

The Visualized Mapping Knowledge Domains of the Research on Chinese Government Information Disclosure

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Abstract—This study summarized the overview of the research on Chinese government information disclosure through systematically analyzing the research literature on the disclosure of government information published by Chinese Academic Journals Network Publishing Database(CAJD) during 2002-2012 and at the same time extracted five hot topics of the research, namely the research on system legislation, IT, media and information resources management, levels of government, literature and institutions and governance by the bibliometric analysis methods of the visualized knowledge mapping and through integrating scientific metrology, graphics and computer science. The study also investigated and interpreted the research topics and the keywords and finally discussed and revealed the trends of the research on Chinese government information disclosure on the basis of the related research profile and hot spots. These trends include system legislation and improvement of information disclosure, electronic platform for information disclosure, public libraries and information services, e-government and public participation, government information resources development and management and other aspects.

Keywords— government information disclosure, research focus, visualized mapping knowledge, China

I. INTRODUCTION

In recent years, the rapid development of China's democratic politics has strengthened the government's guarantee for the public's rights of knowledge, participation, expression and supervision. Meanwhile, their consciousness of rights is also enhanced and they are eager to know the government's enforcement of rights and to get various government information. Through publicizing government information to the public, the government cannot only promote the political communication between the official and the public, encourage the political participation of them, but also strengthen the public's confidence in government, realize social supervision and information circulation, rectify bad administrative atmosphere and finally build a solid foundation for the construction of modernized democratic politics [1].

Currently, government information disclosure system has been established in more than 70 countries and regions in the world, and the theoretical research about government information disclosure continues to heat up and the outcomes emerge one after another [2]. Although China officially implemented the Government Information Disclosure Ordinance of the People's Republic of China in 2008, during the more than four years since the implementation of the Ordinance, the academia and the public have launched a fierce discussion on issues related to government information disclosure. The argument was mainly focused on

domestic public management, information management theory and others. A large number of scholars have carried out in-depth study on the issues of government information disclosure from the different perspectives of the system construction, theoretical significance, institution building, information organization and utilization. Especially since 2008, research achievements of government information disclosure have increased significantly [2]. It is shown that the government information disclosure will become a hot social issue that concerns scholars and the public generally in the current and coming period. Therefore, summarizing hot topics about the government information disclosure research in recent years and exploring the future trends are of theoretical and practical significance.

This paper intends to adopt a bibliometric analysis of visualized knowledge mapping and a statistical analysis of the research literatures involving the disclosure of government information, which were published in 2000-2012 by CAJD to build a social network mapping of government information disclosure study and refine and explain hot research topics and cutting-edge trends about domestic government information disclosure and discuss them in depth. Specifically, the framework of this study includes the following parts: first, sort out the overview of the research on Chinese government information disclosure and sum up the number of research literatures and frequently cited references in recent year; second, through systematically sorting out the research literature, extract the high-frequency

keywords from the literature, build co-word matrix of the keywords and map out the social network mapping of co-words of government information disclosure; third, on the basis of co-word social network mapping, further explore research focuses and discuss them in depth; finally, based on the above analysis, advance forecast and outlook about the research of China's government information disclosure.

II. DATA AND METHOD

A. Data Source

In this study, the data derives from CAJD and the retrieval keywords are government information disclosure, time: 2000-2012; retrieval condition: accurately retrieving a total of 6,584 relevant research literature, operating time: November 8, 2012. By further excluding invalid documents that are obviously not related to literature research theme including notices of meetings, product introductions and eventually 4718 effective literature were left, containing a total of 5297 keywords, 1573 authors, and involving public management, information management, law and other disciplines. In this study, these documents are used as a sample source of studying and sorting out the domestic government information disclosure status.

B. Research Methods

Visualized knowledge map analysis is applied by the academia to analyze the development course, hot topics and cutting-edge trend of the academic circles in a field of research [3]. The so-called knowledge mapping is an icon of the development process and structural relationships of scientific knowledge and it has become a popular research method in current scientific metrology. With the way of scientometric's revealing scientific knowledge and its activity patterns turning from mathematical expressions to graphical representation, knowledge mapping shows the structural relationship and evolution rule of the knowledge instead of the geographical distribution of scientific knowledge [4]. Literature has suggested that the application of the knowledge mapping mainly focuses on three aspects: first, Citation Analysis, namely the use of a variety of mathematical and statistical methods to analyze scientific journals, theses, books, research institutions and other

analysis units references to reveal the inheritance and usage relationship of the development of a discipline, and some of the important research literature [5-6]; second, Document Co-citation Analysis which was first proposed by the American intelligence scientist Henry Small and Soviet intelligence scientist I.V. Marshakova respectively, when studying the citation structures and literature classification. This term is understood as this: for two literature (author): when two literatures appear in the third literature references directory at the same time, the relationship between the two literatures (author) became co-citation relationship [7]; third, Word Frequency Analysis, mainly using high-frequency keywords and the co-word analysis of keywords and Social Network Analysis software Ucinet to draw knowledge mapping so as to find research focus and cutting-edge issues in certain disciplines [8].

