

# Literature Review of Network Organization Power Research based on Citespace

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**Abstract:** As an important factor affecting the performance and governance effect of network organization, network power has attracted more and more attention from scholars in the management field in recent years, and has gradually formed a research hotspot. In this paper, using the method of information metrology and the application of citespace software, taking 224 network power research papers in CNKI from 2000 to 2018 as the research sample for quantitative analysis, analyzing the important scholars as well as research hotspot evolution trends and research frontiers, and so on in China's network organization power research. High-frequency key words "social network analysis method", "knowledge power", "cooperative behavior" have strong centrality and are hot issues in the field of network power. The emerging term "technological innovation network" and "knowledge power" show its research frontier. The study of the specific forms of network power has become the focus of future research.

## 1. Introduction

In the market environment of Internet + and big data development, in order to build its own competitive advantage and obtain heterogeneous resources and more information resources, enterprises and their communities of interest communities unite to form a corresponding network organization. In such a network environment, enterprises have influence and control over other enterprises in the network due to their location advantages and their possession of key core resources, namely network organization power[1]. As an important factor affecting the performance and governance effect of network organization, and as an important basis for explaining and predicting the economic and social behavior of cooperative nodes, network organization power has attracted more and more attention from scholars in management circles in recent years, and gradually formed a Research hotspots[2].As an emerging research field, what kind of distribution does its research and development show in China? What are the current research hotspots? And what are the frontiers of their research? Clearing out these basic questions has positive implications for exploring the future of network power.

Now through citespace software, taking 224 network organization power research papers from 2000 to 2018 in CNKI as a sample, mining authors, institutions, keywords and citations, analyzing knowledge maps through co-occurrence analysis, and discovering the core authors and research of network power. Hotspots and research frontiers provide direction guidance for subsequent in-depth research.

## 2. Data Collection and Method

### 2.1 Data Collection

The measurement data used in this study are all from CNKI (China Knowledge Network), and the subject search is used to screen the data. Through the theme "=Network organization Power", the collection time is August 3, 2018, the time span is 2000 - 2018, a total of 338 documents are retrieved,

and the abstracts, keywords and authors included in the download are analyzed. On the basis of preliminary data analysis, newspapers, periodicals, conference reports, news reports, and artificially-discussed journal articles with less relevant topics and repetitive search content are deleted, mainly to screen out relevant topics. The theoretical proposition and the subject literature containing future research prospects, finally selected 224 papers as the summary inductive analysis object of this paper.

## 2.2 Methods

Knowledge map is a research method that integrates computer science and metrology, and can draw, mine, analyze and display the relationship between knowledge, and clearly visualize “knowledge” and “relationship” to highlight similar characteristics<sup>[3]</sup>. In this paper, the knowledge map analysis method is used, and the information visualization software Citespace5.0 analyzes the data, authors and institutions, and the keyword co-occurrence frequency and the analysis of the prominent words, in order to draw the hotspots and frontiers, development characteristics and trends of domestic network rights research.

## 3. Visualization and Analysis

### 3.1 Analysis of overall trends

The number of papers published with the annual changes can clearly describe the development trend of this research field, and reflect the changes in the research heat of the research field<sup>[4]</sup>. From the annual distribution map of the network power research literature (see Fig. 1), it can be seen that the research on network power of Chinese scholars has generally increased from 2007 to the present, but the middle is slightly fluctuating. In 2007, Xiu-Yan JING scholars first defined the concept of “network power” and defined the possession of resources as the core element of network power allocation<sup>[5]</sup>. From 2008 to 2011, the academic research on network power showed an upward trend year by year. It can be seen that the emerging research direction of network power has become a new research hotspot. From 2014 to 2017, there is a steady upward trend. It can be seen that during this period of time, the research on network power has been fruitful, and many scholars have emerged. Among them, representative scholars include Guo-Qiang SUN, Ying-Dong JI and Yong-Ping XIE. At the same time, it can be seen that the number of online power literature publications in China has shown an upward trend in the past two years, indicating that network power will become a hot research direction in the field of network organization power.

