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Progress Analysis of Library Knowledge Management Research in China Based on Bibliometrics

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Abstract: Knowledge management has been the general concern of the academic community, library knowledge management is one of its important applications. Take journal articles at China National Knowledge Infrastructure and books published in China from 1999 to 2012 as data sources. Applying bibliometrics and content analysis, the authors try to statistics relevant literature on Chinese library knowledge management and make a detailed analysis: the study on library knowledge management in China experienced three stages. The 1,658 authors in total publish these 1,558 articles on LKM which come from 810 institutions and so on. On the basis of that, it summarizes the achievements and disadvantages to offer some proposal to the research of library knowledge management in China.

Key words: Knowledge management, library knowledge management, research progress, trend analysis, bibliometrics

INTRODUCTION

As a new management theory and method, Knowledge Management (KM) has been the general concern of the academic community since its appearance. Being the resource center for preserving human cultural heritage, library must consider how to adapt to the knowledge-based transformation, seek for knowledge orientation and sustainable development in the era of knowledge economy. As a consequence, it has a far-reaching significance to conduct a study on Library Knowledge Management (LKM). Therefore, it is very important to understand the current library of knowledge management in the field of research and progress. For example, when did library knowledge management originate, develop and change in the country? What were the content, focus and achievement of LKM studies? They will help us to grasp the knowledge management library industry in China's current situation and future trends and the application of knowledge management for the library to provide guidance and practice.

Library knowledge management research in China is attention by scholars since 1999. "Library Knowledge Management in the 21st Century" is the first article in China of LKM (Sheng, 1999). Other articles explored and studied LKM in many aspects, such as "Opinions on library knowledge management" (Liu, 2000), "Library knowledge management features and its

implementation strategy" (Li, 2003), "Knowledge management and practice in university libraries" (Chen *et al.*, 2003).

To fully grasp the current research progress, this article explores related scholars and journals. The article tries to reveal the stage and trends visually in a certain study field through the analysis of the publication and cited year distribution of literature and its research focus and trends to provide a reference for this kind of research in the future.

Applying bibliometrics and content analysis, the authors statistics relevant literature on Chinese library knowledge management and make a detailed analysis on the basis of that, it summarizes the achievements and disadvantages to offer some proposal to the research of library knowledge management in China.

DATA SOURCE AND RESEARCH METHOD

Data source: Academic literature is an important carrier of academic research. With a short text and publication cycle, journal article can fully reflect a research breadth while book mirror the depth of a study systematically. This article selects journal articles and books on LKM as sample data, among which journal articles are obtained from CNKI and searched by subject terms "knowledge management" and "library". Their time scope is before December 31, 2012. Books are gained from China National

Library bibliography and Duxiu database and title retrieval is done through keywords the same as those of journal articles.

Research method: This article conducts an analysis of the above literature through the application of bibliometrics and content analysis. Bibliometrics is a subject that applies mathematics and statistical methods to analyze the literature. It is capable of a more intuitive and hotspot comprehensive display of the field generated by the study for a certain time. Currently it is widely used in the literature field of intelligence.

Statistical results: From CNKI and Duxiu database, to analyze the results got from above, it can be learned that the number of journal articles about LKM is 1,558 while books 19.

ANALYSIS OF THE DEVELOPMENT TREND ON LKM

It can reveal the stage and trends visually in a certain study field through the analysis of the publication and cited year distribution of literature which is shown in Fig. 1. From the Gompertz growth curve model, it can be get that literature change shows a combination of numerous S curves when one research project starts to flourish. The trend of research literature numbers can be divided into three stages:

The First stage is from 1999 to 2001, when research outputs are all journal articles, with no special books. Although there are only 39 articles at that time, accounting only for 2.5% of all literature, the cited number is 34, the total citation frequency is 938 and the average cited frequency of each article is 27.58. They have made much contribution to the development of such kind of literature. Take "Library Knowledge Management in the 21st Century" for example. It is the

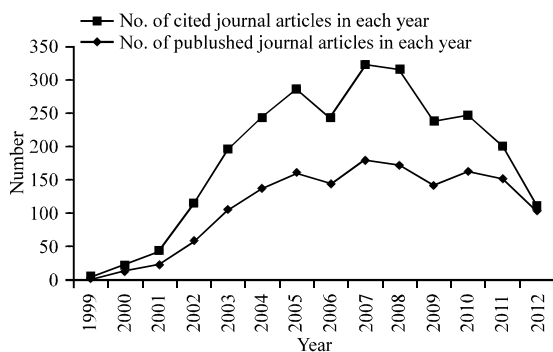


Fig. 1: Published articles and cited articles in each year

first article in China that explores the basic theory and development of LKM after Peter Drucker put forward a more complete concept about it (Sheng, 1999). Other articles, such as "Opinions on library knowledge management" (Liu, 2000), also lay a solid foundation for the research of LKM.

