Research Hotspots and Trends of Business Ecosystem: Visual Analysis based on Citespace

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Abstract: This paper takes the literature related to business ecosystem collected in CNKI database from 2000 to 2021 as the research object, uses CiteSpace software to carry out visual analysis from the aspects of document number, author, research institution, keywords, clustering and co citation, and identifies the research status, hot spots and evolution trend of this research field in the form of drawing knowledge spectrum. It is found that the research topics mainly focus on 10 aspects: business ecosystem, innovation ecosystem, enterprise ecosystem, ecosystem, knowledge ecosystem, information ecosystem, coevolution, value ecosystem, business model and ecological engineering; The latest research trends are mainly reflected in the fields of platform ecosystem, corporate social responsibility, digital transformation, digital economy and so on.

1. INTRODUCTION

With the development of economic globalization and the leap of science and technology, the market industrial environment has become more and more open and complex. Under the background of this era, the strategy of seeking development from the perspective of enterprises in the past has not adapted to the development of the times. Under this background, the theory of business ecosystem came into being. American scholar James. F Moore(1993) published the article "New Competitive Ecology" in Harvard Business Management Review (Porter 1998), and put forward the concept of "business ecosystem" for the first time. Business ecosystem is defined as "economic association based on the interaction between organizations and individuals"(Moore 1996). The theory focuses on the enterprises in the system to share resources and achievements, and finally achieve comprehensive win-win. The business ecosystem includes consumers, major producers, competitors and other risk bearers. Each subject member pursues different, but actively gathers to form a complex relationship in order to deal with the risks and transaction costs of the external environment.

Later, more and more scholars carried out research on the business ecosystem and received more and more attention. The research was carried out from multiple aspects and multiple perspectives, but the research on the theory was still relatively scattered, mainly qualitative analysis, and did not form a more systematic and complete content. Therefore, with the help of CiteSpace visualization software, this paper visually analyzes the collected data, and combined with the retrieved literature, analyzes the research status, research hotspots and development frontier in this field, so as to further understand the overall picture of this research field and provide reference experience for the theoretical research and practical development of this field.

2 RESEARCH METHODS AND DATA SOURCES

2.1 Research Methods

Bibliometric analysis is a scientific and technological text mining tool for quantitative analysis of documents published in specific fields (ZHI 2012, JI 2012, LI 2009, DING 2009, FENG 2009, et al). Through a wide range of indicators and methods, it can find the distributed architecture characteristics and patterns of basic science and technology, and can also evaluate the development trend and future research in specific fields. CiteSpace visualization software provides scientific knowledge map with

diversified functions such as citation space mining on the basis of scientometrics and information visualization. Using CiteSpace software, this paper analyzes the keywords, authors, institutions, clustering and sudden detection of 808 documents retrieved from China HowNet database from 2000 to 2021, and then reveals the research status, hot spots and development trend of this field.

2.2 Data Sources

The data of this paper comes from the China HowNet database. The retrieval subject is "business ecosystem" or includes enterprise ecosystem. The retrieval time range is 2000-2021. The source types are core journals and CSSCI journal papers. The data download date is November 14, 2021. A total of 823 Chinese documents were retrieved. In order to ensure the accuracy of the analysis results, The literatures with low correlation were eliminated, and 808 sample literatures were finally determined.

3 OVERVIEW OF BUSINESS ECOSYSTEM RESEARCH

3.1 Time Distribution

In order to reveal the current research status in this field and predict the future development status, this paper makes an annual statistical analysis on the number of relevant papers, and obtains the time distribution of the literature based on the literature of nearly 20 years retrieved from the China HowNet database, as shown in Figure 1. It can be seen from Figure 1 that from 2000 to 2005, there were few published documents and relevant research was tepid. This field did not receive too much attention from researchers. The reason is that the acceptance and dissemination of new theories need a process. There was a sudden change in the number of documents issued in 2006, and the growth trend continued until 2009. Then it experienced a decline for three consecutive years, but on the whole, it maintained a steady upward trend. In recent years, the research in the field of business ecosystem has attracted more and more attention from the academic community, with a large number of documents. At the same time, according to the prediction data of China HowNet, there will be 68 documents in this field in 2021. As can be seen from the trend of documents issued over the years in Figure 1, the research heat in this field has gradually maintained a stable state, which is one

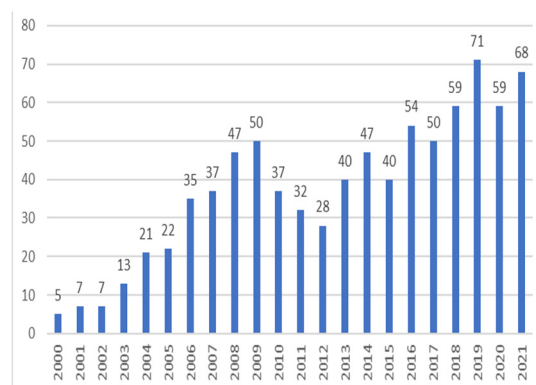of the important contents for relevant scholars to study enterprise strategic management.