### 3.2 Author Co-occurrence Map of Network organizations Power

The authors can reflect the cooperation between the core authors and authors in the field of network power research and the relationship between authors<sup>[6]</sup>. Using CiteSpace5.0R7 information visualization software, select "Author" to get 33 The authors of the nodes and 18 connections cooperated to develop a scientific knowledge map.

According to Price's law, the number of core authors in a certain field should satisfy  $m = 0.749 \times \sqrt{n_{\max}}$  (representing  $\sqrt{n_{\max}}$  the number of documents that have the most authors)<sup>[7]</sup>. After finishing  $\sqrt{n_{\max}} = 19$ , the calculated  $m$  is about 3.2. An integer of 4, that is, an author with a volume of 4 or more can be considered as the core author of the field. We can see that the core authors have a total of 42 articles, accounting for about 19% of the total number of documents. Professor Price believes that the core authors should account for more than 50% of the total number of articles, but the core authors of network power are far less than 50%. It can be seen that the domain of network power does not form a true core author group. According to the statistics of the core authors in the field of network power research (see Table 1), we can see that scholars such as Xing-Hua DANG, Guo-Qiang SUN, and Ying-Dong JI are the core and prolific authors of the field of network organization power.

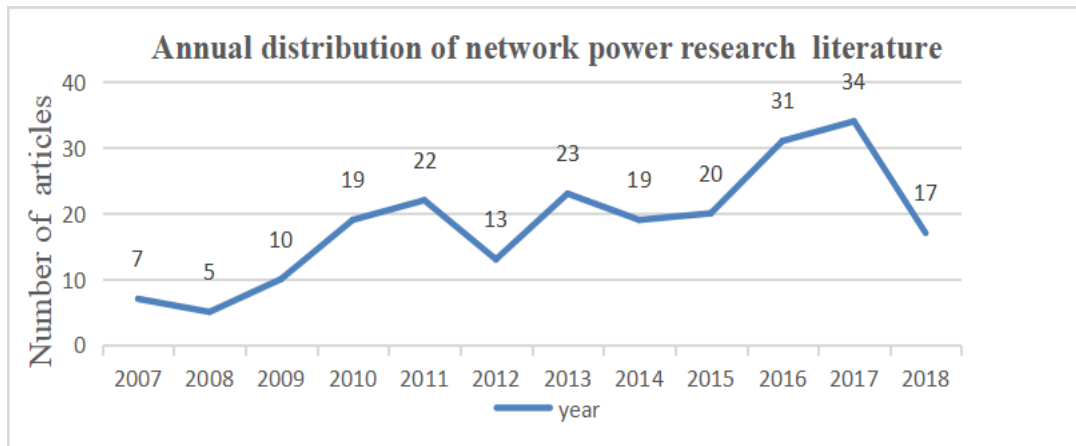


Fig1: Annual distribution of network power research literature

Table 1: Statistics of core authors of network organization power research

Number	Author	Institution
19	Xing-Hua DANG	Xi'an University of Technology
8	Guo-Qiang SUN	Shanxi Finance University
6	Ying-Dong JI	Shanxi Finance University
5	Li-Feng XU	Shanxi Finance University
4	Wei ZHANG	Xi'an University of Technology

It can be seen from the cooperation of network organization power authors (Figure 2) that Xing-Hua DANG is an important scholar in the field of network power. The author's cooperation situation shown in Figure 2 is basically consistent with the institution cooperation shown in Figure 3. Xing-Hua DANG, Yong-Lei Sun, Li LIU and others from Xi'an University of Technology, they have close ties with Xie Yongping from Xi'an University of Electronic Science and Technology, and have little cooperation with scholars from other institutions. In addition, Guo-QiangSUN, Ying-Dong JI, Li-Feng XU and other scholars from Shanxi University of Finance and Economics are also very active in this field. It can be seen that scholars conduct academic research more internally or independently, and there are fewer collaborative research and development. This situation enlightens scholars' future research on network power should focus on interaction and cooperation with external scholars, enhance academic influence and discourse power in this research field.