The second stage is from 2002 to 2005, a new phase of high-speed production and articles published each year present a linear growth. There are 5 relevant books and 462 articles in this period, accounting for 29.65% of all the literature. The number of cited articles reaches 379, the total citation frequency is 3,846 and average citation frequency of each article is 10.15. Many scholars of library information arise attention, such as Sheng Xiaoping, Ke Ping, Du Yeli, Ma Haiqun and so on, who write articles in succession on innovation of LKM, knowledge service and LKM in colleges and universities as well. What is noteworthy in this period is scholar's concern of practical application and implementation of KM strategy in library during the discussion and expansion of theory research. Articles like "Library knowledge management features and its implementation strategy" (Li, 2003), "Knowledge management and practice in university libraries" (Chen *et al.*, 2003), are all important research achievements. There are 5 books at this stage, among which writers of three books are from Taiwan and another two are coauthors. They have limited depth exploration on LKM.

The third stage is from 2006 to 2012. At this period, there are 1,057 articles, accounting for 29.65% of all the literature. Six hundred and twenty two cited articles' total citation frequency reaches up to 2,487 and average cited frequency is 3.99. Fourteen books are published and their total citation frequency is 156. With the first two stages' development, some theoretical results are gained on KM, the manifestation of which is some systematically related works on it come out. For example, the book Library Knowledge Management written by Shi (2006) makes a systematical research on KM concept, library goal and task, users and knowledge receive and so on. Library Knowledge Management Research makes an analysis of knowledge management in libraries, theoretical foundations, mode and application of LKM (Ping, 2006).

DISTRIBUTION OF AUTHORS STUDYING LKM

Distribution of authors is a good indication of the overall radiation intensity and breadth of a research field. One thousand six hundred and fifty eight authors in total publish these 1,558 articles on LKM, among which 205 authors write 2 or more articles. The number of authors who participate in or complete 1 article is 1,453, accounting for 87.46%, the proportion of which

Table 1: Published and cited articles of influential authors

Author	Published articles	Published year	Cited articles	Citations
Sheng X.P.	9	1999-2011	9	343
Qiu J.P.	1	2001	1	143
Gu Min	1	2001	1	133
Ke Ping	4	2003-2010	4	128
Gong J.T.	7	2003-2008	7	118
Ren Q.E.	8	2004-2007	7	110
Du Y.L.	3	2002-2004	3	110

is much higher than Lotka’s Law value, 60%. The largest number of articles written by one author is 12. According to Price Law, it can be calculated that there are 32 prolific writers who publish 3 or more articles. These 32 writers write 153 articles in all, accounting for 9.82%. There is a great gap from the prolific writer group, whose articles account for about 50%. It can be known that cooperative writing on LKM is very common. Results show that there is no core writer group on the research of LKM. Table 1 shows lead authors who make a research on LKM. It can be learned from it that 2 of the 7 well-known writers publish only one article, but the citation frequency reaches over 100. They do not make a continued research on the topic which on the other side reflects the insufficiency of the research strengths in this field.

DISTRIBUTION OF SOURCE JOURNALS ON LKM

There are 1558 articles about library knowledge management. They come from 456 journals, among which 723 articles are published in journals ranking the top 20, accounting for 46.4% of all the literature. There are 265 articles from 9 identified core journals, only accounting for 17% of all the literature (Table 2). With a large number of research articles, there are few high-quality ones which cannot form a core journal periodicals group.

DISTRIBUTION OF RESEARCH INSTITUTIONS OF LKM

Distribution of research institutions in certain field can reflect the collective scientific strength. These 1,558 articles come from 810 institutions, shown in Fig. 2. From that it can be got libraries and departments of library management in colleges and universities, followed by public libraries, pay more attention to the development of library knowledge development. It is also a most cutting-edge application industry which will attract scholars’ concern inevitably.

Research institutions publishing over 11 articles are listed in Table 3. These institutions publish 165 articles in all, accounting for 10.6% of all the literature. Although the number of articles is larger than that of core institutions in other countries, the

Table 2: The quantity and proportion of published articles on library knowledge management from 9 core journals

Core journal	Published articles	Proportion (%)
Journal of information	47	3.02
Researches on library science	41	2.63
Library tribune	32	2.05
Library theory and practice	30	1.93
Library and information service	29	1.86
Information and documentation services	27	1.73
Library	22	1.41
Information science	20	1.28
Library work and study	17	1.09

Table 3: Research institutions on library knowledge management which published 11 articles at least

