Visualization Study of Management Hotspots Based on CSSCI in China

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Abstract

Using content analysis method based on word frequency analysis and mapping knowledge domain and information visualization to analyze 17981 papers published in the 27 core journals of management that embodied by Chinese Social Science Citation Index during 2004-2006. We got the co-word map to identify the main research hotspots of management in China. And by mapping knowledge domain studies we dynamically revealed the research hotspots domain and the trend of research of management on the academic area in China during the recently three years.

1 Introduction

Management is a subject that the basic problem of management activities. "Management" not only can refer to management activities, but also refers to management disciplines. Fayol think that the management equates with the planning, organization, command, coordination and control. Simon (1977) who is the well-known U.S. management expert believes that management is the decision-making. The author of the book *what is the management* Margarita Joan believes that management is contained in everywhere. Management is not the patent of the leader, while it is one of the themes that everyone must face everyday. So the research of management is always the hot spot in these years.

Along with the thorough development of China's economy, the research of management has the more progress in the depth and the breadth in China. At the same time the exchanges between the domestic management research and foreign research have gradually increased. Grasping the latest trend of management development in China can help to guide and inspire our research. In recent years, the domestic

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scholars have made the massive explorations to the front and the hot spot of management science. Wang Liangliang, Peng Xiaodong (2007) used the content analysis approach to analyze the trends of management sciences at home and abroad. Miao Yuan et al. (2007) used nonlinear model to define focal points, and made a dynamic analysis on focal points of management science and engineering. Guo Jue and Xi Youmin (2004) pointed out the situation and aim of China management science development in the 21st century. Zhang Ling-ling and Fang Yong (2005) used the bibliometric analysis approach to analyze the hotspots of management sciences and engineering in China.

There are some different characteristics in above studies, but the intuitiveness is not strong. So we have made the bibliometric analysis and survey to 17,981 papers which is contained in Chinese Social Science Citation Index (CSSCI) from 2004 to 2006 included all the 27 kinds of core management journals, by means of word frequency statistics, co-word analysis and visualization technology. Finally we mapped the co-word knowledge map of Chinese management, summed up the hot spots of current management study in China, and evaluated them.

2   Data and Method

All the data used in this paper are downloaded from Chinese Social Science Citation Index （CSSCI）database. CSSCI has filled social science citation index gaps in China that reaches a leading domestic lever. The database which offers great convenience for us to download data, transfer format, and analysis data is authoritative and representative. So the 27 core journals of management that embodied by Chinese Social Science Citation Index during 2004-2006 are selected in our research as data source (see table 1).

Table1. The whole management Journals from CSSCI (2004-2006)

Rank	Journal Name
1	Management World
2	Science Research Management
3	Studies in Science of Science
4	Scientific Management Research
5	Forum on Science and Technology in China
6	Future and Development
7	Reform of Economic System
8	China Soft Science
9	Forecasting
10	Journal of Industrial Engineering and Engineering Management
11	Foreign Economics & Management
12	Nankai Business Review
13	Economic Management
14	Strategy and Management
15	R&D Management
16	Chinese Public Administration
17	Science of Science and Management of S.& T
18	Modernization of Management
19	Chinese Journal of Management Science
20	Science & Technology Progress and Policy
21	Journal of Management Sciences in China
22	Science and Technology Management Research
23	Journal of Business Economics
24	Macroeconomic Management
25	Soft Science
26	Journal of Management Sciences
27	Human Resource Development of China

Monarch had studied the history of the co-word analysis. He believes that co-word analysis technology can get the patterns and trends of research and development in a certain areas through analysing the link intensity between the representative terminologies of the literatures (Monarch I. 2000). One of the main functions of co-word analysis is to identify the concept map or knowledge network architecture among these representative terminologies. We can detail the theme of a certain subject areas through a series of similar patterns (Liu Zeyuan and Yin Lichun 2006).

This research used the key words which are in the 27 core journals of management in CSSCI as

the object. The key words are the important component of academic papers. Although there are often only 2-5 words, actually it is the essence of papers. Key words can be used to retrieve documents and understand the domain and content of the literature.

