

# Research hotspots and development trend of green marketing in China from 1993 to 2021: knowledge graph analysis based on Citespace

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**Abstract.** As the whole world enters the era of environmental protection, the green revolution has brought vitality to enterprises and society. Carrying out green marketing, producing green products and setting up green marketing concepts are the hot topics of academic interest, and also a great opportunity for enterprises. Using the visual analysis software citespace, draw the corresponding knowledge map, carry out corresponding quantitative research on domestic green marketing research, and analyze the knowledge structure and evolution pattern of green marketing research in China from a bibliographic perspective. The results of the study show that there is little cooperation between authors and institutions in the field of green marketing, . The research themes are mainly distributed in green marketing, eco-marketing, low carbon economy, green consumption, green products and other aspects, among which "green marketing" is the biggest node of continuous attention. Future research should focus on the application and promotion of green marketing in agricultural products, and at the same time, strengthen the connection and cooperation between authors and institutions, broaden the breadth and depth of research, and study the development and application of green marketing through more literature.

**Keywords:** Green marketing, Research hotspots, Development trend, Citespace knowledge graph, Visual analytics.

## 1. Introduction

Originally, the word "green" emerged from the United States in the 1960s. Since then, interest in its research has increased among economists, sociologists and marketing scholars, leading to its development in the early 1980s (Leonidou & Leonidou, 2011). In the 1990s, green marketing became a green movement, and the decade of 1990 was declared "the era of the Green Revolution" (Vandermerwe & Oliff, 1990). Since then. Green marketing has become an important research field for scholars (Fuller, 1999; Hartmann et al., 2005; Juwaheer et al., 2012; Peattie, 1995; Polonsky and Mintu- Wimsatt, 1995). In November 1992, Chinese representatives attended the international Marketing seminar held in Hong Kong, where domestic scholars first came into contact with the concept of green marketing and carried out corresponding research [2]. In 1997, the first monograph green Marketing was published, marking the formation of green marketing theory in China.

With the development and evolution of the research theory in this field, domestic researches on green marketing have accumulated more achievements and formed a relatively mature system. By combing through the relevant literature on green marketing research in China, it can be seen that the research in this field is rich in content, diverse in research topics and involves multi-disciplinary cross research. Although the existing research has a certain comprehensive analysis of domestic green marketing [3], the relevant studies are mainly qualitative studies and lack of quantitative studies on green marketing. Unable to capture the hot spots and trends of green marketing research.

Therefore, this research uses the Citespace information visualization software, and uses the SCI, CSSCI, Peking University Core and CSCD included in China National Knowledge Infrastructure (CNKI) as data sources to carry out a corresponding quantitative research on domestic green marketing research, and draw a corresponding knowledge map. It displays the research hotspots, research trends and evolution laws in this field with visual information, providing theoretical reference for follow-up research and practical exploration.

## 2. Definition of Green Marketing

Much of our understanding of green marketing comes from the perspective of consumers (Hartman et al., 2005; Richeye et al., 2014). As a multifaceted concept, green marketing is linked to ecological marketing, sustainable marketing, environmental strategies, environmental marketing and many other terms (Abzari et al., 2013; Chamorro et al., 2009; Dangelico & Vocalelli, 2017; Garg, 2015). Peattie (2010) divides green marketing into three stages: "ecological green marketing", "environmental green marketing" and "sustainable green marketing". At present, the domestic academic circles have basically reached a consensus on the definition of green marketing. They believe that a more comprehensive definition is proposed by Wei Mingxia and Si Linsheng (2001): they believe that green marketing means that under the requirements of the concept of sustainable development, enterprises will take responsibility from the society. From the perspective of responsibility, environmental protection, full use of resources, and long-term development, in the whole process of product research, development, production, sales, and after-sales service, take corresponding measures to achieve sustainable consumption of consumers, sustainable production of enterprises, and complete The balance of three aspects of sustainable development of society. It aims to achieve the effective allocation of limited resources and pursue the organic coordination of short-term marketing behaviour and long-term marketing strategies with society, economy, resources and environment as well as the benign influence on the long-term development of enterprises [3]. It can be seen that green marketing is more focused on the coordination between the interests of consumers, enterprises and the social environment. While meeting the needs of consumers, attention should be paid to the ecologically balanced development of nature.

