

Research Progress, Hotspot Analysis and Trend Outlook of Green Development—CiteSpace-Based Knowledge Graph Visualization and Analysis

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Abstract: Green development is vital for China's contemporary development and involves the economy, society, and ecology. To understand the structure, trends, and hotspots of green development research in China, this paper analyzed CSSCI papers on China Knowledge Network using CiteSpace software. Results show a recent surge in interdisciplinary green development papers, but institutions and authors have limited cooperation. Research focuses on connotation, evaluation, and optimization pathways, reflecting policy changes by the Party and State towards ecological civilization. To serve national strategies and solve practical issues in high-quality development, future research should explore green development from multiple perspectives. These findings will assist in implementing green development scientific approaches.

Keywords: green development; green economy; knowledge mapping; bibliometrics

1. Introduction

For a long time, the crude economic development model has greatly promoted the rapid growth of China's economy, but at the same time has also led to a large amount of energy consumption and environmental damage.^[1] The "brown economy" and "black development" model is unsustainable and needs to be reversed. In order to better respond to this major challenge faced by China in the process of high-quality development, during the 12th Five-Year Plan period, China formally incorporated green development into one of the important issues of national economic and social development planning, which is the first national-level green development plan in China. The Fifth Plenary Session of the 18th CPC Central Committee emphasized the need to "promote green development",^[2] taking green as one of the five major development concepts and emphasizing the need to adhere to the basic national policy of saving resources and protecting the environment, and promoting sustainable development.^[3] In March 2021, the 14th Five-Year Plan for National Economic and Social Development and the Outline of Vision 2035 also put forward the goal of promoting green development and the harmonious coexistence between human beings and nature. Currently, China's social development has regarded green development as one of the crucial strategies and an inevitable choice.

As China continues to improve the institutional mechanism of green development concept and implement the policy of green development concept, our environmental protection level and sustainable development ability have been significantly improved, and a systematic and sound green development system has been gradually established. Therefore, it is important to sort out and summarize the literature on green development research in China, fully understand the existing research results, and grasp the overall context of the research in order to disseminate China's experience and tell a good Chinese story. However, most of the literature on green development has been compiled from a qualitative perspective, but there is a lack of quantitative analysis and summarization, which is not conducive to the in-depth identification of the knowledge structure, frontier issues and research evolution patterns in this research field. In view of this, this paper conducts an econometric analysis of the literature related to green development from 2006 to 2023 based on the China Knowledge Network journal database with the help of CiteSpace software. The purpose is to analyze the information of core authors and their institutions, core keyword co-occurrence and clustering in the relevant domestic literature through visual mapping, and to conduct in-depth analysis of keyword emergence results based on this, which can show the knowledge spectrum of relevant domestic literature and its evolution process more comprehensively, and on this basis, summarize, interpret and explain the research progress, hot spots and their evolution trends

in the field of green development in China, so as to promote the green development in China. It will provide useful reference and support to promote theoretical research and practical exploration of green development in China.

2. Research methods and data sources

2.1. Research Methodology

In terms of research methods, bibliometric and scientific knowledge mapping methods are mainly used. The bibliometric method is a descriptive statistical analysis of the scientific literature system and bibliometric features mainly from multiple dimensions, and is a quantitative method combining statistics and mathematics. The scientific knowledge mapping method is a method of visualization research through a series of means such as data mining, information measurement and drawing graphics, which has the dual nature and characteristics of graph and spectrum and can visually demonstrate the complex evolutionary relationships among knowledge units or knowledge groups. In terms of research tools, Citespace, a literature data mining and visualization analysis software developed by Prof. Chaomei Chen, is selected to sort out the literature in a temporal, dynamic and multifaceted manner and present it in the form of graphs through co-occurrence, clustering and highlighting. This paper will mainly analyze and present the current status, hot topics and contents of research in the field of green development with the above research methods and tools, and try to predict its future research trends, hoping to provide reference for the subsequent research in this field.

2.2. Data sources

The data collected in this paper were obtained from the full-text database of Chinese journals in China Knowledge Network (CNKI), with the subject term search condition set to "green development" and the time span determined from 2006 to 2023. To ensure the authenticity and accuracy of the data sources and analysis results, the main search scope was restricted to high-quality articles collected from Chinese core journals and CSSCI source journals (including extensions), and non-academic papers such as conferences, information, selection guidelines, submission instructions, catalog summaries, etc., as well as duplicate online first publications, unauthored literature and literature with low relevance were excluded through manual checking. Finally, 500 valid articles were obtained to constitute the sample literature.

