

# A Co-word Analysis of Think Tank Field in China

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**Abstract**—The aim of this study is to map the research structure and paradigm correlation of think tank field in China by using co-word analysis. Taking the 715 think tank research papers included in CNKI as the statistical sources, and then constructing the co-word matrix with the help of JAVA program. By the methods of cluster analysis and multidimensional scaling analysis, the paper got eight research hotspots and three research areas in think tank field in China. Finally, the paper summarized the research paradigm and concluded the deficiencies of the current research and expectation in China.

**Index Terms**—think tank, co-word analysis, China, new think tank, Chinese characteristics, research advances

## I. INTRODUCTION

Think tank is the brain of a country. A think tank is an organization that performs independent research and advocacy concerning topics such as social policy, political strategy, economics, military, technology issues and more [1]. Generally, think tanks have no formal decision-making power and claim political neutrality while often making no secret of their ideological standpoints [2]. The annual “Global Go To Think Tank Index” which is released by Think Tanks and Civil Societies Program (TTCSP) ranks the world’s leading think tanks in a variety of categories [3]. At present, there are many famous think tanks around the world, like the Brookings Institution, the Royal Institute of International Affairs, the RAND Corporation, Chinese Academy of Social Sciences, etc.

All countries in the world attach great importance to the construction and development of think tanks. Compared with western countries, the research on modern think tank in China is relative late. Since the 21st century, the number and scope of think tanks in China has grown steadily, and research on think tanks has experienced drastic changes. Thus a majority of research topics of think tank field have attracted much attention in China. So far, many experts and scholars have analyzed the international research situation and the domestic development history, status quo and future direction from qualitative and quantitative views. An thought it was significant to study and learn from the advanced

management mechanism of oversea well-known think tanks, he summarized and explained the foreign famous think tanks’ management mechanism in terms of four aspects: talents management, fundraising, research process management and achievement management [4]. Ren combed the history of Chinese think tanks from several aspects, the author held that Chinese think tanks should explore there own capacities of development while learning from other examples [5]. Xu and Chen summarized the development process and the research work of modern think tanks in China, he thought the research work of think tanks was currently in the primary stage, and the unity paradigm did not appear [6]. Wang reviewed the development of Chinese think tanks and gave some suggestions about the construction of a new-type think tank. He pointed out that the main problems of Chinese think tanks were failure to offer prospective and time-efficient products and the influence of think tank was limited and its quality was yet to be improved [7]. Chen, Jiang and Wang conducted a visualization analysis of core articles on think tank from CSSCI index database between 1998 and 2014. They demonstrated the major groups, the hot fields and frontier topics about think tank research in China with mapping knowledge domains, and found that some areas had made phased achievements [8]. Gu, Tian and Dong collected the relevant papers from CNKI (CAJD) between 1996 and 2013, they used social network analysis and visualization technology to find out the hot spots issue in the related academic research of think tank in China [9].

However, until now, there is no convincing explanation about Chinese think tank research paradigm from the literature and media reports; and few studies focus on the relationship among the research topics in think tank field in China. In 2015, Notice of the General Office of the Central Committee of the CPC and the General Office of the State Council on issuing the opinions on strengthening the construction of new types of think tanks with Chinese characteristics. So it is necessary to understand and make right judgment on its current situation and development trend under the new background. This paper attempts to map the research structure and paradigm correlation of think tank field in China using co-word analysis. The results will identify the main subjects of think tank research and grasp the advances of think tank field in China.

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## II. METHODOLOGY

At present, the academic circles often use co-word analysis and co-citation analysis to map the relationship among hotspots in a research field. Comparison to co-citation analysis, the co-word analysis can better represent the hotspots in new filed [10]. Think tank research is an emerging topic in China, so we used co-word analysis to express the core content of it. Co-word analysis is a kind of content analysis. The method assumes that the keywords can mainly express a certain discipline research topic or research direction. It indicates that any two keywords, co-occurring within an article, are relevant in the topics which they refer to [11]. In the early 1990s, Chinese scholars had noticed the important role of co-word analysis for studying the literature subject and scientific structure in a specific discipline. For a classification selection of the important literatures in subjects, we can identify the “common agreement” or prescribed paradigm in a field. Therefore, the co-word analysis method can reveal and explore the patterns and research paradigm effectively [12].