### 3.3 Institution Co-occurrence Map of Network organization Power

Using CITESPACE5.0R7 information visualization software, select "Institution" generation to get 17 nodes, 5 lines, and network density of 0.368 of the Organization Cooperation of scientific knowledge maps. It can be seen from the cooperation of network power agencies that the overall network is relatively loose and there is no close cooperative relationship between the institutions. One of the most notable is the Xi'an University of technology, economic Management College, Shanxi University of Finance and Economics, School of Management Science and engineering, the two institutions, they published a lot of academic achievements, and there is cooperation between the network power research in the front-end. In addition, Xi'an polytechnic university and Shanxi University of Science and Technology are the most closely related, both of them belong to Shanxi Province, has a natural neighbor advantage, close cooperation. In addition, there is little partnership between the institutions. Xi 'An University of technology is China's first contact and research network power of the university, the school's economic and management college in this field has a certain influence. In addition, the XI ' an University of Technology, the School of Business Administration, University, Renmin University of China has actively studied the network power.

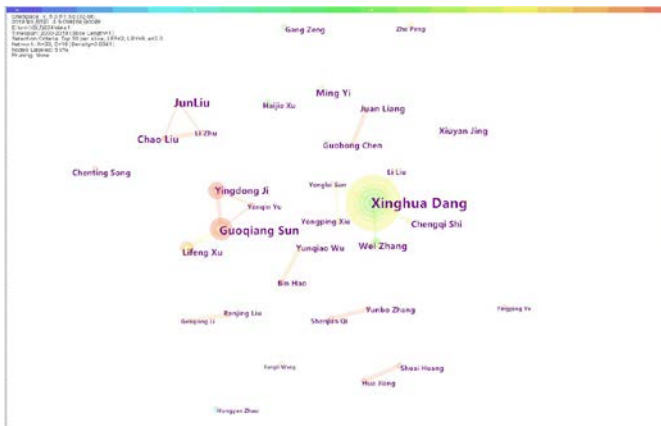


Fig.2: authors collaborate on maps



Fig.3: institutions collaborate on maps

### 3.4 Research hotspot analysis

Research hotspots refer to research topics that are of high concern to researchers in a research field over a period of time [8]. Node centrality is to quantify the importance of a node in connecting other nodes. It is the link between other nodes. In the map, the purple circle indicates that the node is at the core position or controls the flow of information [9]. The article selects keywords for analysis, and runs a hot knowledge map of network power research based on keyword co-occurrence.

According to the comprehensive table 2, the network power node is the largest, the frequency of occurrence is the highest, reaching 64 times, and the centrality is 1.27. This paper analyzes the content of network power, and it is not surprising that the network power appears high frequency. In addition, the intermediary centers of “technical innovation network”, “cooperative behavior”, “network density” and “social network” are also greater than 0.1 and are also important keywords, indicating that these keywords play an important role in the map and are the network power. The key nodes in the research field are also the hotspots of research.

