Citation Analysis of Academic Publications to Identify Subscribed Journals Usage: A Case Study

Jessy A.* Mahabaleshwara Rao** and Shivananda Bhat K.***

Department of Library and Information Science, Manipal University, Manipal - 576 104
*E-mail: *jessysav28@gmail.com*

Department of Library and Information Science and Health Sciences Library, Kasturba Medical College,
Manipal University, Manipal - 576 104
*E-mail: **baikadi@yahoo.com, ***shiva.bhat@manipal.edu*

ABSTRACT

The multiplicity of journals, financial constraints and the ever increasing needs of the user community necessitated the libraries to develop need based information resources. Journals are key to scholarly communication and study of the utilisation of subscribed electronic journals (e-journals) is important for libraries. A case study of usage of the subscribed e-journals in the KMC Health Sciences Library of Manipal University (MU), Manipal was conducted through citation analysis from the year 2010 to 2014. The study was performed with the objectives to determine-citations of subscribed e-journals made in academic publications of five health sciences institutions of MU, Manipal; annual growth rate of the publications and the citations; and frequently cited journals and those selected for publishing their documents. The Scopus citation database was used to retrieve all documents published from the five health science institutions using affiliation search, and from their reference list, the number of citations to the subscribed e-journals of the library were manually recorded. The study identified subscribed e-journals that were cited in published documents, cited frequently, and were selected for publishing the documents. The outcome showed that citation analysis is a practical and reliable method to provide usage information of the subscribed e-journals of the library.

Keywords: Academic publications, citation analysis, subscribed journals, scopus citation database, health science professionals, KMC Health Sciences Library

1. INTRODUCTION

Library collections have changed significantly over the past three decades due to the advent of information and communication technology. One of the consequences of these changes is the subscription of resources on different forms of electronic version like e-journals, e-books and online databases. Today e-journals have become the major resource for academic and scholarly communication. Effective measurement of the usage of subscribed journals helps to make appropriate decisions about the journals that need to be retained for subscription and the ones that may be discontinued from subscription. Traditionally, usage of print journals in the library was measured using re-shelving data of journals. In such cases, each time a journal was used and left on the reading table in the library was counted as a single time use of that title. Later, citation analysis, i.e., the study of journals cited in the references of publications, was formulated by information scientists to track how often people cite or actually use the work of others. Citation analysis of references at the end of the documents published in journals is one of the few major indicators for the extent of usage of journals. Ranking of journals using citation analysis is a key aspect of knowledge management and collection development in academic and research libraries[1].

1.1 KMC Health Sciences Library, Manipal University, Manipal

KMC Health Sciences Library was established in 1953 along with the Kasturba Medical College (KMC), Manipal University at Manipal. The library has a rich collection of print as well as Electronic Information Resources (EIR) comprising off print books, theses, current print journals, back volumes of journals, CDs & DVDs, online journals, e-books, online databases (full text/bibliographical) and EBM resources of various publishers and aggregators. Health Sciences Library of Manipal University at Manipal had started its EIR subscription from 2004 with the subscription to 'ProQuest Medical Library' database.

Currently KMC Health Sciences Library caters to the needs of Medical, Dental, Pharmacy, Nursing, Allied Health Sciences and Life Science institutions. The library is presently (year 2015) subscribing following EIR[2].

• Online databases: CINAHL Plus with Full Text, Science Direct (Health Sciences Collection), ProQuest Health & Medical Complete, UpToDate–Clinical Information Resource, Scopus, Web of Science, Journal Citation Reports (JCR), SciFinder and J-Gate Plus.

• Online journals subscribed from different publishers: Elsevier Science (107 journals), Wiley (83 journals), Lippincott Williams & Wilkins (65 journals), BMJ Publishing Group (31 journals),Springer (355 journals), Sage (23 journals),Taylor & Francis (23 journals), Oxford University Press (22 journals), Nature Publishing Group (10 journals), American Medical Association (10 journals), Karger(6 journals), Thieme Publications (6 journals), Quintessence Publishing (4 journals),Other Publishers (152 journals).

• e-Books: McGraw Hill/Access Medicine, Lippincott/ OvidSp, Springer/Springer Link.

2. LITERATURE REVIEW

According to Lancaster[3] evaluation of periodicals are examined to determine the utilisation of subscribed journals through the collection of citation data, by actual usage data, rating of already collected usage data, by user's opinion, by impact factor of journals, cost-effective journals (with lowest cost per use) and by the number of articles contributed to a particular subject area. This underscores the importance of citation analysis and actual usage data for the evaluation of library collection.