3. Basic information of green development research literature

3.1. Posting time and posting volume

The trend of the number of articles published in academic literature directly reflects the academic attention and knowledge growth in this field, which is helpful to understand the research intensity of this field at each stage of development. After the preliminary statistics of the sample literature selected in this paper, it is found that the volume of publications before 2010 is generally low and there is a breakpoint in the volume of publications, so the reference value is not high, so we choose to plot the volume of publications in the field of green development research between 2010 and 2023. The results are shown in Figure 1, which is roughly divided into 3 phases in this paper:

(1) Initial germination period (2010~2014). During the 12th Five-Year Plan period, along with the increasing prominence of ecological and environmental problems, China's first national green development plan was born. As a result, scholars began to focus on the field of green development one after another, and the number of articles published during this period was less than five. This stage can be regarded as the initial germination stage of green development research in China, and it also indicates that green development research in China is closely related to the major national strategic policies and is a policy-oriented research.

(2) Medium-speed exploration period (2014~2018). The Party and the government attach great importance to ecological environmental protection and sustainable development, and there is an urgent need to maintain economic growth while taking into account the environmental benefits, so the direction of China's economic and social development has been more clear and specific guidance. From the trend graph, we can see that the number of articles issued in this period is considerable, and the number of articles issued and the growth rate are both 2~3 times of the budding period. It indicates that this stage is the medium-speed exploration period of green development research, and the number of articles issued

in the last year of this stage has increased five times compared with the first year, which shows that the attention of Chinese scholars to green development research has been gradually rising.

(3) Golden period of development (2018~2023). With the full convening of the 19th Party Congress and the comprehensive deployment of ecological civilization construction as well as the implementation and promotion of a series of policies such as the clear requirement of increasing green development and promoting the harmonious coexistence of human and nature in the 14th Five-Year Plan in 2021, China's green development research has reached an unprecedented height and ushered in a golden era of development. The number of articles issued during this period has surged, from 24 in 2018 to 162 in 2022, an increase of about seven times, and up to about 50 articles have been issued in 2023 as of March, and it is expected that the number of articles issued in core journals can reach 200 by the end of 2023. The promising progress of research at this stage will help enrich theoretical research on green development in China and promote the construction of ecological civilization and high-quality development in China^[4]

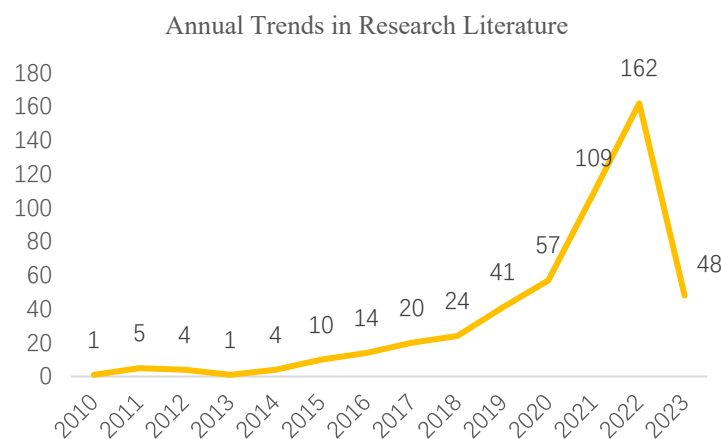


Figure 1: Annual posting trend of green development keyword research literature.

3.2. Collaborative network of core authors and research institutions

The visual analysis of author collaboration networks and research institutions helps to quickly understand the distribution of the stalwarts of research in the field and their influence, so as to identify the main research institutions and research subjects in the field. At the same time, it can provide a clearer grasp of the authoritative research institutions and researchers in this research field and their collaborative relationships. Based on the sample literature, we run Citespace to obtain the following network map.