III. RESEARCH SUMMARY ANALYSIS

A. Published Article Volume Statistics

By counting the amount of literature, the research status and popularity overview in the field can be found in a certain extent. Figure 1 reflects the published article volume statistics and the corresponding years of the 2000-2012 research on domestic government information disclosure.

The results show that during the year of 2000-2009, the number of articles about government information disclosure research continues to rise, and in 2008 and 2009, the amount of literature saw a dramatic increase, about 2-5 times of the past amount, while in 2008 it also reached the pinnacle of the domestic government information disclosure research with 1127 literatures. Thereafter, until 2012, nearly three years, the overall published article volume declined slightly, but it was still significantly higher than the number of 2007. The general trend of Fig. 1 shows that the research boom of domestic government information disclosure has kept rising, especially in 2008, the first year when the Chinese Government Information Disclosure Regulations was promulgated and implemented, there were many scholars who focused on government information disclosure research, therefore, the number of the published articles reached a new high and since 2008, domestic government information disclosure studies have also entered a new stage of development.

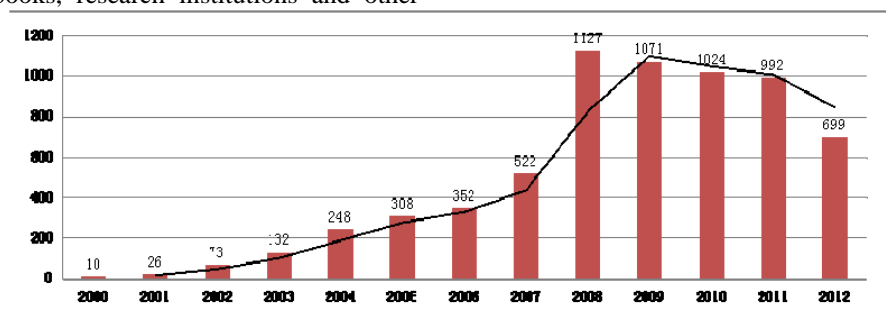


Figure 1. Research literature distribution and number during 2000-2012

B. Main Research Force

Tables I show the main research force of the domestic government information disclosure. Table I shows the first 15 authors in terms of their published article

volume. From Table I, it can be seen that the published article volume of Suzhou University is the most. Professor Zhou Yi of this university is the most prolific author and an author who started earlier to study government information disclosure. In addition, a number of domestic key universities, such as representative of the Renmin University of China, Wuhan University, China University of Political Science and Law and other scientific research institutions have served as pillars of the research on government information disclosure and well-known scholars from these institutions, such as Pro. Wang Quansheng, Pro. Mo Yuchuan, Pro. Zhou Hanhua and Pro. Duan Yaoqing, who are academically fruitful are leaders in the field of government information disclosure. As shown in Table I, those renowned “985” and “211” project universities and their research team have strong research capabilities, they are the main force of domestic government information disclosure research over the past decade, and the studies on government information disclosure are mainly focused on the field of political science, law, information science, information management, public administration science and other disciplines. In recent years, these institutions and scholars have a leading edge among the domestic counterparts either in the number of papers and fund or in the monograph and award-winning achievements. However, due to the time of research on government information disclosure in China is short and the above institutions were just established, which result in less contact and cooperation of them, all of the above to a certain extent hindered the in-depth development of the domestic government information disclosure research.