Romic & Mitrovic,[4] in their study acclaimed that citation checking is a time-consuming and in-depth approach for determining the usefulness of libraries' collection to support education and research activities. Citation checking of scholarly documents and comparison of those citations against the subscribed materials in a library collection offers an unnoticeable method of evaluation of the collection and usage of subscribed resources.

Duy[5] exposed that citation data of the journals could be considered as the mirror to the usage of the journals by the researchers, who formally acknowledge the work of others. Studies have also been conducted on whether citation data correlate with electronic journal usage data, with outcomes demonstrating significant positive correlation between local citation data and electronic journal usage data. Tsay[6] investigated the relationship between library journal usage and journal citation usage in the medical sciences. The study revealed that "the most-used and most-cited journals are in some way the journals that are most important to the medical sciences".

Pan[7] pointed out that journal citation can be used as predictor of journal usage in libraries and can be used as a valid guide for the selection of library materials. According to McDonald[8], citation analysis is the standard methodology for studying journal usage in information science. Margaret[9] opines that citation analysis is an unobtrusive method for journal collection evaluation. Based on the above arguments, authors made use of citation analysis in the publications of five health sciences institutions of MU, Manipal to identify the utilisation of subscribed journals in the KMC Health Sciences Library.

3. OBJECTIVES

A study on the usage of journals is important to achieve better utilisation of budget for the effective collection development, due to the vast collection of journals from different publishers and high cost of subscription.No study has been conducted for the comprehensive rating of usage of electronic journals subscribed by the Health Sciences Library of Manipal University at Manipal so far.

Currently KMC Health Sciences Library is subscribingjournals from more than 35 publishers and it becomes imperative to assess their usage in order to make decisions regarding renewal or subscription and to replace the underutilised journals with journals of users' need. Journal citation analysis helps the library in collection development and in deciding which journals to renewfor subscription and which ones to cancel from subscription. The current study was conducted for the citation analysis of publicationsof the health science professionals to identify the usage of subscribed journals at the KMC Health Sciences Library, Manipal University, Manipal as a case study.

The study has the following objectives:

(i) Analysis of citations of subscribed journals made by the health sciences professionals in their academic publications using Scopus citation database from 2010 to 2014;

(ii) Determination of annual growth rate of academic publications and citations;

(iii) Identification of subscribed journals that were cited frequently;

(iv) Identification of subscribed journals that were selected for publication during the period 2010-2014.

4. METHODOLOGY

All the titles of journals subscribed by the KMC Health Sciences Library were retrieved from the library management software and library website. All types of documents-articles, reviews, conference papers, notes, letters and short surveys-published by the five health sciences institutions, viz., Kasturba Medical College (KMC), Manipal College of Dental Sciences (MCODS), Manipal College of Nursing (MCON), Manipal College of Pharmaceutical Sciences (MCOPS) and School of Allied Health Sciences (SOAHS) were retrieved year-wise, using affiliation search of the Scopus citation database. References appended to the academic publications of the five health sciences institutions were screened

manually to record the number of citations obtained by the subscribed e-journals of KMC Health Sciences Library. All the journals subscribed (year-wise) by the library was arranged alphabetically in the excel sheet for recording the journal usage and comparing the library's subscribed journals against the journals cited in those publications was performed. The study, besides, retrieved the data of the subscribed journals that were selected for publishing documents by the health sciences professionals from the year 2010 to 2014. The data was analysed using Excel software and is presented in tables and graphs.

Keywords that are used to retrieve academic publications of five health sciences institutions using Scopus citation database are as follows:

(a) Kasturba Medical College, Manipal

(b) Manipal College of Dental Sciences, Manipal

(c) Manipal College of Nursing, Manipal

(d) Manipal College of Pharmaceutical Sciences, Manipal

(e) Allied Health Sciences, Manipal

The study is limited to subscribed e-journals of the KMC Health Sciences Library, Manipal University, Manipal, and only those publishers from whom the library subscribed more than 3 journals were selected.

5. DATA ANALYSIS

The Scopus citation database was used to collect the data regarding academic publications and citations of references of documents published by the health sciences professionals of MU, Manipalfor five years from 2010 to 2014.