In this study, we choose China National Knowledge Infrastructure (CNKI) as the data source. CNKI is the largest Chinese academic resources aggregator in China. We retrieved the related articles of think tank field with the title “think tank”, the time span from 2000-2015. Notice that, for the synonyms of “think tank” in Chinese is more, so the name of the article we retrieved was equal to “think tank”. A total of 3146 preliminary bibliographic records were retrieved, but we found that the results contained a large number of useless information such as government reports, expert interpretation, conference notice, etc, and even some

earlier literatures did not contain the keywords. After a series of data cleaning by three graduate students, we finally got 715 articles.

The application of the co-word analysis in this study follows four steps: firstly, a program in Java was developed to filter the keywords in 715 articles and calculate the highly frequencies that two keywords appeared together in the same article; secondly, a co-word matrix was transformed into the correlation matrix and then into the dissimilarity matrix because of too much zeroes by using VBA in Excel; thirdly, cluster analysis and multivariate statistical methods were conducted by using SPSS 19.0; fourthly, the research hotspots and paradigm were analyzed by the former statistical results.

## III. RESULT AND DISCUSSION

### A. Frequencies of Keywords

Keywords are the most important elements in co-word analysis. A total of 2,625 keywords (3.7 per article) were collected as the sample. Some keywords just express the same meaning, so we eliminate the synonyms to achieve a precise result (e.g., “college think tank” was replaced by “university think tank”; “intelligence service” was replaced by “information service”). We reserved the general terms (e.g., influence, construction, proposal) as the think tank was a scientific research on practical problems. Notice that, the keyword “think tank” (369 times, 51.61% of the total articles) must be removed in the analysis below as it is our search term and has less significance in this study. Finally, we selected the keywords with the frequency are not less than 8 (shown in Table I).

TABLE I. THE HIGH FREQUENCY KEYWORDS LIST

No.	Keyword	Word frequency	No.	Keyword	Word frequency
1	university think tank	44	19	Local Academy of Social Sciences	14
2	folk think tank	40	20	China	13
3	American think tank	39	21	problem	12
4	new think tank	38	22	functional localization	12
5	think tank construction	34	23	foreign policy	12
6	America	32	24	feature	11
7	decision consultation	31	25	government decision-making	11
8	Chinese characteristics	28	26	information service	11
9	influence	27	27	enlightenment	11
10	public policy	25	28	educational think tank	10
11	operating mechanism	25	29	public decision-making	10
12	construction	20	30	decision-making scientifically	10
13	decision-making	17	31	solution	9
14	university	17	32	Brookings Institution	8
15	proposal	17	33	collaborative innovation	8
16	library	16	34	policy process	8
17	Chinese think tank	15	35	effect	8
18	policy research	14	36	transformation	8

The 36 high frequency keywords can reflect the hotspots of in think tank field to some extent. The top 10 high frequency keywords are university think tank(44), folk think tank(40), American think tank(39), new think tank(38), think tank construction (34), America(32), decision consultation(31), Chinese characteristics(28), influence(27), public policy and operating

mechanism(25). It can, therefore, be said that these topics are important in think tank research field in China.

*B. Construction of the Matrix*

We counted the frequency of the two high frequency keywords appearing together in same article with a program in Java. In this way, a 36×36 co-word matrix was constructed (shown in Table II).

TABLE II. A PARTIAL CO-WORD MATRIX

j \ i	1	2	3	4	5	6	7	8	9	10
1	44	0	0	2	2	1	1	2	2	0
2	0	40	0	0	0	0	1	0	0	4
3	0	0	39	0	0	0	0	0	3	1
4	2	0	0	38	2	0	3	8	1	1
5	2	0	0	2	34	0	1	4	0	0
6	1	0	0	0	0	32	1	0	2	3
7	1	1	0	3	1	1	31	4	0	2
8	2	0	0	8	4	0	4	28	3	1
9	2	0	3	1	0	2	0	3	27	2
10	0	4	1	1	0	3	2	1	2	25

TABLE III. A PARTIAL CORRELATION MATRIX

j \ i	1	2	3	4	5	6	7	8	9	10
1	1	0	0	0.048912	0.051709	0.02665	0.027077	0.05698	0.058026	0
2	0	1	0	0	0	0	0.028398	0	0	0.126491
3	0	0	1	0	0	0	0	0	0.09245	0.032026
4	0.048912	0	0	1	0.055641	0	0.087407	0.245256	0.03122	0.032444
5	0.051709	0	0	0.055641	1	0	0.030802	0.129641	0	0
6	0.02665	0	0	0	0	1	0.03175	0	0.068041	0.106066
7	0.027077	0.028398	0	0.087407	0.030802	0.03175	1	0.135769	0	0.071842
8	0.05698	0	0	0.245256	0.129641	0	0.135769	1	0.109109	0.037796
9	0.058026	0	0.09245	0.03122	0	0.068041	0	0.109109	1	0.07698
10	0	0.126491	0.032026	0.032444	0	0.106066	0.071842	0.037796	0.07698	1