## 3. Data sources and research methods

### 3.1 Data sources and processing

The data sources of this study are mainly selected from journals with high quality literature in China Knowledge Network (CNKI), including CSSCI, SCI, CSCD and Peking University Chinese core journals. As Green Marketing is generally considered to be the Chinese translation of English "Green Marketing". Some scholars also use "Environmental Marketing" (Environmental Marketing), "lower-carbon Marketing" (low-carbon Marketing) and "Ecological Marketing" and other words to express. Considering that green marketing, environmental marketing, low carbon marketing and eco-marketing are often blurred by scholars, these four keywords were searched simultaneously. The search terms were limited to "green marketing" or "environmental marketing" or "eco-marketing" or "low carbon marketing ". In order to make the data more credible, the data classification proposes engineering technology, etc., and only retains the economic and management science literature. Through precise matching, a total of 1300 literatures related to green marketing from 1993 to 2021 were retrieved, and the retrieval time was March 21, 2022. Through manual screening one by one, irrelevant topics and no-author documents were eliminated, and finally 1040 valid documents were screened.

### 3.2 Research method

CiteSpace is a visualization software developed by the famous Chinese American scholar Chaomei Chen in Java language. It is mainly based on co-citation analysis theory and pathfinding network algorithm, etc., to measure the literature (collection) of a specific field, in order to explore the key path of the evolution of the discipline and its knowledge inflection point (represented by key papers), and through a series of visualization mapping to form the analysis of the potential dynamics of the discipline evolution and the detection of the frontier of the discipline development [5]. As a dedicated scientific knowledge mapping tool, CiteSpace has been widely used by relevant research institutions and personnel in the international scientometrics community since its launch in September 2004. Therefore, with the help of CiteSpace software, this paper takes the core journals in the field of green

marketing in China as the research object, and visualises the authors and institutions, research hotspots and evolution patterns in this research field, so as to objectively show the current situation and development trend of research in this field. The parameter selection (Selection Criteria) of Citespace was Top50 per slice, and the running time was December 1, 2021, with a time span of 1993-2021 (Slice Length=1). The Pathfinder function was used for pruning and optimisation to construct a co-occurrence map of authors, organisations and keywords in the field of green marketing, and the corresponding clustering map was generated according to the keyword co-occurrence.

## 4. Analysis of research results

### 4.1 Analysis of the overall trend of domestic green marketing research

A corresponding analysis of the volume of domestic green marketing publications from 1993-2021, according to the results of Figure 1, shows that the number of papers published increased year by year from 1994 to 2001. The number of articles published in 2002 was a breaking point and a turning point, after which the number of articles tended to first decrease and then increase, reaching a peak of 116 articles in 2007. After that, the number of articles published fluctuated, but the number of articles published every year reached more than 50. But after 2011, the number of articles published reached less than 20. However, the corresponding prediction of the trend of the number of articles shows that the number of articles will show an increasing trend year by year after 2020. The data results are shown in Figure 1:



Figure 1. Domestic green marketing publication volume, 1993-2021

### 4.2 Core authors and institutional analysis

#### (1) Visualization analysis of core authors

The citespace software was used to visualise the core authors, setting the Node types as Author Author and selecting the top 50 frequency data in each time slice. Run the citespace software and get the author distribution and cooperation map in the domestic green consumption field, as shown in Figure 2. In the author distribution graph, the node represents the number of papers published by authors in this field, and the larger the node, the more papers the authors publish; the line represents the cooperation between authors, and the thicker the line, the stronger the cooperation between authors. Conversely, the weaker the collaboration between the authors. By running citespace software, an author distribution profile with 658 nodes, 204 connections and a network density of 0.0009 was obtained.

The visualization map of core authors shows that the whole network distribution in the author distribution map is loose, and there are many published authors, but not many highly productive authors. By analysing and collating the literature, the top ten authors of the article were obtained,

namely: Jing Shaoping, Deng Desheng, Li Shu, Wei Mingman, Si Linsheng, Rao Kefu, Shen Genrong, Zhang Guohua, Zhang Juihuan and Yu Daisong. In the author distribution network map, the number of connections between authors is also scattered, indicating that there is less cooperation between authors in the field of green marketing, and a certain scale of cooperation has not yet formed. The published literature is basically completed independently.