Figure 2 The author collaborative network map has 284 nodes, 119 connections, and a network density of 0.003. We can visualize the publication situation through the nodes in the map. Yu Fajian, Wu Chuanqing, Zhang Feng, and Yuan Huaxi are the four most prominent nodes, with more publications, all between 4 and 8, and these four scholars are the backbone of the research field. These two scholars occupy the two largest node positions in the collaborative network map, and the other scholars with more obvious nodes in the map also have 2-4 articles. By combining the inter-author connections and network density in the map with the Price's law in bibliometrics, we can determine the author collaboration in the field of green development research. According to Price's law, the minimum number of core authors' publications $M=0.749(N_{max})^{1/2}$, and the minimum number of core authors' publications in this paper is approximately equal to 2.11, so the number of publications of three or more can be regarded as the core authors in the field of green development research during the sample observation period, with a total of 11 authors and a total of 44 publications, accounting for 8.8% of the total literature in this research field, which is lower than "This indicates that a stable core group of authors has not yet been formed in this research field, and this provides a broad research space for future scholars to explore green development-related issues in depth and form a high academic influence. At the same time, the network density of 0.003 also indicates that the authors of green development research have not yet formed a wide and close academic cooperation and communication among themselves, showing a small concentration and large dispersion in general, with only a small number of scholars represented by the core authors forming an academic group with close communication and outstanding contributions. Through the above analysis, we can see that at present, in the research field of green development, close cooperation among scholars in China has not been established, and is generally in the state of "fighting alone", lacking a

mature and unified academic community.

The analysis of the issuing institutions of related literature yielded the network diagram of institutional cooperation in Figure 3, with 252 nodes and 107 connections, and a network density of 0.0034. In terms of the number of articles issued, the largest number of articles was issued by the Chinese Academy of Social Sciences, with the cumulative number of articles issued by each institute reaching 30, followed by Southwest University, Lanzhou University, Wuhan University, Northwest University, Xinjiang University, and Nanchang University, with the number of articles issued The number of articles published is more than 6. On the whole, the number of institutions currently studying green development in China is relatively large and basically evenly distributed in all regions of China, especially in cities above the second tier. This feature reflects that green development research has attracted extensive attention from experts and scholars nationwide and has produced rich results, and also indicates that when the economic scale of cities and regions has reached a considerable level, their needs for green development have become more urgent. This also makes it easier for local scholars and research institutions to take a keen interest in related topics. In terms of cooperation, the density is only 0.0034, and some cooperation has been formed, but most of the research institutions still publish independently, and most of them are in the stage of "working alone", and the cooperation and communication among institutions, agencies and regions lack depth and breadth. There is an urgent need to promote the flourishing of research in this field by establishing academic communities. It is urgent to establish an academic community to promote the development of research in this field.



Figure 2: Core Author Collaboration Network Map.

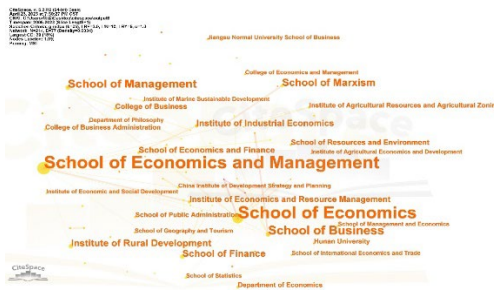


Figure 3: Organizational cooperation network diagram.

4. Green development research hot areas and evolutionary trend analysis

4.1. Green development research hotspots: keyword frequency analysis

Keywords are the condensation and distillation of research topics, and their frequency and centrality can be seen through co-occurrence analysis, which can, to a certain extent, visually reflect the diverse research hotspots and their intrinsic connections in the field. To this end, the keyword node type is selected in Citespace software and the time span is set from 2006 to 2023, and the time slice is 1 year, and a co-occurrence graph with 315 nodes, 353 connected lines, and a network density of 0.0071 is drawn as shown in Figure 4.

