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Flawed Citations in Indian Scientometric Literature: A Case Study

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FLAWED CITATIONS IN INDIAN SCIENTOMETRIC LITERATURE: A CASE STUDY

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Abstract

This study explores the citation errors and level of reference accuracy in the Indian scientometric journal entitled, *Journal of Scientometric Research (JSR)*. One hundred and seventy four journal citations appended in eight research articles appeared in the *JSR*, volume 9, issue 1, Jan-Apr, 2020, were checked meticulously by breaking them into seven bibliographic components, i.e. author(s) name, article title, journal name, year, volume and issue numbers, and pages (both first and last page); and they were matched with the original source articles. Results reveal that 44.25% (77) citations in *JSR* were erroneous and remaining 55.75% (97) citations were error free. In 77 faulty citations, a sum of 116 errors was observed, out of which 59 were minor and 57 were major. A rigorous reference management system or procedure is essentially needed to enrich the reference accuracy as well as upgrade the standard of the research articles published in the *JSR*.

Keywords- Reference accuracy; Citation errors; Reference lists; Scholarly communication; Journal of Scientometric Research; Peer review.

INTRODUCTION

Accuracy of references is essential to the proper development of scholarly communication in every subject field. Library and Information Science (LIS) as a subject field, its various sub-fields, and services of library and information centres, for example- citation analysis and bibliometrics studies, document delivery services (DDS), interlibrary loan (ILL), evaluation of a researcher's work, citation database management, retrieval of information sources, etc. may be badly influenced by referencing errors (De Lacey, Record, & Wade, 1985; Garfield, 1969b; Gupta, 2017b; Gupta, 2020; Pandit, 1993). Accurate referencing makes trouble-free all of these works and services. Errors in references squarely affect the findings of citation analysis and bibliometric research studies. Proper care and attention of authors, editors, and peer-reviewers are required while writing, editing and reviewing any scholarly writings for publication, respectively. Reference errors committed by the scholars in their scholarly writings may be either indicated or rectified by the peer-reviewers and/or editors. The large number of major errors in a reference isolates that cited information sources from the users (De Lacey, Record, & Wade, 1985). The main task of references is to couple the structure of present research to the earlier researches. References enable the users to verify, authenticate or reject the researcher's statements and opinions. References are the most intellectual way of acknowledging credit in science and make an indispensable part of the modern scholarly communication (Cronin, 1984). Not only doctoral theses and dissertations but also many peer-reviewed scholarly journals, which are included in world's leading citation databases, i.e. Elsevier's Scopus and Clarivate Analytics' Web of Science, and have high impact factor contain inaccurate references (Cappell, 2016; Davies, 2012; Gupta, 2019a; Gupta, 2020; Lee & Lin, 2013; Sassen, 1992).

Citation errors usually blight the standard of a manuscript as well as culture of scholarly communication (Santini, 2018). Conscientious citing of documents and compiling error free references or bibliography according to a prescribed referencing style remove the problems of researcher's scientific performance, charges of plagiarism, and academic honesty (Gupta & Babel, 2017; Santini, 2018). Meticulous citing in a scholarly writing is the hallmark of an honest scholar. Careful citing consists of accurate detailing of bibliographic components, i.e. authors' name, article title, journal title, volume and issue number, year, first and last page numbers, and last but not the least punctuation marks.

Quality of journals has been determined on the basis of coverage by indexing services (Gupta, Kumar, & Kabra, 2017). No Indian LIS journal was included in Web of Science citation database till 2011 (Mahesh & Wadhwa, 2012). But in 2020, there are four Indian origin LIS journals listed in Web of Science's ESCI, namely- *Annals of Library and Information Studies* (1954), *COLLNET Journal of Scientometrics and Information Management* (2007), *DESIDOC Journal of Library and Information Technology* (1981), and *Journal of Scientometric Research* (2012) (in alphabetical order and starting year of the journal mentioned in brackets). Among these all, Journal of Scientometric Research (JSR) is the youngest one which receives and publishes manuscripts from various countries. The JSR, started as a triannual (3 issues a year) international journal, is an official publication of Phcog.Net and double blind peer reviewed open access e-journal, which is being included in various world's leading indexing and abstracting databases, such as- Clarivate Analytics' Web of Science (ESCI), Elsevier's Scopus, Google Scholar, ProQuest, OpenJGate, and much more. It devoted to empirical and theoretical scholarly articles and research field of scientometrics, techometrics (patent studies), webometrics (web-based studies) etc. The *JSR* follows the *Vancouver citation style* for in-line citations and references (www.jscires.org).

