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Changing trends in Knowledge Management research from Library and Information Science perspective

Ashiya Ahmadi
Department of Library and Information Science, Aligarh Muslim University, Aligarh, India.

Mohammad Nazim
Department of Library and Information Science, Aligarh Muslim University, Aligarh, India.

Abstract:

The main objective of this paper is to explore the changing dimension of KM by comparing the nature of research carried out in KM during 1986 to 2016. Bibliometric and citation analyses methods were applied for exploring the trends in KM research in the field of Library and Information Science (LIS). Data for analysing the outcome of published literature on KM is collected from Web of Science's Core Collection database. A total of 8,069 articles were identified and complete bibliographic and citation details of all the articles were imported to Microsoft Excel. Further, 1,696 articles were identified by refining "Information and Library Science" subject category to know the research trends specifically in the field of LIS. Then, 500 highly cited articles from 'Information and Library Science' subject category were selected for analysing the changing and emerging trends of KM in LIS. Authorship, keywords, references, page count, publication outlets and other contents of the selected articles were analysed to explore whether they have any relation with the number of citations. Findings revealed that the most cited articles are from United States and England. We also found a positive relationship between the number of publications, keywords and pages and the number of citations that they have received but there is no such relationship found between the references and the authors on citations. The Journal of Knowledge Management has the largest share in publishing the most cited articles in this field.

Keywords: Knowledge Management, Bibliometric, Research productivity, Content analysis.

Introduction

Knowledge management (KM) is getting prominent attention and is conceived as an important area within the commercial organization as well as in the academic research field. KM as a field of study is not limited to a specific subject as it is multi-disciplinary in nature. KM literature has been growing continuously as it is still considered as a hot issue in many institutions/organizations. KM researches have been published in a large number of journals with authors affiliated from institutions all over the world. To know the trend of research in KM in different subject category, bibliometric techniques were used to investigate the trends of KM research in general as well as in the field of Library and information science. A bibliometric technique is a simple statistical method of bibliography counting to evaluate and quantify the growth of research topics. Bibliometrics is the quantitative study of literature as it is reflected in bibliographies. Its task, broadly speaking, is to provide evolutionary models of science, technology, and scholarship (White and McCain 1989). The word Bibliometrics was first defined by Pritchard (1969) as "the application of mathematical and statistical methods to books and other media." Bibliometric techniques using references made to other documents can be applied to establish statistical models of scholarly communication flow. For example, citations can be used to map relationships between documents, between journals or other channels of scholarly communications. It also can be clustered to identify the flow of topics within and among disciplines (Borgman, 1999, p. 118). Indeed, citation analysis is an important area of library and information science. From the studies of citation analysis, one can teach which scholars from which disciplines cite which articles? Which journals are cited more often? Which disciplines cite the journals of other disciplines? The results of citation analysis are used for many purposes, for example, to determine the impact of specific articles or journals on subsequent research and to document the interdisciplinary applicability of various journals (Desai, 2003; Harter, 1996).

Review of published literature on Knowledge Management (KM) indicates that KM is a multidisciplinary subject and borrowed a range of concepts, theories and techniques from several disciplines, including management science, Library and Information Science (LIS), computer science, cognitive sciences, sociology, knowledge engineering and artificial intelligence. KM started with the formation of electronic system to guide and store the scholarly capital of an organisation, with search and retrieval interfaces for clients. KM has moved well beyond the concept of capture, codification, and interpretation of knowledge. The concept of KM has evolved many models and theories such as knowledge transfer; game-theory; co-ordination and control; technology transfer; Expert-systems; knowledge-oriented view; static systems; dynamic systems; recognition; retrieval. Ample of research has been carried out to know the issues related to knowledge management, its tools and techniques, initiatives and principles in various organization/institutions as well as countries (Akhavan et.al 2016; Dave, Dave and Shishodia, 2012; Gu 2004; Husain and Nazim, 2013; Nonaka and Peltokorpi, 2006; Sedighi and Jalalimanesh 2014; Serenko and Bontis, 2004; Serenko and Bontis 2012; Serenko and Bontis 2013; Serenko and Dumay, 2015; Serenko et.al, 2010; Singh, 2017; Pawlowski and Bick 2012; Qiu and Lv, 2014). But no research, however, have been carried out to know the changing trends of knowledge management in the field of library and information science all over the world. The objective of research is to find out its research productivity, to identify the core journals, to find out the prolific authors, top contributing institutions as well as country, to calculate the citations and most frequently cited articles during the period of 1986-2016. Hence, the research will screen out a bibliometric profile of publications in the field of KM specifically in library and information science.