As can be seen from the statistical Table 1, most of the high-frequency and central keywords in green development research, such as "industrial agglomeration" and "green economy", appeared for the first time in 2015, indicating that the first national-level green development plan proposed during the "12th Five-Year Plan" period and the five development concepts including "green development" proposed at the Fifth Plenary Session of the 18th Party Central Committee in 2015 had a strong influence. "The first national green development plan proposed in the 12th Five-Year Plan period and the five major

development concepts including "green development" proposed in the Fifth Plenary Session of the 18th CPC Central Committee in 2015 have had a large impact on the policy guidance at the national level. Until the 13th Five-Year Plan period and the 19th National Congress, as China continues to improve the institutional mechanism of the green development concept and implement relevant policies, "green development," "digital economy," "green transformation ", "environmental regulation", "ecological civilization" and other hot keywords with high frequency and high centeredness emerge continuously, entering an explosive period of green development hotspots. Combining the knowledge map with the statistical table, we can see that green development has the largest intermediary centrality of 1.02 and appears as high as 200 times; followed by manufacturing (0.16) with 31 times, digital economy (0.13) with 19 times, and green transformation (0.13) with 11 times; and then environmental regulation, green finance and green economy, which are three Although the frequency of these three keywords varies, their intermediary centrality is 0.09, which indicates that the scholars have different degrees of investment in their research, but their impacts are not far apart. The above keywords are the main research hotspots that are closely related to and inseparable from the continuous refinement and deepening of green development research in China's academic circles in recent years, which together constitute the focus of research in the field of green development in China at present.

Table 1: Green development keyword frequency and centrality statistics.

number	Frequency	Centrality	Year	Keywords	number	Frequency	Centrality	Year	Keywords
1	200	1.02	2010	Green Development	16	9	0.03	2021	Carbon Neutral
2	31	0.16	2014	Manufacturing	17	8	0.03	2018	Innovation driven
3	29	0.13	2021	Digital Economy	18	6	0.03	2018	Rural revitalization
4	11	0.13	2011	Green Transformation	19	5	0.03	2016	China
5	31	0.09	2017	Environmental Regulation	20	5	0.03	2019	Time and space evolution
6	13	0.09	2011	Green Finance	21	4	0.03	2019	City Cluster
7	11	0.09	2015	Green Economy	22	4	0.03	2022	Financial Technology
8	21	0.08	2019	Yellow River Basin	23	2	0.03	2014	Eco-efficiency
9	16	0.08	2015	Industry Cluster	24	1	0.03	2014	Financial Development
10	11	0.08	2012	Ecological Civilization	25	1	0.03	2013	Western Region
11	18	0.07	2020	Technology Innovation	26	1	0.03	2015	Inflection Point Analysis
12	9	0.06	2015	Indicator System	27	1	0.03	2015	Green Assets
13	2	0.06	2019	Suggestions for countermeasures	28	17	0.02	2015	Influencing Factors
14	1	0.04	2016	Carbon Finance	29	8	0.02	2021	Technology Innovation
15	11	0.03	2020	Intermediary Effect	30	6	0.02	2012	Entropy method

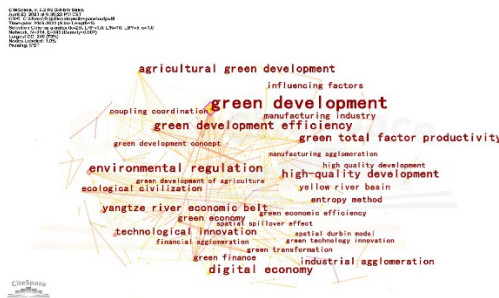


Figure 4: Co-presentation of green development research keywords, 2006-2023.

4.2. Green development research content: keyword clustering analysis

In order to better examine the research content, knowledge structure and prior foundation in the field of green development research, this paper chooses to cluster the high-frequency keywords using the log-likelihood ratio (LLR) method with the help of Citespace software. A clear clustering map is obtained by adjusting the threshold value several times as in Figure 5, and the clustering results are manually sorted into a Table 2 with their corresponding knowledge structures for presentation. The number of nodes in the clustering knowledge map as shown is 315, the inter-node connection is 353, the network density is 0.0071, and there are 10 main clustering units. Among them, the modularity Q value = 0.7006 and the profile S value = 0.9296 indicate that the clustering results are significant and credible.

In order to deeply analyze the research content and knowledge base of each cluster and the keyword members it contains, by deeply analyzing and integrating the literature cited within each cluster, we can identify three different research perspectives, one of which is the causal perspective on the field of green development, including #0 green development, #2 environmental regulation, and #5 ecological

civilization; the second is the object perspective, including #3 Yellow River Basin, #4 manufacturing; and the third is the path perspective, including #1 digital economy, #6 green finance, #7 rural revitalization, #8 green transformation, and #9 eco-efficiency.