5.1 Subscription and Details of Citations of Journal

The number of journals subscribed and total number of citations obtained by the subscribed e-journals (publisher-wise) from 2010-2014 is presented in Fig.1. The raw data analysis indicates that the subscription of journals from BMJ Publishing Group increased noticeably from 2013. Though the number of journals subscribed from Nature

Publishing Group was lesser during the study period (2010-2014), the citations of these journals compared to the journals of a few other publishers (Sage, Taylor & Francis) were higher as shown in Fig. 1. Most of the cited literature is from the Elsevier Science Publisher.

5.2 Academic Publications and Citations of Health Sciences Institutions

Table 1 presents the academic publications from the five health sciences institutions during 2010-2014 and the corresponding number of citations made from the subscribed journals in the KMC Health Sciences Library. The names of five health sciences institutions from whom the academic publications were gathered is shown in column one. The number of publications (583) and number of citations (2774) were the highest in 2011. KMC, Manipal showed the highest number of publications (1766) among the groups followed by MCOPS (453) for the study period. The total publications of the five institutions for the 5 year period were2640 and the corresponding number of citations, 11041. The number of citations from the subscribed journals showed a positive correlation with the increasing number of publications. The data also show variations in the growth rate of publications and corresponding number of citations. The highest annual growth rate was observed 2011 for both publications and number of citations. Details of publications and citations are given in Table 1.

5.3 Citation Frequency

The subscribed journals citation data was analysed to identify frequency of citations of journals and the more frequently cited (consistently cited) journals. Journals with 25 times or more citations (minimum average frequency of 5 citations per year) for the entire study period (2010-2014) were identified by analyzing the citation data. 145 journals that were cited 25 or more times for the entire period of five years (2010-2014) received a total of 9495 citations.

The citation data was analyzed further, to identify the subscribed journals that were consistently (more

Table 1. Institutions with number of publications and citations during the period 2010-2014

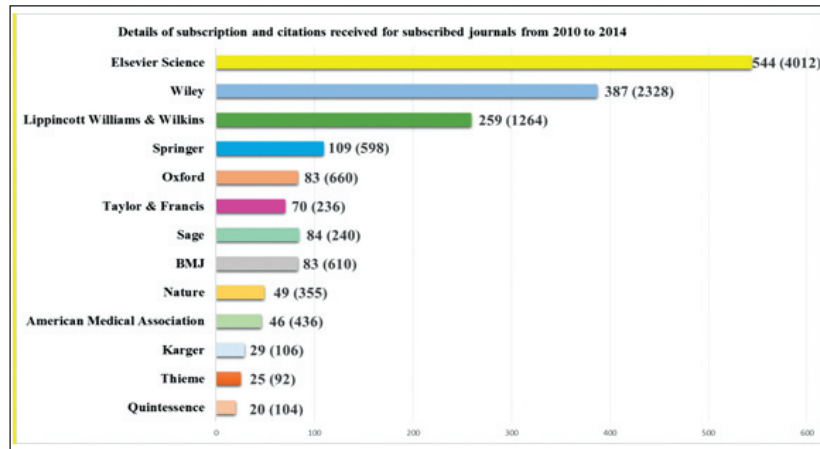| Institutions	Year					Total 2010-2014	
	2010	**2011**	**2012**	**2013**	**2014**	**Total 2010-2014**	
	Publications (Citations)	**Publications (Citations)**	**Publications (Citations)**	**Publications (Citations)**	**Publications (Citations)**	**Publications (%)**	**Citations (%)**
Kasturba Medical College	319 (1239)	359 (1511)	322 (1502)	370 (1388)	396 (1218)	1766 (66.89)	6858 (62.11)
Manipal College of Dental Sciences	31 (223)	78 (583)	52 (329)	66 (381)	65 (436)	292 (11.06)	1952 (17.68)
Manipal College of Nursing	1 (3)	8 (4)	2 (1)	4 (5)	4 (15)	19 (0.72)	28 (0.25)
Manipal College of Pharmaceutical Sciences	76 (292)	110 (558)	72 (259)	108 (406)	87 (194)	453 (17.16)	1709 (15.48)
School of Allied Health Sciences	11 (46)	28 (118)	18 (53)	27 (135)	26 (142)	110 (4.17)	494 (4.47)
Total	**438 (1803)**	**583 (2774)**	**466 (2144)**	**575 (2315)**	**578 (2005)**	**2640**	**11041**