Due to inaccurate references, function of indexing and abstracting of scholarly articles as well as authors in citation databases becomes disturbing and inconvenient. The highest degree of reference accuracy enriches the scholarly work in terms of usefulness and reliability. A fabulous reference list explicitly underlines the scholar's knowledge of subject in addition to his/her egregious attention towards reference style guides.

REVIEW OF RELATED LITERATURE

Not only Scopus and Web of Science indexed Indian journals but also International journals on Library and Information Science are not immune from citation errors (Boyce & Banning, 1979; Davies, 2012; Gupta, 2017a; Gupta, 2018; Gupta, 2019b; Pandit, 1993; Pope, 1992). Even biomedical bibliographic databases contain inaccurate citations (Cappell, 2016). Garfield (1969a) claimed that "shoddy citations cost everyone time, money, and energy" and blamed the journal publishers for this enormous wastages. He further succinctly commented that in information centres and libraries the costly time of library professionals is consumed in rectifying incomplete and faulty citations.

Assessing the 1280 references chosen from 40 academic journals in four subject domains, Sassen (1992) wrote his doctoral dissertation on the topic of "Citation accuracy in the journal literature of four disciplines: Chemistry, psychology, library science, and English and American literature." She found a relationship between citation format and citation error in the research.

Using Journal Citation Report- Social Science of 2006 from the ISI Web of Knowledge, Davies (2012) analyzed the 4183 journal references appended in 137 research articles in four LIS journals, namely- Information and Management (IF 2.119), Information Systems Research (IF 2.537), Journal of the American Medical Informatics Association (IF 3.979), and MIS Quarterly (IF 4.731) (in alphabetical order), having impact factor more than 2. She found that the number of faulty references was 45.3% (1895) out of 4183 references verified. A total of 2080 inaccuracies were identified in all 4183 faulty references. The range of reference errors was found from 41.3% (MIS Quarterly) to 49.1% (Information and Management).

Majority of authors who cited references in their scholarly writings don't read them (Ball, 2002). Primary reason of forwarding citation errors in reference lists in scholarly communication is authors' behaviour of ignoring references and copying references from another source which already contains faulty references. In 2003, University of California based two electrical engineers, Simkin and Roychowdhury (2003) revealed that "only about 20% of citers read the original." Only one scholar out of five had done his homework well.

Doms (1989) examined the reference accuracy of 500 references (100 references randomly selected from March 1987 issues) appended in five peer reviewed National Dental Journals and observed that 42% (211) of references contained inaccuracies. Broadus (1983) examined the validity of references and revealed that 23% of bibliographical references wrongly cited the article's title. He concluded that journal citations often borrowed from others papers' bibliographies without verifying the original document.

Citing process is not only highly complex but also multidimensional in nature (Bornmann & Daniel, 1983). Lanning (2016) made a proposal for modernizing and simplifying citation styles. He was in favour of a technology friendly "Simplified Citation Style (SCS)."

In December 2019, the *International Committee of Medical Journal Editors* (ICMJE) published a revised set of recommendations, entitled "Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals" focusing the necessity for citing primary sources and ignoring unethical references, which are acceptable to the international scientific fraternity. With the massive growth and development of literary items and associated references, it becomes paramount to describe tasks of all major stakeholders of scholarly communication for controlling the issue of unethical and irrational references and thereby enhance the quality and indexability of scholarly communication, especially journals (Gasparyan et al., 2015).

OBJECTIVES OF THE RESEARCH

The primary objectives of the current research are:

1. To examine the number of errors in citations;
2. To find out the major and minor errors in citations;
3. To evaluate the accuracy level of citations;
4. To find out the errors in citing name of authors;
5. To find out the errors in article titles;
6. To examine the errors in journal name;
7. To find out the errors in year and page number; and
8. To find out the errors in volume and issue numbers.

SCOPE AND CONSTRAINTS OF THE STUDY

The study is based on journal references appended in eight research articles published in JSR, volume 9 (1), 2020. Non-journal references such as books, monographs, theses and dissertations, conference proceedings, reports, patents, websites, etc. are eliminated from the study. Digital object identifiers (DOI) associated with some journal references are also excluded from the analysis.

MATERIAL AND METHOD

The study was conducted to find out the citation errors and reference accuracy level in eight research articles appeared in the JSR, volume 9, issue 1, Jan-April, 2020. All the eight articles have been assigned an exclusive code- A1 to A8, which are the unique accessory of the individual article in the further text of this study.