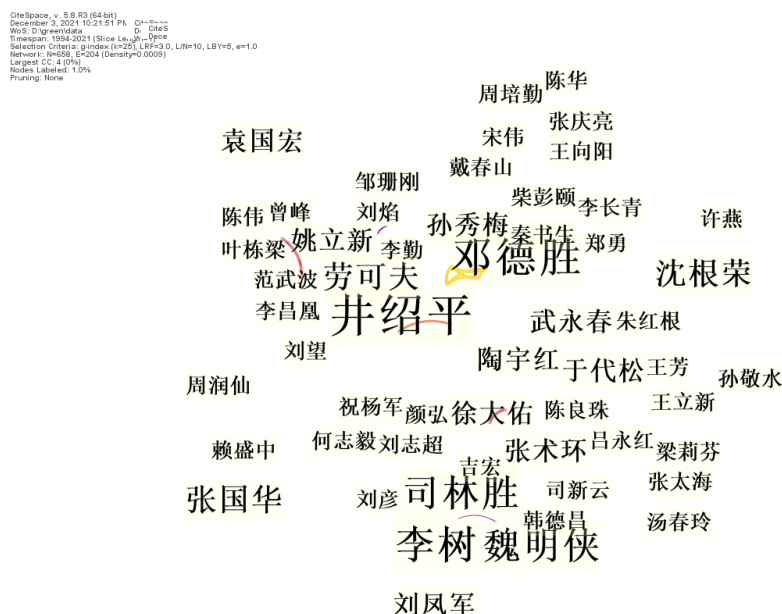


Figure 2. Distribution and co-occurrence mapping of green marketing research authors in China

## (2) Visualization analysis of core institutions

In order to further analyze the institutional distribution and cooperation map in the domestic green marketing research field, Set the Node types to Institution and leave all other parameters untouched. Run Citespace and get the distribution and cooperation map of domestic green consumption institutions, as shown in Figure 3. A distribution and cooperation map of institutions with 575 nodes, 154 connections and a network density of 0.0009 was obtained. In this research area, the top ten institutions in terms of number of publications were School of Economics and Management of Harbin Engineering University, the Department of Trade and Economics of Zhongnan University of Economics and Law, Business School of Central South University, the School of Business of Central South University of Forestry and Technology, the School of Finance and Economics of Anhui University of Finance and Economics, the School of Economics and Finance of Xi'an Jiaotong University, the School of Law of Shandong University of Technology, the School of Business Administration of South China University of Technology, the School of Business of Jilin University and the School of Economics and Management of Beijing Forestry University. The results of the study show that there are many institutions issuing articles, but not many articles per institution, and that the top ten institutions in terms of the number of articles issued are mostly colleges of university management. In terms of institutional collaboration, institutions are spread out, mostly in a two-point partnership, suggesting a lack of collaboration between institutions and less collaborative output.

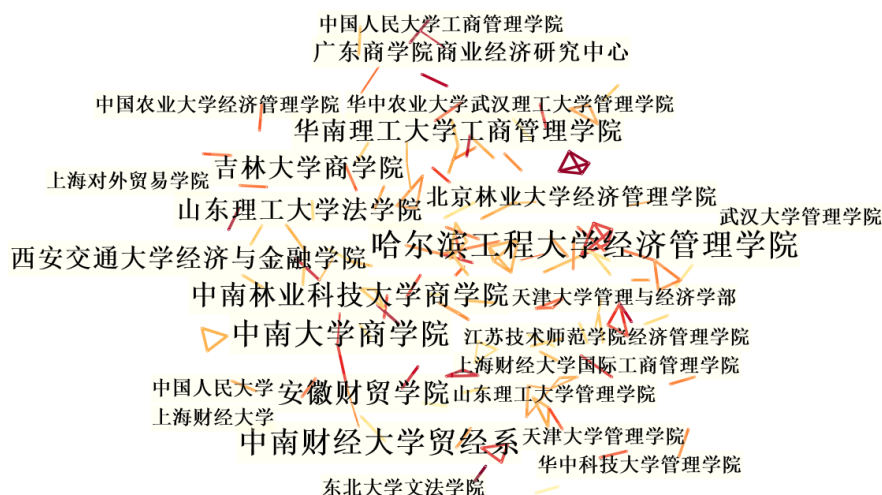


Figure 3. Distribution and cooperation network map of domestic green marketing research institutions