We used the literature co-occurrence mining system (Ccmatrix) that developed by ourselves based on Visual Basic 6.0 to analyse the downloaded literatures. Then we counted the times of all the key words appearing in these 17981 literatures, and sorted them in descending order. We listed the top 50 core key words and analysed the hotspots (see table 2). The frequency of these key words is higher than other words in Chinese management science research papers; therefore we considered that they can represent the current management research hotspots in China.

Table2. The distribution of the high-frequency key words about Chinese management study during 2004-2006

rank	key word	frequency
1	technology innovation	465
2	industry cluster	212
3	knowledge management	199
4	sustainable development	197
5	supply chain	177
6	SMEs	164
7	corporate governance	164
8	scientific outlook on development	160
9	listed companies	146
10	human resources management	140
11	transnational corporations	139
12	index system	138
13	human capital	122
14	economic growth	121
15	risk investment	119
16	independent innovation	114
17	competitive advantage	113
18	recycling economy	106
19	corporate culture	105
20	scientific and technological innovation	104
21	electronic commerce	102

22	intellectual property rights	100
23	system innovation	99
24	regional economic	96
25	industrial structure	91
26	core competitiveness	90
27	incentive mechanism	90
28	organizational learning	88
29	strategic alliance	84
30	enterprise management	79
31	performance evaluation	77
32	project management	74
33	high-tech industry	70
34	information technology	70
35	e-government	69
36	private enterprises	68
37	harmonious society	67
38	real option	65
39	management model	64
40	macro-control	64
41	high-tech enterprises	61
42	risk management	61
43	public management	61
44	R&D	61
45	knowledge innovation	60
46	business performance	60
47	virtual enterprise	59
48	strategic management	59
49	AHP	58
50	the commercialization of research findings	57

In order to further reflect the relationship between these key words, we have made the further treatment to these high-frequency key words, and continually used the literature co-occurrence mining system (Ccmatrix) to count the times each two of the 30 top high-frequency key words displayed in one document, so that we can get the co-word matrix (30×30) of high-frequency words. Then we used the method of mapping knowledge domain and information visualization to identify the main research hotspots of management in China. Mapping knowledge domain, which is based on

citation analysis of scientometrics and information science and technology, is international emerging visualization research method. This method can reveal the development and evolution trend of subjects, the proliferation and dissemination of knowledge, the relations of author or agency, and so on. The method includes Co-word Analysis, Correlate Analysis, Cluster Analysis and Multidimensional Scaling Analysis (Small, H. 1973; Katherine W. McCain 1991). We used a software SPSS15.0 to do the cluster analysis in the study, and by means of Pearson correlation coefficient statistical method, so that the top 30 high-frequency key words gathered into different clusters (see figure 1). The numbers in Figure 1 are the same to the rankings in Table 2, and the numbers represent the key words that the same rankings correspond to. The clusters directly reflect the concentration theme and scholars for their concern. In general, strong theory, research strong guidance, and more emphasis areas of research will form the larger category (Qiu Junping and Ma Ruimin 2006). We used the non-metric multi-dimensional scaling technology to get two-dimensional plot of these 30 high- frequency key words and drew mapping knowledge domain of the 30 key words at last.

Figure 1. The clusters of the top 30 high-frequency key words
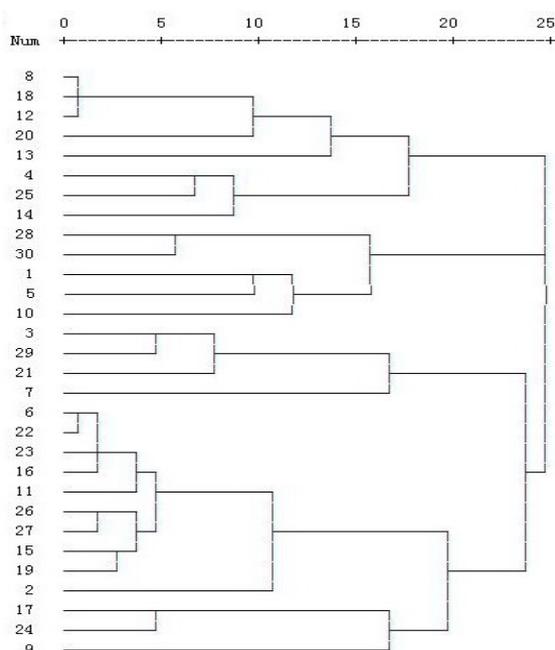
3 Results and Discussion