Figure 1. Subscription and citations received for subscribed journals during 2010-2014.

frequently) cited 10 times or more per-year from 2010 to 2014. Figure 2 presents the journals that were cited 10 times or more per-year from 2010 to 2014. Nineteen subscribed journals were identified in this category with 10 times or more citations and with a total number of 3132 citations from 2010 to 2014. *Journal of Endodontics* was cited most (328) times.
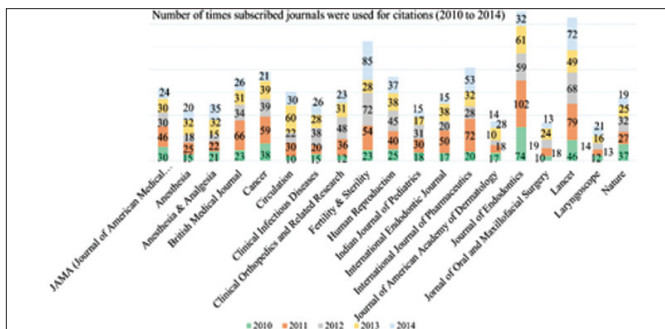

Figure 2. Journals that received citations of 10 times/year during 2010-2014.

5.4 Subscribed Journals Selected for Publishing Documents

Figure 3 shows the names of publishers, the number of subscribed journals that were selected for publishing documents and the number of times they were used for publishing documents-by the health sciences professionals. Two journals from BMJ Publishing Group (BMJ Case
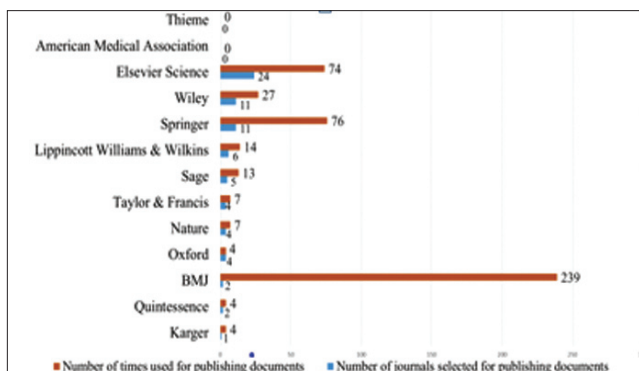

Figure 3. Journals selected for publications by the health science professionals (0=Not used).

Reports and *Journal of Medical Genetics*) were used the most number of times (239) for publication; however, the BMJ Case Report alone was used 238 times. Twenty four Elsevier Science journals were used 74 times for publishing documents and the *Journal Forensic and Legal Medicine* was alone used 25 times for publications. From the Springer journals, 11 journals were used 76 times for publishing documents and a journal, *Indian Journal of Surgery* was used 21 times for publication.

6. FINDINGS

Citation analysis is an unobtrusive method of evaluation of usage of subscribed journals of the library. The following are the major findings:

- KMC, Manipal showed the highest number of citations (6,858 citations) from the subscribed journals among the groups followed by MCODS (1,952 citations) for the study period 2010-2014.

- Annual publications and citations were highest in 2011 (33.11 % and 53.855) respectively and least in 2012 (20.07 % and 22.71 %).

- 145 journals that were cited 25 times or more for the entire period (2010-2014) secured 85.99 % of total journals citations (11041 citations).

- The 19 journals that were cited ten or more times per-year received 3132 citations (28.37 %) of the total citations (11041 times) received for all journals during 2010-2014.

- Among the 19 journals, '*Journal of Endodontics*' ranked first for being cited the most number of times (328 times) followed by '*Lancet*' (314 times) and the *Journal Fertility and Sterility* (262 times).

- The journal, *BMJ Case Reports* which the library is subscribing since 2013 was used maximum, 238 times (50.75%) for publications by the health science professionals. At the same time 11 journals of Springer were cited 16.20 % (76 times) from 2010 to 2014.

- Journals from two publisher groups (Thieme and American Medical Association) were not selected for

publishing their documents during 2010 to 2014.

The study found that the professionals of five health sciences institutions citedmajority of the subscribed journals of the KMC Health Sciences library in all types of publications; however, fewer journals were selected for publishing documents. The reason for variations in the number of citations may be due to increase or decrease in the annual publications.