## 5. Research Hotspots and Frontier Analysis

### 5.1 Research Hotspot Analysis

#### (1) Keywords analysis of domestic green marketing research

Select the top 50 frequency data in each time slice. Run Citespace to get the keyword distribution map with 684 nodes, 1320 connections, and 0.0057 network density (as shown in Figure 4). Each circular node represents a keyword and the frequency of the keyword is indicated by the size of the circle, the larger the circle the more frequently the keyword appears and the more representative of the research hotspots in the field of green marketing. The lines between the nodes indicate the co-occurrence (or co-introduction) relationship and their thickness indicates the strength of the co-occurrence (or co-introduction). The colour corresponds to the time of the first co-occurrence (or co-introduction) of the node. The change in colour from cool blue to warm red indicates a change in time from early to recent.



Figure 4. Green Marketing Research Keyword Co-occurrence Map

Figure 4 shows that the largest node in the mapping is green marketing, followed by green products, green consumption, countermeasures, green barriers, consumers, companies, green management, and marketing. The frequency of keyword appearance, that is, the size of the node, also reflects the research hotspot in the field of green marketing to a certain extent. In addition, the keyword nodes in the graph are purple circles indicating that the keyword has a high centrality. From Figure 4, it can be concluded that the keywords with high centrality in the field of green marketing research are green marketing, eco-marketing, low carbon economy, green consumption, green products, countermeasures, green barriers, consumers, marketing strategies, innovation and other high centrality keywords.

Comprehensive domestic green marketing research in the field of high-frequency keywords and high-centrality keywords derived from the initial research in the field, ecological marketing, green marketing, green products, green consumption, marketing and other mainstream research position, and then promote marketing strategies, green management, ecological civilization, green barriers and other research, and later with the study of countermeasures, innovation, enterprise and other research to promote the research of low-carbon economy, supply chain and other research has become a green marketing research field of research hotspots, and continue to promote the field of in-depth research.

## (2) Hot spot cluster analysis of domestic green consumption research

Keyword clustering focuses on reflecting the structural characteristics and thematic distribution among clusters, highlighting key nodes and important connections, and by doing corresponding clustering analysis on keywords in the field of green marketing research to reveal the research topics in this field. Run citespace software to obtain a keyword clustering distribution profile with 684 nodes, 1568 connections and a network density of 0.0067 (as shown in Figure 5). Q value is greater than 0.5, S value is greater than 0.7, so the clustering is reasonable. Obtained 11 major cluster labels of domestic green marketing research, including: green marketing, green barriers, green products, network marketing, green consumption, low-carbon economy, marketing strategies, innovation, green management, ecological marketing, and marketing.



Figure 5. Cluster map of domestic green marketing research hotspots

Analyze the research topics under each cluster tag, select the first five topics under each cluster tag, as shown in Table 1. Based on further analysis of the corresponding literature, it is concluded that green marketing research mainly focuses on traditional marketing, consumers, eco-tourism, marketing and other research topics; Green barriers are mainly studied around countermeasures, agricultural products, marketing and enterprises; green products are more concerned with consumer demand and green marketing of enterprises; online marketing involves knowledge marketing, relationship marketing, marketing innovation, knowledge economy and other research themes. Green consumption involves more fields, including green marketing development countermeasures, tourism, international marketing, etc. The research scope of low carbon economy covers supply chain, low

carbon marketing, enterprise marketing and other topics; Marketing strategy pays more attention to the formulation of strategy; Innovative research themes are mainly combined with the development trend of the new century to determine the corresponding research themes, such as green entrepreneurship, green management, etc.; green management includes green certification, strategies, the current situation, hotels and other research themes; eco-marketing mainly focuses on the research of products and product promotion, etc.; marketing involves various research themes, including market economy, socialism, state-owned commercial banks, opportunities and other research themes.