3.1 Word Frequency Analysis (Content analysis method)

The innovation domain becomes the largest research hot spot of Chinese scholars. In all key words of 17981 paper, the frequency of the key word "technology innovation" is 465, ranking 1st. At the same time the frequency of independent innovation is 114, ranking 16th. The frequency of S&T innovation is 104, ranking 20th. The frequency of institutional innovation is 99th, ranking 23rd. The frequency of knowledge innovation is 60, ranking 45th. Inputs "the innovation" in the GOOGLE search, inquires the Chinese homepage. There are approximately 62 million "the innovation" inquiry results. The sufficient confirmation innovation is a major hot spot which Chinese scholars study. The frequency of technology innovation places first proved that it is the most important domain of innovation research. The technology innovation is the important component and the core of the national innovation system. It is a comprehensive activity which is the science and technology and the economic activity unity. Since the 21st century, with China's accession to the WTO transition period ended, the step that the humanity enters the era of knowledge economy moves more and more quickly. Improving Chinese capability of independent innovation and building an innovation-oriented country has become an important basic national policy. In addition, Chinese scholars pay great attention to the independent innovation. Facing the intense international competition, the weak ability of independent innovation has increasingly become the bottleneck that the development of Chinese enterprises (Zhang Yan and Peng Jun 2007). Because it is impossible to buy the core technology from other countries, and the core competitiveness is impossible to obtain from exterior. Only daring to innovate independently, China could occupy initiative in the global competition.

3.2 Co-word Knowledge Map (Multidimensional Scaling Analysis and Cluster Analysis)

Using multidimensional scaling analysis and cluster analysis, we obtained the co-word map of management hotspots in China during 2004-2006 (see figure 2). The map clearly shows that there are four knowledge groups and the corresponding academic domains of management in last three years.

In the knowledge group 1, technology innovation, enterprise management, corporate governance, organizational learning, human resources management and supply chain, such as high-frequency key words appearing, this shows that the knowledge group 1, which is based on technology innovation as the main line, enterprise management as the core, focused on organizational learning capacity, human resources management, supply chain management and other fields. Enterprises and the companies are the core of achieving economic growth and the main body of technology innovation. We can also see that the organizational learning and human resources management are essential for enterprises' technology innovation.

In the knowledge group 2, economy growth, industrial structure, scientific outlook on development, sustainable development, cycle economy, index system, scientific and technology innovation, human capital etc. gathered in a cluster, which shows that the scholars often stands on the macro-perspective to research the economy development of country and industry. The frequency of "sustainable development" that highest frequency words in this knowledge group is 197, which ranks the fourth in the whole key words. It's a high-frequency, and the reason is that sustainable development is reported by World Commission on Environment and Development in the "Our Common Future" report in 1987, which is referring to the economy, society, resources and environmental protection coordinated development so that generations can develop to sustain forever. After sustainable development is reported, it's widely recognized by the international community immediately. The sustainable development is ever-lasting (Liu Zeyuan and Yin Lichun 2006). Thereby sustainable development becomes the center of the knowledge group.

