \) (3 articles). The node size reflects the amount of author publications. Based on the amount of author publications, Zhao Yushan, Qian Kaisheng and other scholars, are the core authors in the research field of "Internet plus" Specialty Fruits. In terms of the number of nodes, there are only 27 authors who have researched in the field of "Internet Plus" Specialty Fruits, and the earliest article appeared in 2011, and 12 years have passed, and the scholars' attention to this field has significantly increased. In addition, from the perspective of connection, there are only 4 author cooperative groups, the number of connectivity between authors is not large, and the communication and cooperation between scholars still need to be strengthened.

![Fig 2. Mapping of author collaboration in the field of Internet plus specialty fruits](image)

Table 1. Core authors' publications and research areas in the field of Internet Plus Specialty Fruits

<table>
<thead>
<tr>
<th>Order number</th>
<th>Author</th>
<th>Volume of publications</th>
<th>Field of research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zhao Yushan</td>
<td>12</td>
<td>Agricultural; Horticulture; Crops</td>
</tr>
<tr>
<td>2</td>
<td>Qian Kaisheng</td>
<td>8</td>
<td>Agricultural; Trade economics; Market</td>
</tr>
<tr>
<td>3</td>
<td>Peter Ge Deguang</td>
<td>6</td>
<td>Agricultural; Market research and</td>
</tr>
<tr>
<td>4</td>
<td>Wu Bin</td>
<td>4</td>
<td>Light industrial crafts; Horticulture;</td>
</tr>
<tr>
<td>5</td>
<td>Wei Jia</td>
<td>4</td>
<td>Light industrial crafts; Horticulture;</td>
</tr>
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Note: The number of publications includes both first-author and non-first-author publications in the statistical collation.

In order to further clarify the core authors and their specific research fields, the core authors’ publication volume and research fields in the field of Internet Plus Specialty Fruits are obtained by collation (see Table 2). The analysis shows that: firstly, most of the core authors' research directions are agricultural economy and horticulture, indicating that "Internet Plus" Specialty Fruits research has a certain degree of specialization; secondly, the core authors are involved in a number of different research fields, such as, trade economy, light industry handicrafts, macroeconomic management and sustainable development, automation technology, etc., indicating that Internet Plus Specialty Fruits is a multidisciplinary integrated system; thirdly, there are 5 authors with 3 or more papers issued, and the total number of papers is 34, accounting for 5.42% of the total number of papers on "Internet Plus" Specialty Fruits. There is
a big gap with the core author group that needs to reach 50% of the papers issued. It reflects that the research on Internet Plus Specialty Fruits has not yet formed a stable core group of authors, and the scholars still need to strengthen the attention to this field.

3.3. Distribution of Institutions and Their Cooperation

Statistics on the institutions where the authors of the main literature are located can reveal the main research institutions in the field of Internet Plus Specialty Fruits in China and give a side view of the distribution of the stalwart research force in this field [4]. Based on the literature data drawing to get the institutional cooperation graph (threshold 2) (see Fig. 3). The analysis shows that there is only 1 connecting line between 17 research institutions, reflecting the lack of cooperation between research institutions. Further observation of Figure 3 reveals that the Internet Plus Specialty Fruits literature is concentrated in business schools and economics and management schools of universities. In terms of node size, research institutions that have significant contributions to the research on Internet Plus Specialty Fruits are Shanxi Linfen Agricultural Committee and Wuhan Donghu University. After analyzing the literature, it is concluded that the former focuses on the key direction of apple e-commerce and pear e-commerce, while the latter mainly carries out research related to the development strategy of "Internet Plus" fruits.

4. Internet Plus Specialty Fruits Research Hot Spot Analysis

4.1. Overview of Research Hotspots based on Keyword Co-occurrence

Further, 627 Internet plus Specialty Fruits research documents were generated into a keyword co-occurrence and clustering visualization graph (see Fig. 4), and the analysis revealed that 131 keywords had 289 connecting lines to each other, with a module value of 0.5258, which was greater than 0.30, indicating that there were significant differences between the various research topics in Internet plus Specialty Fruits. And the average contour value was only 0.3621, which was smaller than 0.70. The possible reason is that there are many research perspectives and different research paradigms in the field of Internet plus specialty fruits, which leads to the existence of many small clusters [5]. It is analyzed that there is a close connection between keywords such as Internet plus, agricultural products, e-commerce platforms, fruit e-commerce, and the existence of interlocking phenomena in key clusters such as fresh food e-commerce, Internet plus agriculture, and industrial development, which suggests that there is an intrinsic logical relationship in which these themes are intertwined and influence each other.