Table.1. Comparison of power load forecasting of 403 line

| Cluster number | Cluster size | Identifiers (select the first 5)                                                                         |
|----------------|--------------|----------------------------------------------------------------------------------------------------------|
| 0              | 173          | Green marketing, traditional marketing, consumers, ecotourism, marketing                                 |
| 1              | 70           | Green Barriers, Countermeasures, Agricultural Products, Marketing, Business                              |
| 2              | 58           | Green products, consumers, green signs, green consumer demand, corporate green marketing                 |
| 3              | 42           | Internet marketing, knowledge marketing, relationship marketing, marketing innovation, knowledge economy |
| 4              | 37           | Green consumption, development strategies, international marketing, promotion, tourism marketing         |
| 5              | 37           | Low carbon economy, supply chain, evolutionary gaming, low carbon marketing, corporate marketing         |
| 6              | 33           | Marketing strategy, green logistics, brand marketing, internationalization, localization                 |
| 7              | 31           | Innovation, ecological civilization, new century, green entrepreneurship, green management               |
| 8              | 28           | Green management, green certification, strategy, status, hotels                                          |
| 9              | 28           | Eco-marketing, eco-products, green marketing, blockchain, infomercials                                   |
| 10             | 23           | Marketing, market economy, socialism, state-owned commercial banks, opportunities                        |

## 5.2 Research Frontier Analysis

### (1) The sudden detection of domestic green marketing research keywords

Keyword burst detection can reflect the research fields with greater influence over a period of time. A total of 15 emergent words (as shown in Figure 6.) are obtained through the corresponding keyword emergent detection in the research field of green marketing. The top 10 keywords in terms of prominence are: green barriers, low carbon economy, consumers, countermeasures, green products, agricultural products, environmental protection, green labels, marketing strategies, and green logistics.

Judging from the time series of sudden keywords, before 1999, the sudden keywords were: consumers, green signs, green products, environmental protection, green industry and knowledge marketing; The emergent words from 2000 to 2010 are: knowledge economy, green management, green barriers, countermeasures, green logistics; The sudden keywords in 2010 and after are: low-carbon economy, marketing strategy, low-carbon marketing, agricultural products. According to the keyword emergence degree and time node analysis, the domestic green marketing research field mainly focuses on consumers, enterprises, green products and the development of corporate green marketing strategies. Based on the time cycle of the sudden occurrence of keywords, agricultural products emerge with the longest cycle (10 years), followed by green management, low carbon economy and low carbon marketing with a cycle of 6 years, with most cycles concentrated around 4

years. However, in general, green marketing research in China mainly focuses on consumers, enterprises and environmental protection. In recent years, due to the national emphasis on green economy and green products, agricultural products have also become a major research hotspot in the field of green marketing research. For green and natural agricultural products, enterprises formulate corresponding green marketing strategies to promote the healthy and balanced development of enterprises, consumers and the environment, which is a hot topic in the field of green marketing research.

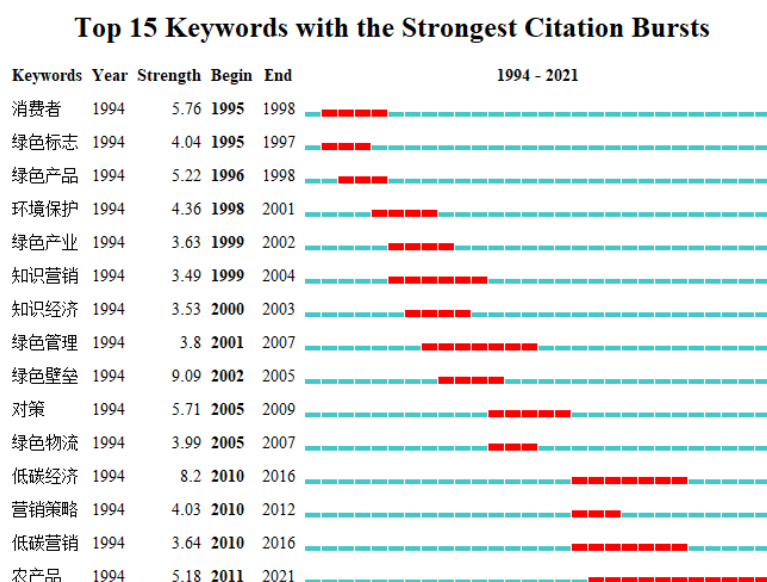


Figure 6. 1994-2021 Top 15 emergent keywords

(3) The evolution of the frontier of domestic green marketing research and the division of research stages