Objectives

The main objective of the study is to explore the changing dimension of KM by comparing the nature of research carried out in KM during 1986 to 2016. To fulfil this objective, following goals are needed to accomplish:

1. To examine a bibliometric profile of publications in the field of KM.
2. To analyse the changing and emerging trends in KM research, specifically in LIS.
3. To measure the impact of number of keywords, authorship, references and page count on the number of citations.

Methodology

Bibilometrics and citation analyses methods were applied for exploring the trends in KM. Data for analyzing the outcome of published literature on KM is collected from Web of Science's Core Collection database that includes "SCI-EXPANDED", "SSCI", "A&HCI", AND "CPCI-SSH" "BKCI-S" "BKCI-SSH" "ESCI" to include article with acceptable level of quality (Gu, 2004). The Web of Science database allows users to search keywords through Topic Search (TS). Boolean operator was used to retrieve relevant article. The term 'knowledge management' is searched in topic search (TS) option for finding articles which have been published in English during 1986 (since the term 'knowledge management' was first used in 1986 by Carl Wiig) to 2016. Any article that has the word 'knowledge management' in the paper title, abstract, author keywords and *KeyWords Plus* were identified. A total of 8,069 articles were identified and complete bibliographic and citation details of all the articles were imported to Microsoft Excel. Further, 1,696 articles were identified by refining "Information and Library Science" subject category to know the research output specifically in the field of library and information science. Then, 500 highly cited articles from 'Information and Library Science' subject category was selected for analyzing the changing and emerging trends of KM in LIS. Authorship, keywords, references, page count, publication outlets and other contents of the selected articles were analyzed to explore they have any relation with the number of citations. Published research output on KM in different countries was also analyzed using bibliometric parameters.

Results: Bibliometrics analysis

Year-wise and subject-wise distribution of KM research

Figure 1 shows time trend of KM publication. The concept of KM emerged in 1986 when Carl Wiig, first used the term KM, since then a number of researches have been carried out in various disciplines. During 90s the number of publication increases with a very slow rate but there is a sudden significant increase in number of publications during 20s. During the specified period of time, 2016 has been seen as a peak time of KM research overall as well as in the field of LIS as maximum number of publications has been published in 2016. KM research in the field of LIS shows increasing rate of publication. KM as a field of study is not limited to a specific subject. The concept of KM emerged in business sector, but its practices have now been used in the domain of non-profit and public sector organizations, including academic institutions and libraries (Husain & Nazim, 2013). The concept of KM has drawn much attention among management field as it is a leading subject and it maintains its continuity since 1987 as identified by Akhavan *et.al* (2016). 'Information Science Library Science' is found to be the second most subject in whom KM has been done.