### 3.5 Analysis of research hotspot evolution path

The keyword clustering analysis (cluster) is used to obtain the keyword co-occurrence clustering map (see Fig.4). It can be seen that the clustering index Modularity  $Q=0.05956$ , Mean Silhouette  $=0.7633$ , which means that the keyword clustering result is very good. From the keyword co-occurrence clustering map, it can be seen that the keywords are divided into 10 clusters, most of which are in the same topic, indicating that the network power research topics are concentrated and the common knowledge base is clear. The largest cluster #0 outbreak in 2011, the key words are technology innovation network, knowledge power, innovation network, enterprise knowledge ability, the keywords of clustering labels are very clear. In #1, innovation performance, network structure, and network practices have gradually become hot words. From 2007 to 2018, the hot words have been constantly changing. We can see a clear evolutionary line. The research field of network power is constantly deepening, and it is evolving in the direction of network structure and network behavior. From the keyword co-occurrence map of network power research field (see Fig.5), it can be further seen that the field of network power research is expanding and the research system is gradually maturing. In 2007, there appeared articles related to network power. Among them, representative scholars are the network power of Xiu-Yan JING scholars in the global production network background; 2009-2011, #0 technology innovation network has become a research hotspot; 2011-2012, #1 knowledge Power has become a research hotspot in this field. From 2014 to 2014, #2 social network analysis became an important key word for network power research. University students used social network analysis methods to study the related content of network power; From 2015 to 2018, network practices, network structure, inter-enterprise behavior, and the structural characteristics of network organizations have become hotspots for studying network power. The hotspots of network power research can be clearly seen from the keyword map. From the keyword clustering and time axis map, the hotline keywords on the timeline and corresponding time nodes are

found, which has a clear understanding of the hot word evolution path in the network power domain.

Table 2: Network organization Power Keyword Center

Frequency	Keyword	Center degree	Year
64	Network organization power	1.27	2007
14	Technology Innovation Network	0.28	2009
4	Cooperative behavior	0.24	2016
8	Network density	0.13	2011
7	Social network	0.13	2013

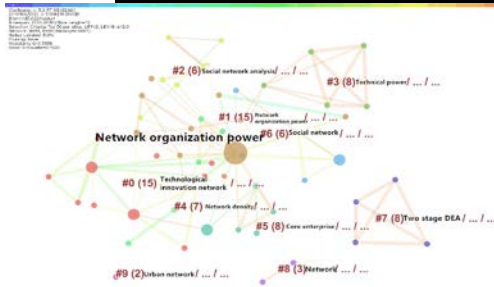


Fig 4: Keyword co-occurrence clustering map

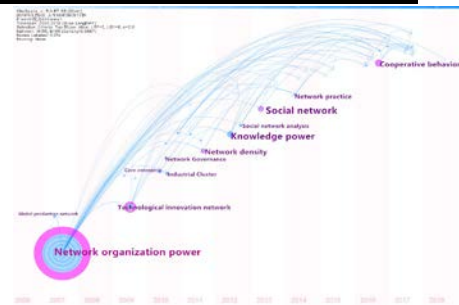


Fig 5: Keyword co-occurrence map

### 3.6 Analysis of the development trend of research frontiers

By identifying and tracking the frontiers of research, researchers can understand the evolutionary dynamics of the subject's research field and then predict the future direction of the discipline. Using the emerging word detection technology and algorithm provided in the citespace software, the emerging words "technical innovation network" and "knowledge power" in the field of network power are obtained. In 2009, the key words were the technology innovation network. It can be seen that at this time, each scholar relies on the network of technology innovation network to study the network power in the network and become the research frontier of network power in the current stage. In particular, it is represented by the research of the party Xinghua scholars. In 2011, the key words were knowledge power. At present, scholars focus on the specific expression of power, including structural power and ability power.

Table 3: Mutation Keywords

Burst	Rate	Frequency	Year
Technology Innovation Network	3.54	14	2009
Knowledge power	3.06	13	2011

## 4. Conclusions

This paper uses the bibliometric visualization tool Citespace to study the related literatures of 224 network power topics in CN from 2000 to 2018, and quantitatively analyzes the overall development law of the literature in the field of network power, research hotspots in the field, research frontiers, and authors. Now, the institutions are co-occurring, and according to the process of network power related research, the evolution path of research hotspots in this field is systematically analyzed. The following conclusions are obtained:(1) From the overall development trend, the volume of publications generally shows an overall increase, showing that the academic community is paying more and more attention to network power; (2) Research authors tend to study independently, with less cooperation and lower cooperation. (3) According to the keyword frequency and centrality, the research hotspots in the field have focused on technology innovation networks, network density, knowledge power, etc. In addition, research frontiers also focus on the study of the role of specific forms of power.

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