Author affiliation	Published articles	Proportion (%)
ZhengZhou University	34	2.18
Zhengzhou Institute of Light Industry	21	1.35
WuHan University	19	1.22
XiangTan University	16	1.03
Harbin Normal University	16	1.03
Zhanjiang Normal College	13	0.83
Hunan University of Science and Technology	12	0.77
SiChua University	12	0.77
NingBo University	11	0.71
HeNan University	11	0.71

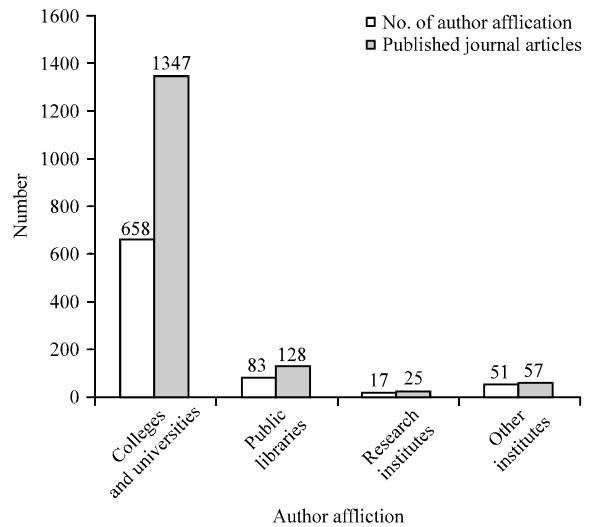


Fig. 2: Published articles of the research institutions on library knowledge management

proportion is lower. It means that further exploration for research institutions is needed to study the LKM.

DISTRIBUTION OF RESEARCH TOPICS AND FOCUS OF LKM

Research topics and focus reflect the basic features and key contents of a particular field which also mirrors the overall trend and law of the research progress.

Table 4: High-frequency keywords on library knowledge management which appear more than 30 times

High-frequency keywords	Occurrence frequency	Proportion(%)
Knowledge management	1352	23.81
Library	760	13.38
University library	244	4.29
Library management	139	2.45
Knowledge service	135	2.38
Tacit knowledge	112	1.97
Knowledge-based economy	102	1.80
Knowledge innovation	98	1.73
Digital library	87	1.53
Library knowledge management	87	1.53
Innovation	74	1.30
Information management	66	1.16

Keywords are the core vocabulary reflecting the theme of one article. Through the analysis of the keyword frequency, it can fully understand research topics and focus. High-frequency keywords which appear more than 50 times are in Table 4.

Table 4 shows that with decades of development, study on LKM makes an exploration on basic theory, technology, applied research and so on. LKM is closely related to knowledge service and innovation, tacit knowledge, knowledge economy as well as knowledge sharing. Academic, medical and public libraries pay the most attention to the applied research of KM, such as implementation strategy, service creativity and innovation management. Research topics and focus are as follows:

Basic theory research: Theoretical research of LKM occupies a significant proportion in the overall research literature, mainly about its definition, connotation, characteristics, functions, constitution and so forth. Articles on basic theory research explore the necessity and feasibility of libraries implementing KM, whose fundamental target is knowledge innovation. To achieve this goal, the innovation of library management system and technology is essential. Sheng (2004) points out the basic problems LKM confronts from the perspectives of basic principles of KM, knowledge organization management, KM systems, services and evaluation. In accordance of the status quo of the research on LKM, Ping (2010) states briefly six future development directions of it.

Application practice research: Theory research should be put into practice to test its theoretical achievements. On the other hand, only the active investigation of practical cases can better promote theoretical research. Wang and Meng (2012) explore the practical application in the establishment of institutional knowledge base, knowledge exchange of employees, management of knowledge assets based on the practice of KM

applications at Shenzhen Library. On the whole, researches on LKM application case take up a minimal proportion in all the literature, lacking in effective cases to imitate. Still there is a long way to go compared with this research in other libraries.

Technology research on LKM: Besides the exploration of theoretical research, certain technical support is also needed to guarantee that theory has a possibility to be put into practice and verified. Therefore, it becomes a significant field on how to fulfill the KM and in what way, knowledge exchange and sharing, knowledge acquisition, learning and self-learning. Sheng and Xu (2006) design Library Knowledge Management System model and structure based on library resources and make a probe into its seven main functions, such as knowledge retrieval, expression, publication and organization, exchange and cooperation and so on.

LKM in colleges and universities: LKM draws the most attention from libraries of colleges and universities. As the forefront of teaching and research, universities and colleges lead the interdisciplinary development directions. It is far more important for the knowledge reserve and conversion of intellectual. Library as knowledge resource center of universities, should focus more on the application and practice of KM. Fei and Tang (2002) introduce the application of KM in other academic libraries and higher education and then put forward that new ideas and management models should be employed to promote sound progress of libraries. He (2007) analyzes the influence of tacit knowledge on core competence of the academic libraries and to improve that, it needs to promote the participation of tacit knowledge's users, encourage the externalization of and place an emphasis on the exchange, integration, innovation of tacit knowledge. The value of it will be improved through hard work.