From the perspective of the causes of green development, scholars have mainly focused on the impact of technological progress and policy factors on green development. The former mainly involves "technological innovation", "innovation drive", "engineering technology" and "green manufacturing". Scholars in this research direction believe that promoting industrial upgrading and technological progress through innovation is an important basis for the implementation and application of green concepts, and is also the way to achieve green development and sustainable development strategies; while the latter mainly focuses on "environmental regulation," "green development concept," "ecological civilization," and "green development. The latter focuses on national policy issues such as "environmental regulation," "green development concept," "ecological civilization," "strategic measures," and "common prosperity," and scholars believe that the key to achieving green development is to promote policy and conceptual innovation. The key lies in promoting the innovation of policies and concepts, continuously strengthening the role of the legal system, adjusting government functions, and continuously promoting green development through the formulation of reasonable and efficient economic and environmental policies. From the perspective of green development of specific objects, since "Speech at the Symposium on Ecological Protection and High-Quality Development of the Yellow River Basin" in September 2019, a large amount of green development research literature on the "Yellow River Basin" has started to emerge, many of which focus on the issue of its green development efficiency; some scholars focus on the issue of green development. Some scholars focus on the issue of green development, focusing on the high energy consumption, high pollution and important part of the real economy represented by the "manufacturing industry", combining theoretical analysis and empirical test to explore the relationship and influence mechanism between these industries and green development, and then propose effective policies and systems to promote green development and To build a matching policy support system. From the perspective of the path to green development, some studies focus on "digital economy", "carbon peaking", "carbon neutral", "green finance" and "green agriculture". ", "green agriculture", "ecological economy" and other research directions, aiming to promote the green development of the whole national economy and society through the research of green development of multiple industries and multiple paths, so as to realize the coordinated development of economic benefits, ecological environment and social benefits, Some other researches focus on "efficiency evaluation", "transmission mechanism", "index system", "entropy method", "social benefits", "ecological economy", etc. Some other studies focus on "efficiency evaluation", "transmission mechanism", "indicator system", "entropy method", "threshold effect" and other green development evaluation systems, and focus on measuring the efficiency and level of green development from micro and meso levels, using comprehensive and diversified indicators to deeply analyze the core meaning of green development and grasp its essence to To promote high-quality green development of economy and society more efficiently.

It is worth paying special attention to the fact that the above-mentioned green development studies have certain shortcomings in different perspectives, which are mainly reflected as follows: firstly, scholars focus too much on the influence of technical and institutional factors on green development, and lack comprehensive and in-depth studies on the influencing factors of green development, such as natural resource endowment, infrastructure conditions, regional openness level, industrial development status, etc.; Secondly, research on green development in specific regions usually focuses on developed regions or river basin cities, such as the Yangtze River Delta and the Yellow River Basin, while not enough attention is paid to the green development of less developed regions and inland cities; thirdly, research on green development for a certain industry mostly focuses on the physical industries that generate greater negative environmental benefits, and lacks research on non-traditional heavy industries such as agriculture, tourism and finance Research on how to achieve green, low-carbon cycle sustainable development.

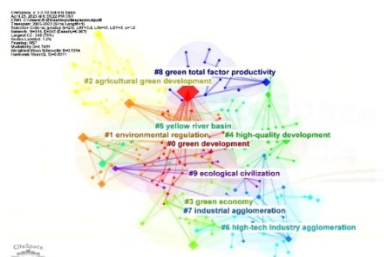


Figure 5: Clustering of keywords for green development research, 2006-2023.

Table 2: Clustering of green development research hotspots, 2006-2023.

Clustering	Size	Silhouette	Year	Topterms (LLR)	Cluster name
0	43	0.966	2019	Green Development; Agriculture; Common Wealth; Innovation; Manufacturing	Green Development
1	26	0.847	2021	Digital economy; mediating effects; carbon neutrality; carbon peaking; threshold effects	Digital Economy
2	21	0.937	2020	Environmental regulation; technological innovation; innovation-driven; Yangtze River Delta; transformation and upgrading	Environmental Regulation
3	19	0.889	2019	Yellow River Basin; Influencing Factors; Coupled Coordination; Spatial and Temporal Evolution; Green Development Efficiency	Yellow River Basin
4	19	0.957	2017	Manufacturing; Carbon Emissions; Generalized Dixie Index; Midwest; Incentive-Based Policies	Manufacturing
5	17	0.971	2016	Ecological civilization; engineering science and technology; strategic countermeasures; green manufacturing; view of science and technology	Ecological Civilization
6	17	0.921	2016	Green Finance; State-owned Commercial Banks; Equator Principles; Social Responsibility; Countermeasure Suggestions	Green Finance
7	15	0.963	2018	Rural revitalization; dynamic comparison; index system; entropy method; green development of agriculture	Rural revitalization
8	15	0.847	2016	Green transformation; ecological economy; transmission mechanism; financial technology; Harken model	Green Transformation
9	13	0.917	2017	Eco-efficiency; mechanism; hysteresis; environmental pollution; efficiency evaluation	Eco-efficiency