7. CONCLUSIONS

Scientometrics techniques are used for various purposes in the determination of different scientific indicators such as the study of usage of journals, selection of journals for libraries and evaluation of scientific output. Citation checking is a time-consuming and in-depth method for determining the usefulness of libraries' collection to support education and research activities. The data of subscribed journals that were cited in reference list of academic publicationswere analysed in this study. Citation analysis of journals helps not only to find journals that are being used but also to identify relevant and top ranking journals in particular subject areas. The study identifies that with the increasing number of publications, the number of citations also increased, there by throwing light on the usage of subscribed journals. The study also revealed the journals frequently cited by the health science professionalsfrom among the journals subscribed by the KMC Health Sciences library as well as the journals that were selected for publishing documents by those professionals during 2010-2014.

REFERENCES

1. Haldua, H.; Arya, C. & Kaushik, A. Citation analysis of dissertations in molecular biology and biotechnology: A case study of G.B. Pant University of Agriculture and Technology. India. *Chinese Lib.: An Inter. Elect. J.*, 2012, **33**, 1-11. http:// www.iclc. us/cliej/ cl33HAK. pdf (accessed on 12 November 2015).

2. Lancaster, F.W. If you want to evaluate your library. The Library Association, London, 1988. ISBN 0-85365-928-1.

3. Romić, K. & Mitrović, G. Using citation checking of Ph D dissertation references as a tool for evaluating library collections of the national and university library in Zagreb. *LIDA Proceedings,* 2014, **134**. http:// ozk. unizd. hr/ proceedings/ index.php/ lida/ article/view/134 (accessed on 9 November 2015).

4. Duy, J. Library journal use. *In* 10th International Conference of the International Society for Scientometrics and Informetrics, Stockholm (Sweden), 24-28 July 2007. https:// library. concordia.ca/ services/ users/ faculty/ bibliofile/spring2007/ bibliofilespring 2007-05.pdf) (accessed on 27 October 2015).

5. Tsay, M. The relationship between journal use in a medical library and citation use. *Bull. Med. Lib. Assoc.*, 1998, **86**(1), 31–9.

6. Pan, E. Journal citation as a predictor of journal usage in libraries. *Collection Management*, 1978, **2**(1), 29-38 (accessed on 5 December 2015).

7. McDonald, J.D. Understanding journal usage: A statistical analysis of citation and use. *J. of the Amer. Soc. for Inf. Sci. and Tech.*, 2007, **58**(13), 39-50. (accessed on 27 October 2015).

8. Margaret, J.S. Citation analysis as an unobtrusive method for journal collection evaluation using psychology student research bibliographies. *Collection Building*, 1998, **17**(1), 20-8. (accessed on 5 December 2015).

9. Miller, L.N. Local citation analysis of graduate biology theses: Collection development implications. *Issues in Sci. and Tech. Lib.*, 2011. http://www.istl. org/11-winter/refereed3.html (accessed on 27 October 2015).

10. MU portal. http://muportal.mahe.manipal.net/lib/ index.asp.

Contributors

Ms Jessy A. is a Research Scholar at Department of Library and Information Science, Manipal University, Manipal. She obtained BA from Calicut University, Calicut and BLIS and MLIS from Manipal University, Manipal. She has presented 8 papers in national/ international conferences and has 4 research publications in her credit.

Dr Mahabaleshwara Rao is Associate Professor and Senior Librarian, Dept. of Library & Information Science and Health Sciences Library, Manipal University, Manipal, Karnataka has successfully completed his Ph.D. degree from Mangalore University, Mangalore in the year 2011 with specialization on user study. He had graduated from Crossland College, Brahmavara and took MA from Karnatak University, Dharwad. He has done BLISc and MLISc from Annamalai University. He has attended many conferences, seminars, workshops and presented 28 papers in national and international seminars/ conferences. He has 15 papers to his credit published in National and International Journals. His areas of interest include: Health sciences librarianship, web resource and information literacy.

Dr Shivananda Bhat K. has obtained his MLISc from Mangalore University and PhD from University of Mysore. Presently he is working as Senior Librarian in the Health Sciences Library of Manipal University, Manipal and as Co-Ordinator & Associate Professor in the Department of Library and Information Science, Manipal University, Manipal. He has published 11 papers in national and international Journals and has attended many conferences, seminars, workshops and presented 18 papers in national and international seminars/conferences. His current areas of interest include: Information literacy, innovative methods in search strategies, and scientometrics.