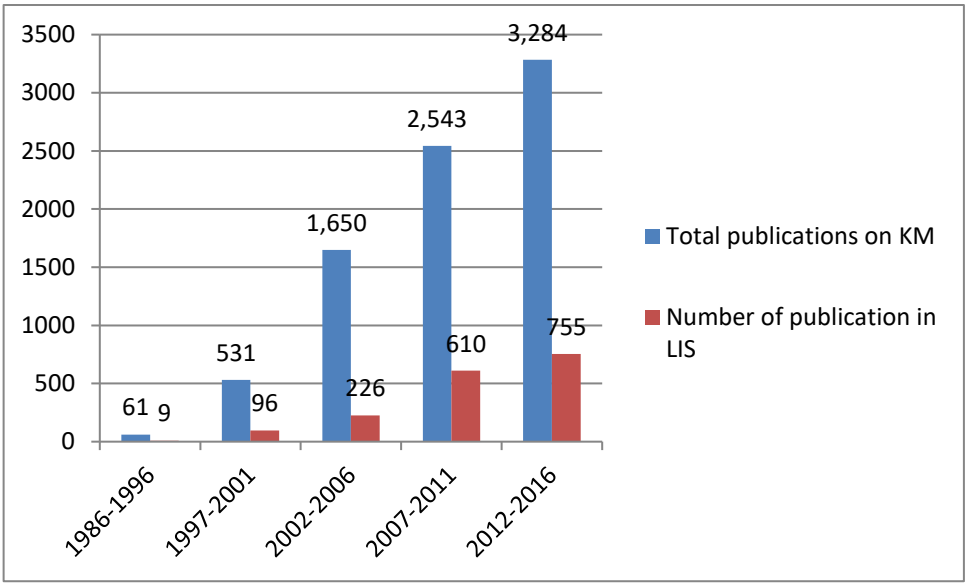


Figure 1 Year-wise distribution of KM publications

Table 1: Distribution of KM literature by Subject categories

Subject categories	No. of publications	Percentage
Management	2,585	32.03
Information Science Library Science	1,696	21.01
Computer Science Information Systems	1,381	17.11
Computer Science Artificial Intelligence	1,097	13.59
Business	877	10.86
Operations Research Management Science	809	10.02
Computer Science Interdisciplinary Applications	612	7.58
Computer Science Theory Methods	512	6.34
Engineering Industrial	447	5.53
Computer Science Software Engineering	410	5.08

Core Journals

It may be seen from the table 2 that researchers in the field of KM publish their research articles in subject based journals and publish the articles especially in the field of KM without going through the IF of the journal. The table lists leading journals in the field of KM in Library and Information science. Similar to the finding of Akhavan *et.al* (2016), Qiu and Lv, (2014) ‘‘Journal of Knowledge Management’’ is found to be the key journal for KM studies. With its exclusive focus on KM topics and the eminent review process that has led to

publishing high quality research, Journal of Knowledge Management has become the primary KM journal supporting KM to become an independent research domain. Having IF 7.268, MIS Quarterly is at 10th position. It can be concluded that researchers prefer to publish their articles in subject specified journal rather than high IF journals.

Table 2: Core journals reporting KM research in LIS

Journals	No. of publications	Impact factor (2016)
Journal of Knowledge Management	364	2.053
Knowledge Management Research Practice	228	1.013
International Journal of Information Management	87	3.872
Information Management	63	
Journal of Information Science	59	1.372
Journal of The American Society For Information Science And Technology	58	2.230
Journal of Information Knowledge Management	43	NA
Aslib Proceedings*	41	1.514
Journal of Management Information Systems	41	2.356
MIS Quarterly	33	7.268

**currently known as Aslib Journal of Information Management*

Leading countries in terms of number of KM publications

Qiu and Lv (2014) in their study found that USA contributed maximum publications on knowledge management during 1993-2012. It must be appreciated that USA is maintaining its consistency as a leading country in terms of the number of publications in the field of KM as may be seen in table 3. Among the top contributed countries, developing country like Taiwan has contributed more publications than the developed countries, Italy, Singapore and Germany. Besides this, among the Asian countries, Singapore and India are the top contributed countries in terms of research output in the field of KM in LIS.

Table 3: KM publications and most cited studies published in various countries

Countries	Total publications	Country	No. of publications in LIS	Percentage (ratio for each country)
USA	1,916	USA	458	23.90
England	892	England	191	21.41
Taiwan	581	Canada	110	26.44
Peoples R. China	549	Peoples R China	108	19.67
Spain	492	Australia	95	22.35
Germany	459	Taiwan	91	15.66
Australia	425	Spain	69	14.02
Canada	416	Italy	61	18.10
Italy	337	Singapore	58	17.05
France	298	Germany	52	11.32
Netherlands	235	India	52	11.06

Number of citations to 500 highly cited articles and their country of origin

Table 4 shows number of citations that the most prolific countries have received in KM research. USA is again leading in terms of number of citation as well as in terms of average citations per year. It can be depicted from the table no. 4 that greater the number of publications, higher will be the number of citations of the country.