Figure 1: Documents issued by business ecosystem from 2000 to 2021.

3.2 Author Distribution

In the CiteSpace software, the node selects the author, the threshold top n = 50, the time slice is set to 1 year, and runs the business ecosystem researcher cooperation network generated by the software. By analyzing the researcher cooperation network, we can see which researchers have made great contributions and whether there is a cooperative relationship among researchers.

There are 529 nodes, 210 connections and the overall network density is 0.0015. The size of the node indicates the number of documents published. Zhang Yunsheng is the scholar with the largest number of documents, followed by Gu Ligang, Miao Zehua, Li Yuqiong, Hu bin, Wang Xingyuan, Li Yong'an, Kong De'an, Zhang Yi and Liu Gang. The different colors and thickness of the connecting lines reflect the year of cooperation and the tightness of the cooperation relationship. According to the analysis of the overall network density, most scholars do not have close cooperation and mainly focus on independent research. For example, Miao Zehua has independently published 10 documents, which reflects that there is still a certain development space for mutual resource sharing.

In the CiteSpace software, the node selects the organization, the threshold is top n = 50, the time slice is set to 1 year, and the business ecosystem organization cooperation network map generated by the software is run. By analyzing the map of institutional cooperation network, we can see whether there are active institutions in this field and whether there are cooperative relations among institutions.

There are 445 cooperation nodes among institutions in the field of business ecosystem

research, but they are not connected with each other, and the overall density of the network is 0. Among them, the school of Business Administration of Hunan University has the largest number of documents, followed by the school of economics and management of Beijing University of technology, the school of management of Jilin University, the school of management of Shandong University, the Business School of Shijiazhuang School of economics, the Business School of Central South University, the Business School of Hehai University, the school of management of China Ocean University, the Business School of Renmin University of China School of economics and management, Harbin Engineering University. The overall density of the network is 0, which means that there is a lack of cooperative relationship among institutions, the awareness of resource sharing is weak, and most of them fight alone. From the side, it reflects that cooperation between different institutions should be strengthened and a close scientific research cooperation circle should be gradually formed, which plays a certain role in theoretical research and practical development in this field, and can promote the maturity and perfection of research in this field.

4 RESEARCH HOTSPOTS IN THE FIELD OF BUSINESS ECOSYSTEM

Clustering map can intuitively reflect the structural characteristics between clusters, so as to find the topic distribution and knowledge structure of knowledge field (OLAWUMI 2018, CHAN 2018). Using CiteSpace software for cluster analysis, there are 28 cluster topics, and the top 8 clusters with the largest theme scale are selected. According to the size of the theme scale, they are: business ecosystem, innovation ecosystem, enterprise ecosystem, ecosystem, knowledge ecosystem, information ecosystem, coevolution, value ecosystem, business model and ecological engineering. Table 1 lists the clustering topics and the keyword distribution and contour value of each topic.

Table 1: Keyword clustering and topic distribution in Business Ecosystem Research.

cluster ing	label	Contour value	year
#0	Business Ecosystem	0.997	2011
#1	Innovation Ecosystem	0.852	2016
#2	Enterprise Ecosystem	0.871	2006
#3	Ecosystem	0.979	2009
#4	Knowledge Ecosystem	0.97	2013
#5	Information Ecosystem	0.938	2010
#6	Coevolution	0.904	2004
#7	Value Ecosystem	0.938	2011

5 CONCLUSION

Using the information visualization software CiteSpace, this paper makes literature data mining and visual analysis on 808 core journals and CSSCI journals of business ecosystem from 2000 to 2021 included in China HowNet database. Based on the analysis of the basic overview, research hotspots, authors, research institutions and topic clusters of the samples, the research status, hotspots and development trends in this research field are identified. The results show that:and development trends in this research field are identified. The results show that:

Through the analysis of the time distribution of literature and the cooperation network map of authors and institutions, the research status in this field is identified. It is found that the research heat in this field is gradually stable, there is a lack of cooperation between authors and institutions, and there is still a certain development space for sharing high-quality resources.

Through keyword cluster analysis, the research hotspots of domestic business system mainly focus on 10 topics: business ecosystem, innovation ecosystem, enterprise ecosystem, ecosystem, knowledge ecosystem, information ecosystem, coevolution, value ecosystem, business model and ecological engineering.

The research frontier continues to evolve over time. The latest frontier trends are mainly platform economy, digital transformation and digital economy. The emerging hot research trends can improve the existing business ecosystem theory and have guiding

value for the construction and innovation of modern enterprise business ecosystem.

By analyzing the knowledge map of domestic business ecosystem research, we can see that the research in this field has been gradually improved and systematized in recent 20 years. Future research should strengthen cooperation between each other, form a close scientific research cooperation circle, further improve the research field and enrich its theoretical research and practical development.

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