TABLE I. TOP 15 PROLIFIC AUTHORS IN PUBLISHED ARTICLES VOLUME DURING 2002-2012

No.	Author	Unit	Papers
1	ZHOU Y	Suzhou Univ.	32
2	WANG QQ	Shandong Univ.	17
3	MA HQ	Hei long J Univ.	15
4	MO YC	Renmin Univ.	14
5	Wang XZ	Xiangtan Univ.	14
6	Xia Yikun	Wuhan Univ.	13
7	Zhou HH	C.R.I.C	13
8	Wang F	Nankai Univ.	10
9	Zhang XM	Ins of Scien & Tech Inf.	10
10	Duan YQ	Central China Normal Univ.	10
11	Jiang G	Tianjin Normal Univ.	9
12	Yang XJ	National School of Admin	9
13	Li GX	Peking Univ.	9
14	Chen NH	Xiangtan Univ.	9
15	Li X	School of Admin in Huai'an	9

C. Top Cited Literatures

TABLE II. TOP 10 FREQUENTLY CITED LITERATURES DURING 2002-2012

No.	Author	Title	Frequency	Year
1	Stiglitz, LIN SH	Freedom, the right to know and public discourse—the role of transparency in public life	308	2002

Table II shows the top 10 frequently cited literatures in Chinese government information disclosure research literatures of 2002-2012. The results show the following characteristics: first, most of the research literature are from domestic core journals, such as Journal of Renmin University of China, Law Research, National School of Administration Journal, Global Law Review, etc. and the average impact factor of these journals is maintained at about 1.0 and they enjoy a relatively high domestic academia reputation; second, the chief authors of some literatures are economists, management experts and law experts who have reputation at home and abroad, such as the renowned economist Pro. Stiglitz of Columbia University, Pro. Zhang Chengfu of Renmin University of China and Pro. Ying Songnian of China University of Political Science and Law. They started earlier to study government information disclosure over the past decade the earlier study; third, the study is mainly related to government information disclosure system, e-government, the right to information, accountability, etc. These documents also fully embody the intersection between disciplines, such as the interdisciplinary integration and infiltration between law and administrative science as well as information science and information resources management.

IV. CO-WORD SOCIAL NETWORK ANALYSIS

A. Keyword Extraction and Co-word Matrix

Key words, as the summary of the core content in the literature, can better reflect the distribution and characteristics of the theme of a research field. Co-word analysis of keywords aims to identify the higher frequency co-occurrence vocabulary, because these terms can reflect in the same or similar knowledge structure in a particular subject area [9]. Based on co-word analysis of keywords, word frequency statistics analysis is applied to extract 5297 keywords from the 4718 journals, about 1.12 keyword per journal and then select 350 high-frequency keywords whose frequencies are more than 10 times. Table III shows the top 30 list of the high-frequency keywords which are representative terms of the study of Chinese government information disclosure for nearly a decade and which largely characterize the current hot spots of study. From the list, it can be clearly seen that information disclosure, the right to information, government information disclosure system, regulations, government websites, e-government and other hot words are the major labels of the research areas.

2	ZHANG CF	E-government: the development of its prospects	304	2000
3	YING SN, CHEN TB	Government information disclosure legal system	252	2002
4	ZHOU HH	Basic consideration in drafting the Open Government Information Regulations (expert suggestion)	194	2002
5	ZHOU HH	U.S. government information disclosure system	157	2002
6	CHU SY	China's Open Government Information Analysis and Thinking	146	2003
7	WANG XJ	On predicament as well as a way out of the reality of the Chinese government accountability system	138	2005
8	ZHANG QF; LV YB	The disciplining of Right to Know	127	2002
9	GUO DH	Right to know the information disclosure system	121	2003
10	LIU S, LV YB	Disciplining government information disclosure	115	2003

TABLE III. LIST OF 30 HIGH-FREQUENCY KEYWORDS

No.	Keyword	Frequency	No.	Keyword	Frequency	No.	Keyword	Frequency
1	Government information disclosure	1922	11	Government websites	176	21	Service-oriented government	96
2	information disclosure	826	12	Government	176	22	Government department	96
3	Right to information	607	13	Public	154	23	Government information disclosure regulations	95
4	Government information	489	14	information disclosure system	153	24	State secrets	92
5	Regulations	348	15	Public information	143	25	Government organs	88
6	Administrative organs	275	16	Government information resource	137	26	Government affair information disclosure	87
7	E-government affair	275	17	Other organization	121	27	Public participation	87
8	Government affair disclosure	226	18	Right to information	105	28	Archives	86
9	Public library	194	19	Counter measure	99	29	Local government	84
10	PRC	179	20	Current documents	98	30	Legislation	84

Furthermore, in order to ensure that the contents of the keywords are directional and semantically normative, we "cleaned" 350 high-frequency keywords four times, deleted words completely overlapping with the research themes, such as government information disclosure, information disclosure, excluded "method", "problem", "way", "path" and other words whose connotative and semantic meanings are unclear, and emerged synonyms and near synonyms, such as "government information disclosure system / information disclosure system",

"regulations / government information disclosure regulations / Government Information Regulations of the People's Republic of China / disclosure regulations" and "e-government affairs / electronical government / e-government" and finally extracted 77 keywords as the core hot words to study themes of the government information disclosure. Based on the keywords in the 4718 literatures, two of which co-occurred, 77×77 keyword matrix was constructed. Then Ochiai similarity coefficient was used to standardize and normalize the

matrix, ultimately getting co-word matrix that represents the degree of similarity of the keywords.