TABLE IV. A PARTIAL DISSIMILARITY MATRIX

j \ i	1	2	3	4	5	6	7	8	9	10
1	0	0.976163	0.97586	0.97674	0.975483	0.97406	0.973657	0.973133	0.972671	0.969849
2	1	0	1	1	1	1	0.971602	1	1	0.873509
3	1	1	0	1	1	1	1	1	0.90755	0.967974
4	0.951088	1	1	0	0.944359	1	0.912593	0.754744	0.96878	0.967556
5	0.948291	1	1	0.944359	0	1	0.969198	0.870359	1	1
6	0.97335	1	1	1	1	0	0.96825	1	0.931959	0.893934
7	0.972923	0.971602	1	0.912593	0.969198	0.96825	0	0.864231	1	0.928158
8	0.94302	1	1	0.754744	0.870359	1	0.864231	0	0.890891	0.962204
9	0.941974	1	0.90755	0.96878	1	0.931959	1	0.890891	0	0.92302
10	1	0.873509	0.967974	0.967556	1	0.893934	0.928158	0.962204	0.92302	0

In order to meet the needs of cluster analysis, we constructed a correlation matrix by using Ochiai with the help of Excel (shown in Table III). But we can see there are too many zeroes in correlation matrix, and it may cause inaccuracy when we analyze. So we constructed a dissimilarity matrix (shown in Table IV) to achieve more precise results. Contrary to correlation matrix, larger the value is, the weaker the degree of correlation between the two keywords is, while the smaller the value is, the stronger the degree of correlation between two keywords in dissimilarity matrix is [13].

C. Cluster Analysis

Cluster analysis is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to each other than to those in other groups (clusters) [14]. We conducted the cluster analysis by importing the correlation matrix into SPSS19.0 and thus got a tree diagram (shown in Fig. 1). Accordingly, these 36 high frequency keywords were divided into eight clusters which named Cluster 1 to Cluster 8 in Fig. 1.

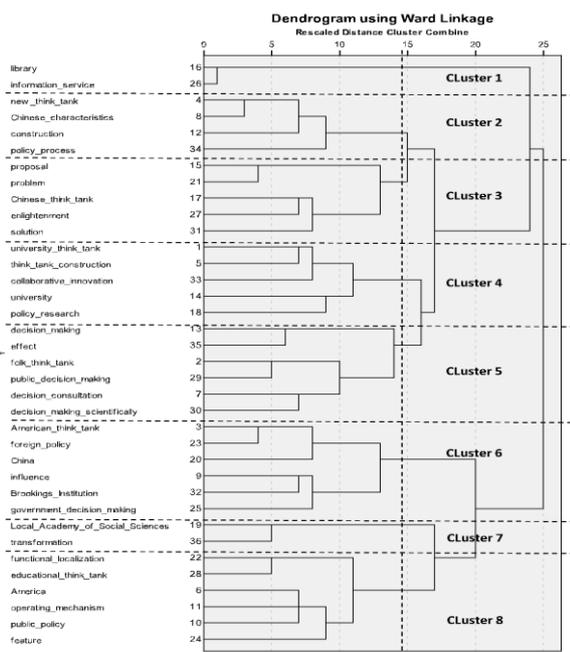


Figure 1. Cluster analysis-tree

Based on the results above, the current research topics of think tank field in China are mainly focused on the following eight aspects.

1) Information service research base on the idea of think tank (Cluster 1). As we all know, think tank construction relies on the data and information support, so the information collection and content of think tanks aroused the attention of many scholars in library and information science (LIS) in China. Most Chinese scholars thought that the library and information service institution has the ability to become or build think tanks, and some may be even a kind of think tank now. For this reason, the information service research base on the idea of think tank grows stronger day by day.

2) Research on the construction of the new think tank with Chinese characteristics (Cluster 2). On November 12, 2013, the Communiqué of the Third Plenary Session of the 18th Central Committee of the CPC first proposed that China should facilitate the building of new think tanks with Chinese characteristics and improve consultation system for policy-making. Since then, China has entered into a new stage of think tank construction. Many Chinese scholars and expert put forward their own views on the construction of the new think tank with Chinese characteristics. From the publication date of relevant articles, we found that this topic has become a new research hotspot in the field of think tank in China.