Table 4: Total number of citations based on the country of origin

Countries	Number of citations	Average citations per year
USA	15017	517.83
England	3403	121.54
Canada	2433	101.38
Peoples R China	2748	137.40
Australia	1229	68.28
Taiwan	2133	112.26
Spain	1259	74.06
Italy	748	39.37
Singapore	2164	127.29
Germany	704	54.15
India	351	25.07

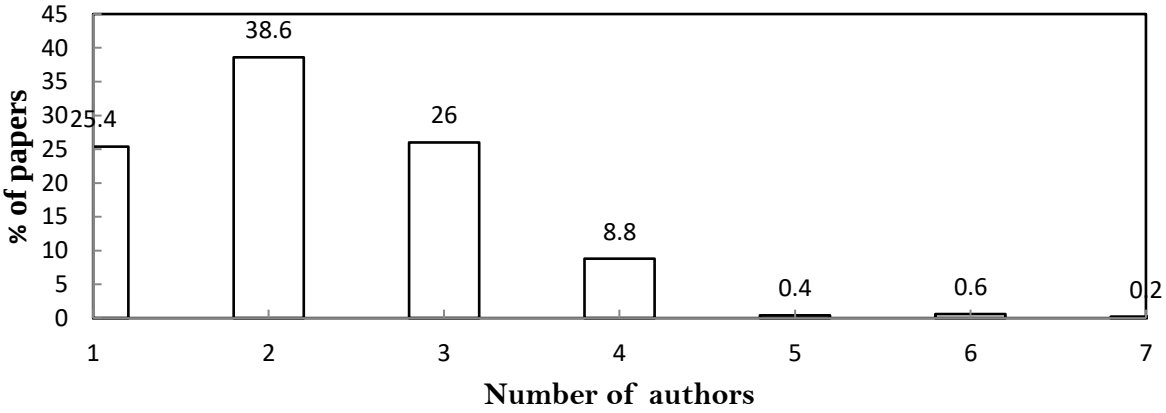
Authorship pattern

Table 5 shows the authorship pattern of the papers published during the period of study, it is revealed that maximum numbers of articles were found to be written by two authors, it means that authors are very much inclined towards collaborative authorship as the analysis of Serenko et al. (2010) and Akhavan et.al (2016) already proved it. The rise in collaboration is partly due to advances in information-sharing technology (Park, 2017).

Table 5: Authorship pattern

Number of authors	No. of article	Percentage of papers
1	127	25.4
2	193	38.6
3	130	26.0
4	44	8.8
5	2	0.4
6	3	0.6
7	1	0.2

Figure 2: Distribution of KM publications based on number of authors



Results: Citation analysis

Keywords and number of citations

A total of 2221 keywords are in the sample of 500 highly cited articles. These 500 articles were cited 28567 times with an average 57.01 citations per article. A total of 1241 unique keywords were found in 500 highly cited articles. The most commonly used keywords are listed in table 6. The term 'Knowledge Management' is found to be the most frequently used keyword in 500 highly cited articles. Out of 500 highly cited articles, 68 articles did not give keywords but they received 2826 citations with an average of 41.55 citations per article.

Table 6 Frequency of the major keywords among 500 most cited publication

Keywords	Number of times occurred	Total number of citations
knowledge management	276	17,422
knowledge sharing	59	2525
Innovation	27	1071
knowledge management systems	23	266
knowledge transfer	23	889
knowledge creation	17	700
organizational culture	17	990
social capital	15	3012
intellectual capital	14	558
knowledge	14	1616

To examine whether there is any significant relation between number of keywords and number of citations, first, we grouped 432 articles (articles in which keywords were found) based on the number of keywords. Then we employed ANOVA test to compare the mean values of citation index across different groups. The minimum, maximum, mean value and standard deviation of keywords (for the 500 most cited publications) are 0, 13, 4.44, and 2.514, respectively. Our ANOVA test resulted in the F-value 157.90 (p value 0.00). Therefore, there is a significance difference between mean values of the number of citations across different groups.

In addition, we calculated Pearson correlation between the number of keywords and citations. The correlation is 0.069 (p value 0.123) which shows there is a significant relationship between keywords and citations. Taken together, our analysis indicates that there is a strong relationship between the number of keywords and number of citations that studies in our sample have received. It can be concluded that studies with more keywords are likely to cover a wider variety of topics which expands their audience and increases their likelihood of being cited by more studies (Akhavan et.al, 2016).