The value of the similar matrix in Figure 2 indicates the degree of similarity between two keywords: the greater the value is, the higher the degree of similarity between the keywords is, and on the contrary, the smaller the value is, the lower the degree of similarity between the keywords is [10]. For example, in this matrix, the coefficients of administrative body & regulations and the government information disclosure system are relatively large, being respectively 0.3371 and 0.2411, which indicates a higher probability of co-occurrence between the administrative body & regulations. The Ochia coefficients of A and B words are calculated as:

$$Ochia(A, B) = \frac{C_{AB}}{\sqrt{C_A} \times \sqrt{C_B}}$$

Wherein: *Ochia* (A, B) means the *Ochia* coefficient of A and B; C_{AB} means the common frequency of A and B; $\sqrt{C_A}$ means the frequency of keyword A while $\sqrt{C_B}$ means the frequency of keyword B.

B. Co-word Social Network Mapping

Based on co-word analysis of keywords, the Ucinet software was introduced to draw keyword-based co-word social network mapping and by computing network density, coherence, centrality and other indexes, and further analyze and judge hot themes of a research area. As shown in Figure 2, 77×77-keyword co-word matrix was imported into Ucinet, finally creating co-word social network mapping of government information disclosure research (Figure 3). The figure's centrality has been pre-analyzed.

The analysis results show that the network density of the Figure 2 is 3.83%, and the degree of intermediate center 43.02%, the consistency index 0.467. These indicators show that the network mapping has obvious center clustering. The size of the node in Figure 2 is determined by the keywords frequency: the greater the nodes are, the higher the frequency of the theme is, and the closer the place is to the middle part, the more capable the node is to reflect the current research focus. All the nodes in the graph mainly center on regulations, government affair disclosure, administrative agencies, e-government, government information disclosure system,

the right to information, and other topics forming a relatively dense sphere. The top 10 centrality of the center of Figure 3 are: open government (132.847, 1), administrative institutions(116.838, 2) ordinance (110.018, 5), the government information disclosure system (106.614, 3), the right to information(100.169, 6), the government website (84.690, 11), information disclosure legislation (73.636, 16), e-government (69.801, 8) current file (49.703, 13), a service-oriented government (38.479, 35), in the brackets are intermediate centrality and frequency order of keywords. From co-word network mapping of keywords and the centrality of the keywords, it can be seen that Chinese government information disclosure research focuses on openness in government affairs, on how administrative organs strengthen the construction of government websites according to Government Information Disclosure Regulations, fully guarantee the citizens' right to know, strive to achieve the goal of the service-oriented government, and constantly improve the government information disclosure system and other academic hot issues for discussion and study.

Co-word social network mapping intuitively shows a hot research topic in Chinese government information disclosure, as well as the relationship between keywords and the importance. On this basis, mind mapping is used to show the visual representation between the similarity of research topics and then classifying cognitive similarities and differences of a group of objects and finally forming multidimensional scaling cognitive map (Kruskal&Wish, 1978) [11]. Specifically, we will integrate and classify nodes with higher centrality in the co-word social network mapping while classifying 77 theme keywords into the 6 hot topics according to the connotation and semantic representation, as shown in Table IV.

(4) In Table IV, the results show that the top five hot topics of Chinese Government Information Disclosure Research during 2002-2012 include: (1) the system legislation research (highest heat); (2) information technology, media and information resources management (quite high heat); (3) the studies of government levels (high heat); the studies of literatures and institutions (general heat); (5) governance research (lower heat). Heat is represented by 1-5 stars, and is based on the level of the average frequency of all keywords of each theme, namely the times of the each subject ÷ the number of the keywords, finally getting an average frequency.