Figure 2. Co-word map of management hotspots in China (2004-2006).
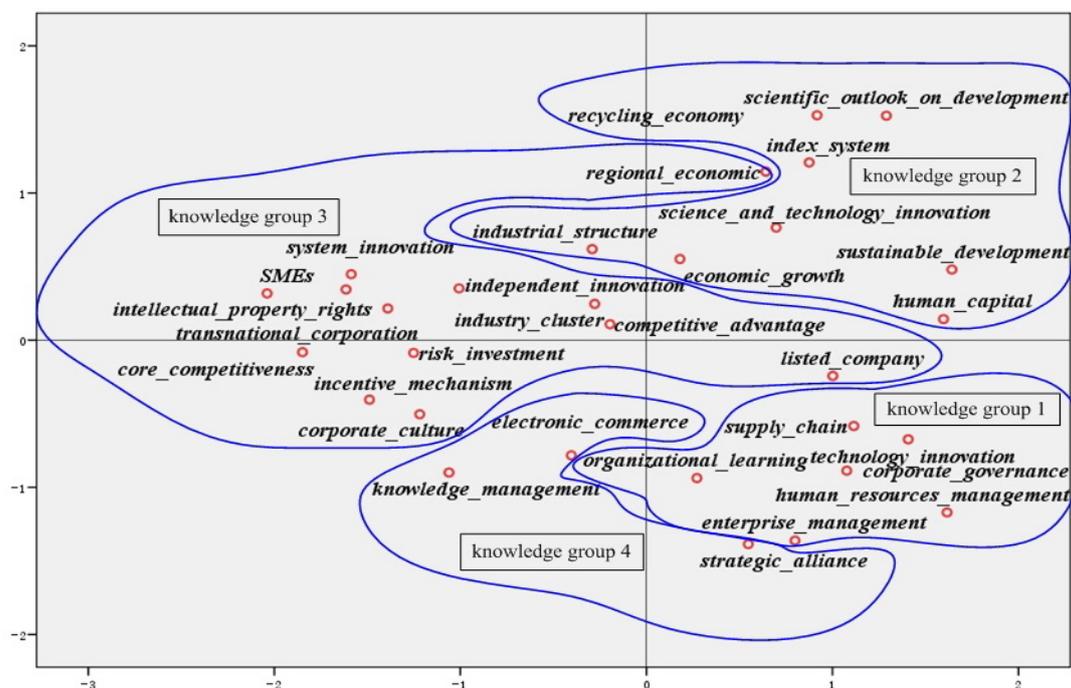
In the knowledge group 3, there are 13 high-frequency words that it contains the most key words among the knowledge groups, so that this group is the most important research domain. This cluster includes many key words such as small and medium-sized enterprise (SMEs), intellectual property, system innovation, independent innovation, multinational companies, the core competitiveness of the incentive mechanism, venture capital, corporate culture, industry clusters, competitive advantage, regional economic and listed companies. This phenomenon shows that researchers focus on the enterprise innovation and the relevant issues, including transnational companies, listed companies, SMEs in independent innovation and system innovation, enterprise culture as well as incentive mechanism. Secondly, on the perspective of national innovation system, independent innovation that involved regional economy development can cause the relationship between industrial clusters and competitive advantages.

In the knowledge Group 4, there are three high-frequency keywords. They are knowledge management, electronic commerce and strategic alliances. Particularly the frequency that the knowledge management appears is 199, ranking 3rd of the top 50 key words. It reflects the knowledge management has got popular attention in Chinese management community. In the past 50 years, the world economy experienced an important transformation process that from the value system almost purely based on the production to the one based on knowledge and skills. People increasingly recognized that knowledge is an asset which needs to be managed. So in this view, knowledge management is the first important aspect that the enterprise should be considered.

4   Conclusions

All the key words of 17,981 papers based on all the 27 kinds of core management journals included the Chinese Social Science Citation Index (CSSCI) from 2004 to 2006 are the research objects. We make the top 50 high-frequency keywords as the sign of the hotspots of management study in China. In order to showing the hotspots of management research in the last three years in China, we can map out a knowledge map of the management study hot spots through the visualization technology means of scientific knowledge map in this paper.

We can clearly see the subject that Chinese scholars most pay attention to is innovation from the above research. In the map, the two knowledge groups that respectively takes the technology innovation, the institutional innovation, the independent innovation as the cores, takes the business management, the industrial colony, the core competitiveness and so on as the auxiliary research's domain are the first research hot spot. The economic development of country and industry is the second hot spot. Knowledge management is the third hot spot domain. The research that the technology innovation of country, industry, enterprise and the management pattern under the instruction of the management theoretical knowledge is the realistic hot spot of the management applied research. In the era of knowledge economy, the research of knowledge management and electronic commerce will have preserved the hot spot of management research in China. We estimate that the focus of research will remain on the technology innovation in future. The technology innovation of state and industry will be worthy of more attention and concern.

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