In order to portray the relationship between the clusters and their dynamic evolution, a timeline mapping was drawn using CiteSpace (see Fig. 5). It can be observed that the hot topics of the Internet plus Specialty Fruits related research are constantly shifting over time, with the main focus on the topics of e-commerce platforms and fresh products in the early days, and then shifted to rural e-commerce, rural revitalization and live streaming with goods in the recent years.

Further analysis reveals that the two keywords with the highest frequency of occurrence in the research related to Internet plus Specialty Fruits are e-commerce platform (96 times) and Internet plus (71 times) (see Table 2). On the one hand, it is because the theme of the search contains "Internet plus" and "e-commerce", both of which, as the identifying words of the field, will not appear less often. On the other hand, it shows that the core of the Internet plus specialty fruit
research is still the Internet and e-commerce platform to help the development of the specialty fruit industry. On this basis, the keywords are further analyzed by clustering, and a total of 11 large clusters are generated, such as fresh food e-commerce, Internet plus, agricultural products, industrial poverty alleviation, etc. According to the results of keyword frequency and cluster analysis, there are three main hotspots in the field of Internet plus specialty fruit research since 2011.

4.2. Analysis of Research Hotspots and Development Dynamics based on Keyword Co-occurrence

4.2.1. Fresh Food E-commerce

Fresh food e-commerce formed the largest clustering, and in 627 sample literatures, e-commerce platform, fresh food e-commerce and rural e-commerce appeared a total of 185 times, accounting for 29.51% of the total samples, indicating that fresh food e-commerce is one of the focal points of attention of scholars in the field of Internet plus Specialty Fruits. It is found that the past research focuses on analyzing the development of fresh food e-commerce industry from both macro and micro aspects [6-9]. First, research on the macro development of fresh food e-commerce, including the status quo and trend of fresh food e-commerce, opportunities and challenges, survival dilemmas and countermeasures, and industry development under the sudden public health events. Second, the micro-dynamic research on fresh food e-commerce mainly includes the fresh food e-commerce customer satisfaction measurement, residents' willingness to migrate to the channel of fresh food products, the investigation of fruit cold-chain logistics and distribution and the analysis of fresh food e-commerce brand effect.

4.2.2. Internet Plus Agriculture

Internet plus, agricultural products, and Internet plus Agriculture constitute four huge clusters, indicating that Internet plus Agriculture is one of the research hotspots in the field of Internet plus Specialty Fruits. With the popularization of the Internet, the use of information technology, the innovation of new business model of modern agriculture can make up for the short board of insufficient agricultural development. In recent years, research on the application of the Internet in agriculture has emerged in an endless stream [1,10-12]. For example, Liu Yanjuan (2021) systematically sorted out the development mode of fruit e-commerce and put forward the optimization strategy of fruit transformation and upgrading in the Internet plus era. Wang Lei et al. (2018) put forward the "Internet+" transformation strategy suitable for suppliers of fresh agricultural products in the origin, suppliers in the sales area, and distribution-type suppliers. Mou Wentai and Lu Yonghua (2018) indicated that it is necessary to improve the construction of the information system, promote the integration of online and offline transactions, build diversified "Internet+" circulation channels, and strengthen the cultivation of talents in the field of "Internet+" to improve the implementation of the "Internet+" fruit industry in Shandong Province. He Wang and Qi Qunqun (2016) explored the financial support for the transformation and upgrading of the Gannan navel orange industry under the agricultural supply-side reform.