By analysing the evolutionary trends of research hotspots, that is, examining the temporal distribution of high-frequency keywords and their trends, it is possible to grasp the research frontiers and developments in the field. In this study, the keyword co-occurrence analysis of domestic green marketing research literature generates Timezone mapping, as shown in Figures 7. Timezone mapping is mainly a time zone mapping formed by gathering together the same time nodes and arranging them in chronological order to determine the overall characteristics of the evolution of green marketing research themes in China. Running citespace, we get a keyword co-occurrence time zone map with Q values greater than 0.5 and S values greater than 0.7, so the clustering is reasonable.

The analysis in the diagram shows that the research hotspots in green marketing in China have evolved over time as the research themes have developed and evolved. The Timezone diagram provides a visual representation of the research hotspots within each time period. The largest node in the graph is green marketing, which first appeared in 1994 and spans the longest time period and has the largest flow to other research hotspots. Followed by hot research topics such as green products, green consumption, countermeasures, and ecological marketing. Judging from the literature and nodes etc. it is concluded that the domestic green marketing research process is mainly concerned with the areas of enterprise, consumer, environment and green products. The development of green marketing in China is broadly divided into three stages according to the hot keywords, emergent words and the number of literature on green marketing in China in different time periods.

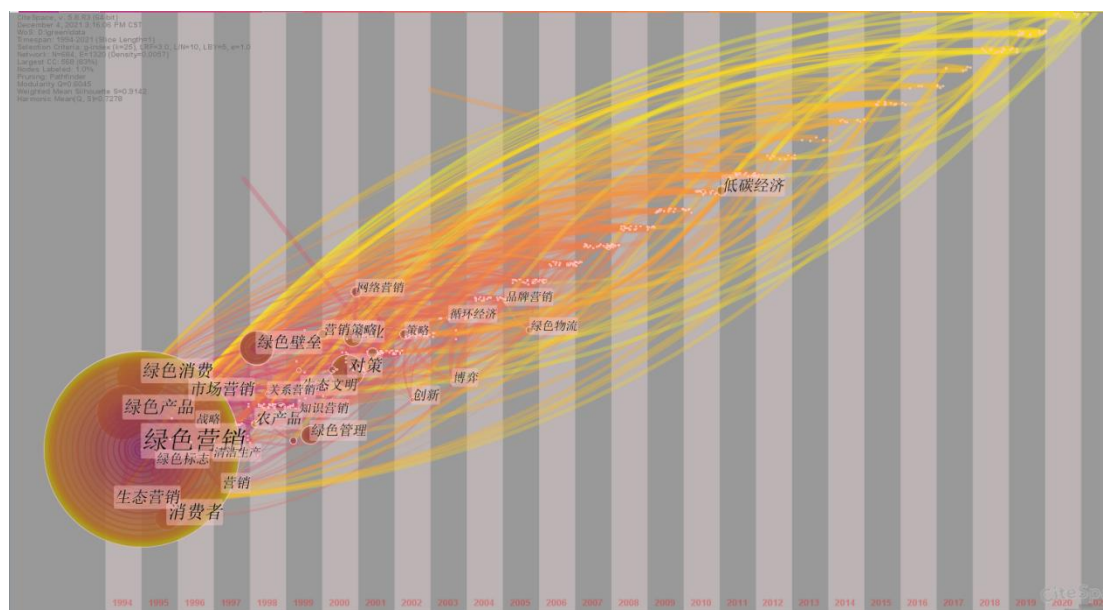


Figure 7. 1994-2021 Domestic green marketing research keyword co-occurrence Timezone mapping

Phase 1 (1993-1999): Green marketing has been widely recognised and studied since its introduction in the 1980s and 1990s. A large number of high-frequency keywords in this research area appear in this period, such as the appearance of high-frequency keywords such as green marketing, green products, eco-marketing, green consumption and consumers. In terms of the volume of literature, this period saw a modest but growing trend in the literature, laying an important cornerstone for subsequent research in the field.