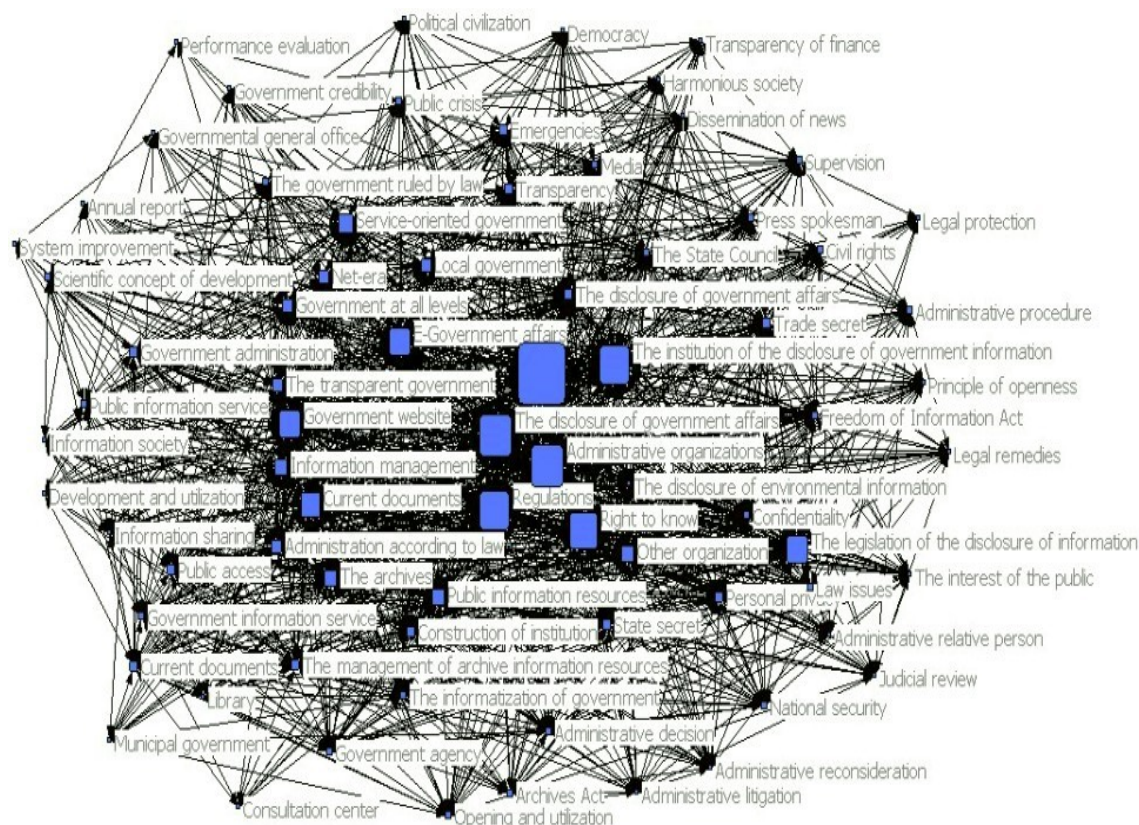


Figure 2. The Ten-year Research Trends of Chinese Government Information Disclosure

TABLE IV. RESEARCH TOPIC CLASSIFICATION, KEYWORDS AND RESEARCH HEAT

Category	Keywords involved	Average frequency	Heat
System legislation	Regulations, right to information, privacy, confidentiality, government information disclosure system, government affairs, information disclosure legislation, government under the rule of law, institution building, system, legal issues, legal remedy, the public interest, public rights, national security, supervision, freedom of information law, administration, and the principle of openness, administrative proceedings, legal protection, judicial review, state secrets, commercial secrets, archives Act, administrative reconsideration, administrative relative person	87.37times	★★★★
IT, media, information resource and management	E-government network era, the media, government websites, government information, the disclosure of environmental information and archival information resources management, records management, information management, public information services, public information resources, government information services, government information technology, information sharing, public access spokesman, news dissemination, development and utilization of the information society, access center	72.63times	★★★★
Government levels	Local government, at all levels of government, the State Council, the municipal government	56.50times	★★★★
Literature organizations	Administrative authorities, government agencies, libraries, and other organizations, the existing documents, archives, annual reports, the Office of the Government	48.54times	★★
Governance	Public participation, emergencies, public crisis, transparent government, transparency, democracy, scientific development concept, the credibility of the government, government management, service-oriented government, political civilization, harmonious society, financial transparency, administrative decision-making, performance evaluation	41.72times	★