4.2.3. Industrial Poverty Alleviation

Industrial poverty alleviation is one of the clusters formed by 627 sample literatures, while rural revitalization, rural e-commerce, and e-commerce poverty alleviation appeared in the top ten keywords, indicating that the Internet plus specialty fruits play a great role in industrial poverty alleviation. In fact, agricultural poverty alleviation is one of the most crucial and important research contents of rural development and poverty alleviation [13], vigorously promoting the development of agricultural e-commerce has now become an important support to promote farmers' sustainable income and prosperity of the rural economy. Relevant research mainly focuses on the model innovation research of fruit industry helping poverty alleviation, the positive role of e-commerce logistics enterprises in industrial poverty alleviation, the precise poverty alleviation of fruit industry relying on the Internet, and the role of agricultural e-commerce in poverty alleviation in poor counties [10,14-17]. For example, Wu Mingfeng (2021) explores the impact of e-commerce on the fruit supply chain, aiming to improve the competitiveness of fruits in the province and promote the rapid and healthy development of the industry. Jiang Zosheng (2020) finds that industrial poverty alleviation in poverty-stricken counties should be based on the local policy, and it is necessary to identify the advantageous industries and prioritize the support of industries with a certain scale.

5. Evolution of Internet Plus Specialty Fruit Research Topics

CiteSpace's time zone mapping can get the evolutionary dynamics and developmental vein of the researched field by analyzing the interaction of keywords, which helps to judge the future development direction of the field [18]. Therefore, in order to analyze the evolutionary trend of Internet plus Specialty Fruits research topics, based on the CiteSpace keyword co-occurrence analysis, the co-occurrence time zone mapping for 2011-2022 is obtained (see Figure 6). Internet plus Specialty Fruits research can be roughly divided into two phases, in the first phase (2011-2017), the research hotspots are mainly centered on fresh food e-commerce, e-commerce platforms and Internet plus. And there are a large number of fine connecting lines between these keywords and subsequent topics, reflecting that the development of e-commerce platforms, Internet technology and its application in fresh food products are the basis of Internet plus Specialty Fruits related research. In the second stage (2018-2022), the focus of scholars in this stage is shifted from fresh food e-commerce itself to rural e-commerce and rural revitalization. The emergence of keywords such as Internet plus Agriculture, live streaming with goods, specialty agricultural products and precision poverty alleviation shows that Internet technology has begun to be vigorously applied in agriculture at this stage, and has played an important role in realizing the farmers' income increase, and promoting the prosperity and
development of agricultural economic.

6. Conclusion and Research Outlook

6.1. Main Research Results

This study systematically reviewed the Internet + characteristic fruits, and used CiteSpace to conduct data mining, statistics and knowledge map visualization analysis on related research progress, research hotspots, and hot topic evolution. The main conclusions are as follows.

First, the amount of articles published in the field of Internet plus specialty fruits shows the general trend of "gradual increase in the number of the first period, and relatively flat in the later period", and the cooperation of authors shows the characteristics of "local concentration", while the cooperation of institutions shows the characteristics of "global decentralization". Firstly, the average number of published documents per year before 2015 is about 18, and the average number of published documents per year after 2015 rises to 109. Secondly, scholars such as Zhao Yushan and Qian Kaisheng are the core authors in the research field of Internet plus Specialty Fruits. And thirdly, the research institutions that have made important contributions to the research of Internet plus Specialty Fruits include Shanxi Linfen Agricultural Committee and Wuhan East Lake College.

Second, fresh food e-commerce, Internet plus Agriculture, and industrial poverty alleviation are the three major research hotspots in the field of Internet plus Specialty Fruits. First, the research on fresh food e-commerce focuses on analyzing the development of fresh food e-commerce industry from both macro and micro aspects. Secondly, regarding Internet+ Agriculture, there are numerous studies on the application of Internet in agriculture; thirdly, studies on industrial poverty alleviation focus on poverty alleviation model innovation, e-commerce logistics enterprises, precision poverty alleviation, and agricultural e-commerce.

Third, Internet plus Specialty Fruits research hotspot presents the stage characteristics of "the classical theme around fresh food e-commerce, e-commerce platform, Internet plus to the emerging theme related to rural e-commerce and rural revitalization". First, in 2011-2017, the research hotspots centered on fresh food e-commerce, e-commerce platform, and Internet plus. Second, in 2018-2022, the focus of scholars shifted to rural e-commerce and rural revitalization.

6.2. Research Outlook

Existing research has focused on the status quo, development and optimization path of Internet plus specialty fruits, and accumulated a large amount of research experience. However, in general, there is not much research on Internet plus specialty fruits, and the deeper investigation is even more lacking. Therefore, in the future, we should strengthen the basic theory research of Internet plus specialty fruits in the field, pay more attention to the hot issues such as "Internet plus" agriculture, and pay attention to the cultivation of talents in the field of "Internet plus".

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