KM in digital library: KM and intellectual property protection has been one of the heated topics in current LKM. Its research focuses on knowledge innovation, organization and development, as well as knowledge property management. Considered from the aspect of KM, Qiu *et al.* (2001) elaborates backgrounds on the introduction of KM into digital library, places a special emphasis on the main content of digital library and investigates its implementation conditions. It is a necessity for the survival and development of library in the era of knowledge economy to know how to use the KM concept to instruct and optimize the construction and exploitation of digital library.

Knowledge service: Library knowledge service is a high-level information service developed by library with the help of knowledge resources and wisdom. Library is an ideal organization to implement KM, whose goal is the realization of knowledge service (Cui and Wei, 2005). Knowledge from overt and tacit resources can be extracted specifically to satisfy library knowledge service and solve users' problems. Tacit knowledge is non-codified which exists in human brain and contains both individual and collective tacit knowledge. It plays a vital role in the organization of KM (Du, 2004). To improve the integral level of library knowledge service in the era of knowledge economy, it need to fully explore the tacit knowledge implicit in the librarians and users grasp and enhance its transformation ability to promote library knowledge service and innovation.

PROBLEMS AND SUGGESTIONS OF RESEARCH ON LKM

Through the arrangement and analysis of research literature on LKM in China, characteristics and relevant issues about it are as follows:

- Although certain achievements on LKM have been obtained after decades of efforts, still further exploration is needed in the breadth and depth of research
- There is not a stable research team on LKM, lacking in core writers in China. The research literature is mainly published in library information journals, without core writers. Much of the overall research finding has no important influence
- The content of LKM research in China is comprehensive which invests more attention to library in colleges and universities, KM in digital library and knowledge service. However, a large number of theoretical studies are repeated, short of sufficient breadth and depth. What's worse, there are few application practice cases about KM, quite different from other countries' research on the issue which pay larger attention to case studies

In summary, KM in library management is still a frontier field, the future development of which will place an influence on the library knowledge-based transformation and the orientation and sustainable development of libraries in the era of knowledge economy. It must pay attention to the core theory research on LKM and greater importance should be attached to linking theory with practice. Only if more and more library put KM into practice will it be possible to make the theory into reality and future library the true center of knowledge resource, sharing and service.

CONCLUSION

The research and application of LKM in China is still in the exploratory stage. The basic theoretical exploration has made certain achievement, but the practice and application appropriately need to be strengthened. In-depth development and application of LKM need the collaboration of Librarians and scholars.

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REFERENCES

- Chen, Q.H., C.H.Y. Liu and Z.H. Wang, 2003. Knowledge management and practice of university libraries. *J. Inform.*, 2: 10-11.
- Cui, B. and X.J. Wei, 2005. Library services research based on knowledge management. *Library Theory Pract.*, 1: 21-25.
- Du, Y.L., 2004. Tacit knowledge conversion of library knowledge management. *Library Theory Pract.*, 2: 22-23.
- Fei, P. and S.J. Tang, 2002. Knowledge management and academic libraries. *J. Acad. Lib.*, 2: 30-32.
- He, X.H., 2007. Core competitiveness of university library building based on tacit knowledge management. *Library Theor. Pract.*, 1: 101-102.
- Li, J.Q., 2003. Characteristics and implementing tactics of knowledge management in library. *Knowl. Lib. Inform. Sci.*, 1: 11-13.
- Liu, M.S.H., 2000. On library knowledge management. *J. Lib. Sci. China*, 4: 91-92.
- Ping, K., 2006. *Library Knowledge Management Research*. Beijing Library Press, Beijing, China.
- Ping, K., 2010. On developing trends of library knowledge management. *Library Inform. Serv.*, 9: 5-13.
- Qiu, J., Y.H. Sha and H.C. Liu, 2001. On the digital library knowledge management. *Inform. Doc. Work*, 5: 2-7.
- Sheng, X.P., 1999. Library knowledge management in the 21st century. *Library*, 8: 28-31.
- Sheng, X.P., 2004. Basic problems of library knowledge management. *Library Theory Pract.*, 3: 1-4.
- Sheng, X.P. and Y.H. Xu, 2006. Library knowledge management system: Its construction. *Library*, 6: 2-7.
- Shi, X.S., 2006. *Library Knowledge Management*. Zhejiang University Press, China.
- Wang, J.W. and X. Meng, 2012. Electronic resources procurement based on knowledge management: Practice and exploration at Shenzhen Libraries. *Library*, 3: 115-131.