3) Some studies about the top-level design of national think tank (Cluster 3). As the construction of think tank in China was promoted to the national strategy level, more and more research focused on the image, strategic fulcrum, path designs or development problems of the construction of Chinese think tank. From the present study, the main research strengths in this hotspot are the official think tanks which are mainly built by governments and the semi-official think tanks which are connected to a supervising government agency.

4) University think tank research and its role in think tank construction (Cluster 4). University think tank is the “engines” of Chinese thought innovation. As the main place of knowledge production and conversion, university think tank has advantages in talents and resources, therefore, the research of university think tank become a hot topic in some famous universities in China. In practice, some local governments tried to promote the resources sharing and advantage compensation among university think tanks by leading the collaborative innovation, such as the research and management center of the university think tank in Shanghai, China. So far as the status, university think tank research makes a breakthrough in some cutting-edge application and the paradigm of important theoretical problems.

5) The public decision-making system of think tanks and supplementary role of folk think tanks (Cluster 5). Think tanks share the basic values for decision consultation, and the government public policy-making relies on the coordination of multi-agent system. Compared with other types of think tanks, folk think tanks in China are not strong enough. Folk think tanks serve as an important supplement of the national think tank. By cooperating with the official think tanks, Chinese folk think tanks gradually show their professional characteristics to improve the government’s recognition and acceptance.

6) American think tank and China’s diplomatic strategy (Cluster 6). American think tanks play a very important role in policy analysis and formulation. Many domestic scholars discussed on American think-tank for their mature experience. In the way of national relationship, American think tanks have important influence on Sino-US diplomatic strategy represented by Brookings Institution. Focusing on the “China studies” in American think tanks in the aspect of national security, network environment, energy demand, etc, become an important module of domestic think tank research.

7) Think tank transformation of Local Academy of Social Sciences (Cluster 7). Some Chinese scholars expound the new positioning of the Local Academy of Social Sciences by considering its features in social and economic development decision-making at present stage. The specific content in this hotspot contains the application of research development, the allocation of talents, the system of performance evaluation, and so on.

8) Comparison on educational think tank between China and America (Cluster 8). Educational think tank has become an important force in influencing the government decision-making of education and promoting the development of education reform. Chinese and American educational think tank differs in several respects: the structure, the sources of money, the talent allotment and the influence of policies [15]. American educational think tanks achieved a leading position benefiting from its mode of operation, yet the development of higher education reform in China still managed to extricate from predicament and gap in practice. For this reason, research on this hotspot needs to be discussed in the long term.

*D. Multidimensional Scaling Analysis*

By means of multidimensional scaling analysis, we can explore the structure of hot topics and research paradigm in the field of think tank in China. We imported the dissimilarity matrix into SPSS19.0, and then got a two-dimensional map (shown in Fig. 2). On the whole, the research topics of think tank field in China could be divided into three large research areas: Area 1(Research on four categories of domestic think tanks); Area 2(Learning from the experience of well-known think tanks in America and some other countries); Area 3(On the role of information research in think tanks).

1) Research on four categories of domestic think tanks (Area 1). In 2014, “Think Tank Reports: 2013 Chinese Think Tanks Report Influence Ranking and Policy Suggestions” was promulgated by Shanghai Academy of Social Sciences (SASS) Think Tank Research Center. In the report, the think tanks in China are divided into four categories: official think tank, Academy of Social Sciences think tank, university think tank and folk think tank, which become the main body of Chinese think tank. Most think tanks in China belong to “inside system”, therefore the independence of the policy interpretation from Chinese think tanks was widely criticized by foreign countries. With the increasing demands of government decision-making consultation, the construction of new think tank with Chinese characteristics was commented by president Xi Jinping in China. And the implementation of the strategy of national think tank had been raised into the agenda. Research on four categories of domestic think tanks from connotation, evaluation system, think tank rankings, orientation, coordination, path dependence and innovation developing pattern, has become the most important module in the study of Chinese think tanks.

2) Learning from the experience of well-known think tanks in America and some other countries (Area 2). Chinese think tank construction starts relatively later than the developed countries. By referring to the foreign experience and ideals, many Chinese scholars discussed

and compared operation mode of the foreign well-known think tanks. Different from western countries’ think tanks, Chinese political think tanks are mostly belonging to the government department. Therefore, lots of policy suggestions from think tanks are simply different in division of labor in decision system. For instance, the motto of Brookings Institution is “quality, independence, and impact”, and the three elements are the key to the success of western think tanks. By comparison, Chinese think tanks did not have enough influence on government decision-making for their less independence, professionalism and competition. Consequently, how to draw lessons from the western experience, so as to stimulate the enthusiasm and creativity of Chinese think tanks’ participation and service in politics and policy, has become an urgent task of Chinese new-style think tank construction project.