4.3. Green development research trends: keyword emergence analysis

The emergent words are high-frequency keywords that appear in a certain time period. Compared with the keyword analysis in the previous paper, this way of analyzing the time frame trajectory of emergent words can intuitively capture the time periods of inflection points and hot spots in the research field, which facilitates a clear understanding of the research trajectory of green development. This paper draws the emergent graph by Citespace software, see Figure 6, and the overall results are consistent with the keyword co-occurrence in the previous paper, which objectively verifies the reliability of the research results, and the keyword emergent graph can further analyze the evolutionary trajectory and development trend of green development research in China.

(1) From the perspective of the duration of the keywords' hotness, the study of green development in China has been attracting much attention for a long time, especially around the Fifth Plenary Session of the 18th CPC Central Committee held in 2015, the three keywords of "ecological economy", "green transformation" and "In March 2016, the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China put forward for the first time "The overall goal of "overall improvement in ecological and environmental quality" was first proposed in the 13th Five-Year Plan, and it was pointed out that "green development" should be applied to all areas of economic and social development during the 13th Five-Year Plan. Green finance" and "environmental regulation" have emerged for the first time during the 13th Five-Year Plan period, and several directions that have received much attention in the field of green development research in recent years.

(2) In terms of the intensity of emergence, it can be observed that the intensity of emergence of the keywords "ecological civilization", "manufacturing", "environmental regulation" and "technological innovation" remained between 2 and 3 in the second half of the observation period. This means that in the early stage of green development, China's research was mainly concerned with how to adapt to economic development in order to achieve sustainable development, until the later stage when more attention was paid to green and low-carbon development, environmental friendliness, ecological civilization construction and the exploration and optimization of related paths, which fully indicates that China's academic research on green development has been very successful. The academic research on green development has been accompanied by the development of China's relevant policies and has been continuously integrated with China's national conditions, and scholars in this field have gradually focused on linking human pursuit, social development and environmental friendliness when exploring new issues of green development.

(3) From the distribution time of keyword emergence, it is roughly divided into three stages: Low-speed development exploration period (2011~2014), rapid scientific development period (2014~2018), High-speed comprehensive development period (2018-present) , which basically coincides with the previous change trend and verifies the reliability of dividing the period by the amount of articles issued. During the period of low-speed development and exploration (2011~2014), the research hotspots in the

field of green development in China during this period were relatively single, mostly theoretical analysis, and did not emerge more hotspots, and the main research directions of "ecological economy", "green transformation" The main research directions of "ecological economy", "green transformation" and "urbanization" have been explored and deepened for a long time. At this stage, many scholars have recognized that green development is the only way to promote the rise of China's economy and achieve the rejuvenation of the Chinese nation, however, their research mainly focuses on the macro level and has not explored the role and effect of the green development concept in other fields in depth. Rapid scientific development period (2014~2017), the Fifth Plenary Session of the 18th CPC Central Committee in 2015 had a profound impact on the overall process of green development in China, further accelerating the pace of green development in China, and the field of green development began to focus more on efficiency with a view to better solving the current reality. The policy effects and research hotspots at this stage are very significant, and the research perspective of green development has been greatly broadened, focusing on "eco-efficiency", "technological innovation", "eco-civilization" and "green finance". "Green finance" and other fields, and the index system and influencing factors of green development have gradually become the focus of academic circles. High-speed integrated development period (2017 to present), in 2017 the 19th Party Congress put forward the goal of establishing a green economic system and promoting economic growth to build a green development ecosystem, green development is no longer a single development method, but a system of integrated development. In this stage, not only the research on green development has received great attention and the number of articles has increased dramatically as analyzed in the previous section, but also the research scope has been expanded significantly, and "manufacturing industry", "environmental regulation", "regional differences", "regional differences", and "green economy" have emerged. A series of buzzwords covering many research directions such as "manufacturing," "environmental regulation," "regional differences," "technological innovation," and "digital finance" have emerged. It can be seen that the research directions at this stage are more closely integrated with the national strategy, and the core of the green development concept has been profoundly enhanced, no longer limited to environmental governance and ecological civilization construction, but playing an indispensable role in social and human development and national strategy, becoming a valuable experience for China's economic take-off and social development.