V. SUMMARY AND OUTLOOK

The bibliometric analysis with visualized knowledge mapping as the core is a visualized expression of scientific knowledge development process and structure relationship. It helps to extract critical information from the massive literatures, to provide researchers a convenient way to quickly understand through macroeconomic and microeconomic measurement of literatures and to grasp the knowledge and cutting-edge progress of related disciplines [12-15]. In this study, theses on Government Information Disclosure Research published by CAJD during the period of 2000-2012 are

taken as data sources, and the literature bibliometric analysis of knowledge mapping is used to conduct in-depth analysis of the research profile and focus of the government information disclosure research in the past decade and two main conclusions are drawn: First, a domestic overview of the Government Information Disclosure Research shows that between 2000 and 2002, the number of government information disclosure research literature remained growth. In 2008, the first year when Government Information Disclosure Regulations was officially promulgated and implemented, so the published article volume reached a new high. Meanwhile, the force (author and agencies) of the research on

government information disclosure should pay more attention to information service function, and thus the information service may be a theme that will be fiercely discussed in the academia in the future. In short, through the analysis of Figure 4, it can be seen that the future trend of the government information disclosure research may focus on: the system legislation and improvement of information disclosure, the electronic platform for information disclosure, public libraries and information services, e-government and public participation, government information resources development and management. Related academic research institutions and fund projects will become the main force of the future funding and support of these studies, and continue to promote government information disclosure framework and ideas [16-17].

References

- [1] D. Cullier and S.J. Piotrowski, "Internet information-seeking and its relation to support for access to government records," *Government Information Quarterly* 26, vol. 26, no. 2, pp.441-449, 2009.
- [2] H. Zhu and K. Zou, "Summary on the study of disclosure of government information at home and abroad," *Library and Information Service*, vol. 55, no. 3, pp.120-124, 2011.
- [3] Y. Liu, W. Hua and S. Yuan, "Visualization analysis of the world important informetric scientists: an author co-citation perspective", *Journal of Intelligence*, vol. 31, no. 1, pp.76-80, 2012.
- [4] P. Wang, F. Zhi and T. Shen, "The visualization analysis of research on international competitive intelligence based on mapping knowledge domains," *Information Science*, vol. 30, no. 6, pp.925-929, 2012.
- [5] H. Small and B.C. Griffith, "The structure of scientific literatures: identifying and graphing specialties," *Science Studies*, no. 4, pp.17-40, 1974.
- [6] K. McCain, "Mapping economics through the journal literature: an experiment in journal co-citation Analysis," *Journal of the American Society for Information Science*, vol. 42, no. 4, pp.290-296, 1991.
- [7] H. Small, "Co-Citation in the scientific literature: a new measure of the relationship between two documents," *Journal of the American Society of Information Science and Technology*, vol. 24, no. 4, pp.265-269, 1973.
- [8] E. Otte and R. Rousseau, "Social network analysis: a powerful strategy, also for the information sciences," *Journal of Information Science*, vol. 28, pp.443-455, 2002.
- [9] M. Wetter and Rappaport, "Computation of word associations based on the co-occurrences of words in large corporation [EB/OL]," (2010-09-12), <http://acl.ldc.upenn.edu/W/W93/W93-0310.pdf>
- [10] Q. Zhang and F. Ma, "On paradigm of research knowledge management: a bibliometric Analysis," *Journal of Management Sciences in China*, vol. 10, no. 6, pp.65-75, 2007.
- [11] N.K. Denzin and Y.S. Lincoln, *Handbook of Qualitative Research*, Sage Publications, USA, 2000.
- [12] H. Zhou, "Basic considerations in the drafting of regulations on the openness of government information (an expert recommended draft)", *Chinese Journal of Law*, vol. 24, no. 6, pp.75-97, 2002.
- [13] F. Wang and X. Wang, "Open information service based on e-government," *Library and Information Service*, vol. 50, no. 8, pp.76-81, 2006.
- [14] F. Zheng, "The study of government information disclosure services in public archives," *Master Thesis of Shandong University, China*, 2010.
- [15] H. Lin, "Improvement on account of participation and transparency: public participation and government information publicity in times of internet," *Administrative Law Review*, vol. 60, no. 2, pp. 89-94, 2009.
- [16] Y. Zhao, M. Guo and V. Kaisa, "The information resources allocation mechanisms in the national innovation system of Finland," *JCIT*, Vol. 5, No. 9, pp. 16-26, 2010.
- [17] P. Z and Z. L, "Analyzing allocation strategies of government information resources using system dynamic feedback archetypes," *International Journal of Digital Content Technology and its Applications*, Vol. 5, 1, pp. 296-304.



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