3) On the role of information research in think tanks (Area 3). Think tanks commonly exerted their influence through the books, journals and reports they published. So the information flow of products designed and popularized of think tanks aroused the attention of some scholars in China. The core destination and role of think tanks to get their ideas accepted by the government and to influence policy. The essence of this process is just information service process of think tanks. Library and information science (LIS) field has been always paying attention to the collection, analysis and processing of various types of information. Data is the raw materials of think tanks’ decision research in big data era. In that regard, focusing on the information service mode of the famous think tanks on the one hand and the transformation of libraries and information institutions on the other, have become an important research hotspot in the field of LIS in China.

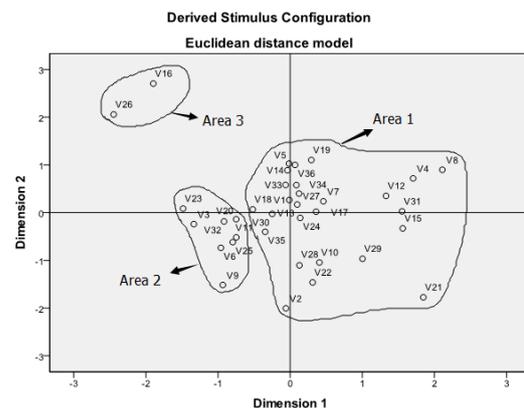


Figure 2. Two-dimensional map of research topics of think tank field in China

According to Fig. 2, the “Area 1” had been in the dominant position; “Area 2” had taken a back seat; and yet “Area 3” had been in an isolated position. Typically, the relationship among three areas is mutual promotion, influence and amalgamation, but from a practical angle, they had not formed a complete prototype. Combining with the existing research status in the think tank field in China, the three research areas have gradually correspond to three research paradigm attribute: Internal paradigm,

external paradigm and information paradigm (shown in Fig. 3). The internal paradigm focused on “building”; the external paradigm focused on “learning”; and the information paradigm focused on “servicing”. Viewing from the Chinese decision consultation space, the external paradigm influences the activities of internal paradigm; and the information paradigm has a tendency towards to the decision consultation space for their institution transformation. Overall, it appears that the three paradigms may coexist with each other in a period of time.

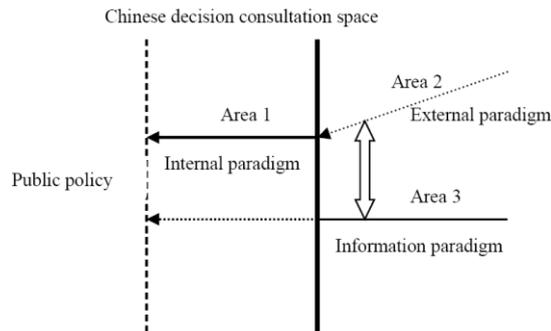


Figure 3. Triadic relation of think tank research paradigm in China

#### IV. CONCLUSION

Think tank is an important component of modern national governance system. The challenge for Chinese think tanks is to harness the vast reservoir of information, knowledge, and experts' intelligence to support public policy and influence political strategy. The government, social, academic have recognized the importance of think tank construction and responded positively to the efforts through building the top think tanks with global influence. In this study, we conducted a co-word analysis of think tank research articles included in CNKI from 2000-2015, we found that think tank research in China has made phased achievements, which reflected the rudiment of the hot fields and frontier topics. Utilizing the tools of SPSS19.0, we got a conclusion of 8 hotspots in the field of think tank in China, which including the information service research base on the idea of think tank, research on the construction of the new think tank with Chinese characteristics, some studies about the top-level design of national think tank, university think tank research and its role in think tank construction, the public decision-making system of think tanks and supplementary role of folk think tanks, American think-tank and China's diplomatic strategy, think tank transformation of Local Academy of Social Sciences, comparison on educational think tank between China and America. Then the paper analyzes the structural features from three dimensions which contained the research on four categories of domestic think tanks, learning from the experience of well-known think tanks in America and some other countries, on the role of information research in think tanks. The three dimensions represent the research community of think tank field in China. On this basis, internal paradigm, external paradigm and information paradigm are initially formed with respective characteristics. Under the background of the construction of new think tank with Chinese Characteristics, the research perspective of think tank field

in China gradually changing from the “foreign introduction” to the “domestic exploration”. Furthermore, we will continue to study on the trend of their immediate effect and consequences over time.

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