Number of authors and number of citations

There are 1114 unique authors associated with these 500 highly cited articles. The average number of authors per paper in our sample is 2.23. To examine whether there is a relationship between numbers of author(s) on the number of citations, we grouped the articles based on the authorship pattern. The minimum, maximum, mean value, and standard deviation of authors (for the 500 most cited publications) are, 1, 7, 2.23 and 0.999 respectively. Figure 2 demonstrates distribution of publications based on the number of co-authors. With regard to the impact of number of authors collaborating in a study, it is important to examine whether there is a significant relationship between the number of authors and the number of citations that a study has received. We conducted an ANOVA test to answer this question. Doing so, we split the sample into two groups: single-authored and multi-authored articles to compare the mean value of citation index between two groups. According to the results, the F-value is 0.39 (p value 0.533) which indicates there is no significant relationship between the mean values of the citation index of single and multi-authored papers. Thus, it may be concluded that papers with two or more authors are not necessary to be cited more times than papers that are written in single authorship.

Table 7 Distribution of KM publication based on author(s)

Authorship	Number of articles	Number of citations	Average citations
Single author	127	6687	52.65
Two authors	193	13227	68.53
Three authors	130	6668	51.29
Four authors	44	1812	41.18
Five authors	2	82	42.00
Six authors	3	64	21.33
Seven authors	1	27	27.00

Number of references and number of citations

Since a high number of references in a publication indicate that the study has been more rigorously conducted and grounded on the available literature (So et al. 2015). In this section, we aim to verify the reliability of this argument for KM studies. The minimum, maximum, mean value, and standard deviation of the number of references in our sample are 3, 339, 57.99, and 32.397 respectively. We calculated Pearson correlation which resulted in the value of 0.074 (p value 0.097). It shows that there is no significant correlation between the impacts of the number of references on the number of citations that a publication is likely to receive.

Number of pages and number of citations

In this section, we investigate whether there is a significant relationship between the length of the publications in our sample and the number of citations that they have received. The minimum, maximum, mean value, and standard deviation of number of pages are 4, 55, 16.42, and 6.784, respectively. Similar to the previous section, we calculated the Pearson correlation. The Pearson correlation is 0.217 (p value 0.00) which again implies a significant and positive impact for the number of pages in a publication on the number of citations that a study is likely to receive. The greater length can reflect scientific complexity and rigorous methodological quality of a publication (Falagas *et al.*, 2013). Additionally, longer articles provide more information that can be cited and referred to by other studies (Akhavan et.al, 2016).

Conclusion

The purpose of our study was to conduct bibliometric analysis for exploring the trends in KM as a whole as well as in the field of library and information science to know the contribution of different countries, variations across publication years, and identifying active research areas and core journals reporting KM research in the field of LIS. During the specified period of time, 2016 has been seen as a peak time of KM research overall as well as in the field of LIS as maximum number of publications has been published in 2016. Journal of Knowledge Management'' is found as core journal for KM studies. It must be appreciated that USA is maintaining its consistency as a leading country in terms of the number of publication in the field of KM. The authorship pattern of the papers published during the period of study revealed that maximum numbers of articles were found to be written by two authors, it means that authors are very much inclined towards collaborative authorship.

We also conducted citation analyses on a sample of 500 highly cited articles to examine the impact of factors such as number of authors, references, pages, and keywords on the number of citations that they received. Results of our analyses revealed that number of citations that KM studies in our sample have received has a positive and significant relationship with number of keywords. This implies the importance of the number of keywords in retrieval of an article. It also acknowledges the fact that studies with more keyword are more likely to cover a wider variety of topics that interest more researchers. Further, we found positive and statistically significant correlation between the number of citations and number of pages of the articles in our sample. We did not find any significant relationship between references with their number of citations. Hence, we can say that there is no impact of citation on references. Further, study found that there is no such relationship between authorship pattern and the number of citations it received.

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Dr. Mohammad Nazim is an Assistant Professor at the Department of Library and Information Science, Aligarh Muslim University. He has 11 years of professional and teaching experience in the library profession. He holds a Ph.D. in Library and Information Science from Banaras Hindu University and a Master's degree in Library and Information Science from Aligarh Muslim University. Prior to joining the Aligarh Muslim, he spent 10 years at Banaras Hindu University as Assistant Librarian. He has 35 publications to his credit besides many articles in Emerald and Elsevier Science journals and a book on knowledge management from Chandos Publishing. He is currently the Managing Editor for Journal of Indian Library Association (JILA) and a member of the editorial board of the Journal of Information. He is also a reviewer for Chandos Publishing (an imprint of Elsevier Science) and BMC Research Notes (an open access journal from BioMed Central). His research interests include open access to scholarly communication, knowledge management, Bibliometrics/Scientometrics and information storage and retrieval.

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