Phase II (2000-2010): This period was marked by the formulation of policies such as the 11th Five-Year Plan and the need to change the mode of economic development and develop a green economy. The number of green marketing studies in China has shown a rapid growth trend, and the number of articles published has taken up a large proportion. High-frequency keywords such as green management, agricultural products, green barriers, ecological civilisation and countermeasures emerge. Began to focus on green marketing strategies and other research.

Phase 3 (2011-2021): In the context of the new economic normal, a green, low-carbon circular economy has become a reality. After 2012, the ecological crisis caused by the high growth, high energy consumption development model has intensified and generated new pressure, the haze formed by the deterioration of the public environment has received global attention, the 18th National Congress creatively put forward the concept of ecological civilization, which is the echo of the serious situation in the environmental field, ecological construction was included in the central government's governance of one of the five major layouts, becoming a basic state policy, China has truly entered the era of low-carbon green growth.

## 6. Conclusion and outlook

## 6.1 Research conclusions

In this study, the core literature in the field of domestic green marketing research in China from 1994-2021 in CNKI was visualised and analysed accordingly by using bibliometric methods with the help of citespace software. By mapping the corresponding networks, it visualises the research hotspots and the evolution of research frontiers in the field of green marketing research in China. The study found that:

In terms of research subjects, there are many authors working in the field of green marketing research in China, but not many highly productive ones, and there is less cooperation between authors

and a looser distribution. In terms of research institutions, the number of institutions publishing green marketing research in China is relatively large, but most of them are independent, with little cooperation between institutions, and most of the issuing institutions are university management schools.

In terms of research hotspots, "green marketing" has always been a hot topic of concern for domestic scholars, followed by green products, green consumption, countermeasures, green barriers, consumers, enterprises and other topics closely related to green marketing. These themes are clustered to form 11 categories: green marketing, green barriers, green products, online marketing, green consumption, low carbon economy, marketing strategy, innovation, green management, eco-marketing, marketing, and each category contains the corresponding research theme. By doing a sudden detection of keywords to reflect the more influential research areas, the results show that in recent years, agricultural products have become a hot topic in the field of green research, the application of green marketing strategies with agricultural products to promote green marketing research areas. Through the analysis of the frontier evolution and development stage of domestic green marketing, it is concluded that with the deduction and evolution of time, the research hotspots in this field are also changing with time, and green marketing has always become a research hotspot in academia. And according to the keyword co-occurrence Timezone mapping, green marketing research is divided into three main development stages, each stage with the development of national development policies and theoretical maturity derived from the corresponding research hotspots, thus promoting the continuous progress of research in this field.

Through a visual analysis of the domestic green marketing research field, it can be concluded that the research on green marketing in China is mainly focused on three levels, namely the consumer, enterprise and environmental levels. At the consumer level, domestic studies have mainly focused on consumers' mindset and perception of green consumption. At the enterprise level, existing literature focuses on green marketing strategies, operational models, and strategies for enterprises to cope with green barriers. At the environmental level, the main emphasis is on the balanced development of enterprises and the environment, low-carbon and green development.

## 6.2 Shortcomings and outlook

By combing through the process of domestic research on green marketing, it can be concluded that since 1993, domestic research on green marketing has become more and more in-depth, but there are still corresponding research problems.

Since the 21st century, due to the concept of sustainable development and people's increasing awareness of environmental protection, the market for green agricultural products in China has continued to develop and grow, and has achieved some remarkable results in the development of green marketing of agricultural products. However, compared to developed countries, China is still at the initial stage of development of green marketing for agricultural products. The visual knowledge map shows that agricultural products have become a hot research topic in the field of green marketing research, and future research can be expanded accordingly for agricultural products, from the perspective of enterprises, consumers and environmental protection. In addition, the mapping of authors and institutions shows that there is less collaboration between authors and institutions. In the future, academic collaboration and the building of academic teams should be further strengthened, focusing on collaborative research among scholars from various institutions and different backgrounds and emphasising multidisciplinary cross-sectional research.

The research in this paper also has corresponding shortcomings. The data sources in this paper are mainly core journals published in China Knowledge Online, and due to the limitation of data format, no citation analysis of the literature has been conducted to show the citation and cited relationship between knowledge. In addition, this study did not include other types of literature, such as dissertations and books, nor did it include research results published by Chinese scholars in international journals; future studies can further compare and analyse through a wider range of literature sources.

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