Top 15 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2006 - 2023
green finance	2011	1.19	2011	2012	
ecological civilization	2012	1.46	2012	2017	
green economy	2012	1.36	2012	2015	
ecological civilization construction	2016	1.11	2016	2020	
green development concept	2016	1.04	2016	2017	
industrial heterogeneity	2017	1.18	2017	2018	
financial agglomeration	2017	1.13	2017	2019	
environmental regulation	2017	2.03	2018	2019	
industrial agglomeration	2018	1.01	2018	2019	
high-quality development	2019	3.72	2019	2021	
green development efficiency	2014	2.02	2019	2020	
green development of agriculture	2019	1.43	2019	2021	
spatial spillover effect	2020	1.87	2020	2021	
yellow river basin	2021	1.7	2021	2023	
high quality development	2021	1.13	2021	2023	

Figure 6: Top 15 keywords of sudden intensity in the field of green development.

5. Conclusion and outlook

With the urgent transformation of China's crude economic development model and green development being identified as the theme of national economic and social development in China's 14th Five-Year Plan and beyond, the attention to the research area of green development will be further enhanced. In this paper, with the help of Citespace software, the research literature on green development published in CSSCI source (including expansion) journals from 2006 to 2023 is comprehensively sorted out and analyzed by visual knowledge mapping, and its research status, hot spots and trends are discussed and reviewed, and the following conclusions and outlooks are drawn:

First, from the characteristics of literature quantity stages and evolutionary trends, China has shown a vigorous development in green development research, especially after the 18th Fifth Plenary Session of the Party put forward the new concept of green development and the 19th Party Congress emphasized the need to establish a perfect green low-carbon recycling economic system as soon as possible, the number of papers published in this field showed an explosive growth. Combining the number of publications and keyword prominence, domestic green development research can be broadly divided into three stages: the period of budding and vulgar exploration (2010~2014), the period of rapid scientific

development (2014~2018), and the period of high-speed comprehensive development (2018-present).

Second, from the characteristics of authors and research institutions in the field of green development research, since the 19th Party Congress, research on green development has shown a trend of large scale and obvious growth momentum; compared with other disciplines, green development-related topics have attracted more extensive attention among researchers in the fields of economics, management and resources and environment; at present, Yu Fazhan, Wu Chuanqing and the Chinese Academy of Social Sciences are the most influential authors and research institutions in the field of green At present, Yu Fazhan, Wu Chuanqing and the Chinese Academy of Social Sciences are the most influential authors and research institutions in the field of green development research, however, the field still has not formed a stable core group of authors, the degree of cooperation is low, and there is a lack of cooperative networks and academic communities. In the long run, scholars and research institutions should try to conduct academic research and exchanges across disciplines, institutions and regions to produce more valuable academic results, which will help deepen the research in the field of green development and contribute more theoretical results to promote the green development of society.

Third, in terms of important research themes and hot research contents of green development, scholars are mainly policy- and application-oriented in choosing green development research themes, which include the analysis of the connotation characteristics of green development, the study of specific objects, the measurement of the current situation and the exploration of the realization path. General Secretary proposed that green development is not only an economic requirement, but also an overall requirement for the development of all areas of the economy and society. Therefore, future scholars can further expand the research horizon of green development from different perspectives of the new development concept. The research objects can shift from heavy industries to more emerging industries, from developed regions and river basin cities to research on green development in less developed regions and inland cities; Meanwhile, domestic research on green finance, agricultural green development and green cultural tourism mostly stays at the stage of theoretical inquiry and analysis, lacking empirical analysis on the role played by the green development concept in them, which is also worth scholars' future This is one of the directions that scholars should conduct in-depth research in the future.

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