The references were classified as journal and non-journal references for the purpose of this research. All the eight articles contained 205 references, in which 174 are journal references, while 31 are non-journal references. Table 1 presents the quantity of verifiable journal references. Two references are duplicated and treated as two major errors in article A4 and A5 (one duplicate reference in each article). According to Vancouver referencing style, if the cited information source is referred to again, then the previous number is used in inline citations in the main text.

Table 1. Total references and verifiable journal references

Article code	Journal references verified	Non-journal References	Total references
A1	28	1	29
A2	25	3	28
A3	5	4	9
A4	13	2	15
A5	20	9	29
A6	24	1	25
A7	42	7	49
A8	17	4	21
Total	**174**	**31**	**205**

All in all 174 journal references were checked thoroughly by breaking them into seven elements, i.e. author's name, article title, journal name, year, volume and issue numbers, and first and last pages; and they were verified from the original source articles.

Doms' (1989) technique was employed for classifying and analyzing the reference errors; as he formed two main classes of all references as "correct or incorrect." He explicitly described both of them as "A correct reference was a reference that was identical to the source. An incorrect reference was a reference that deviated from the source."

Journal reference, which contained one error or more than one error in one bibliographic component, was deemed as containing one error; those which contained errors in more than one bibliographic component were treated as to contain more than one error. Error in initials of author(s) name, addition/deletion word(s) or error in spelling in article title, addition/deletion word(s) in journal title, missing or wrong last page number, breaking the uniformity of capitalization, and punctuation error are categorized as minor errors. While missing or wrong author(s) name, missing or wrong article title, missing or wrong journal title, missing or wrong year, missing or wrong volume and issue number, missing or wrong

first page number, and missing or wrong article number for e-article are grouped under major errors.

ANALYSIS

Table 2 reveals that out of 174 journal references verified, 55.75% (97) references were accurate while 44.25% (77) references in *JSR* were inaccurate. These 77 inaccurate references contained a sum of 116 errors. Among these 116 errors, 59 were minor while 57 were major errors (Table 3). Accuracy level of references is 55.75%, while average number of errors in citations is 0.67. Table 4 presents the number of error wise analysis of references. A total of 58 references contained only one error. Only 5 references had 4 or more errors. As shown in table 5 and figure 1, maximum number of errors were detected in article title 31.03% (36), followed by author's name 18.97% (22) (either missing author(s)/initials or wrong initials or spelling errors or punctuation errors). Ignoring uniformity of capitalization especially in article title in journal references is observed in all eight research articles. Authors' names are critical for retrieving articles as well as relevant while author's citations are helpful to calculate the research productivity. According to Garfield (1969b), "…practice to drop or not have a middle (second) or third name is a constant source of difficulty to librarians, indexers, editors, and all those who must use the literature." Errors in page numbers in both first and last page including article number for e-article were in 13.79% (16) references. Issue number was found to be incorrect in 11.21% (13) references. Journal name errors were detected in 8.62% (10) references. References with missing or wrong year, missing or wrong volume number and duplicate were accounted 7.76% (9), 6.9% (8), and 1.72% (2) respectively. A list of some erroneous references from all eight research articles (A1 to A8) is presented in appendix A.

Table 2. Correct and Incorrect References

Article code	Correct references	Cumulative Correct References	Incorrect references	Cumulative Incorrect references
A1	16	16	12	12
A2	10	26	15	27
A3	2	28	3	30
A4	6	34	7	37
A5	9	43	11	48
A6	20	63	4	52
A7	29	92	13	65
A8	5	97	12	77
Total	**97**		**77**	

Table 3. Minor and major errors

Article code	Minor errors	Major errors	Total errors	Cumulative total errors
A1	10	11	21	21
A2	9	7	16	37
A3	2	5	7	44
A4	4	5	9	53
A5	10	12	22	75
A6	2	2	4	79
A7	10	5	15	94
A8	12	10	22	116
Total	**59**	**57**	**116**	

Table 4. Number of errors per reference

No. of errors↓	**Article code →**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**Total**
1		**9**	**14**	**1**	**5**	**8**	**4**	**11**	**6**	**58**
2		**1**	**1**	**0**	**2**	**0**	**0**	**2**	**3**	**9**
3		**0**	**0**	**2**	**0**	**1**	**0**	**0**	**2**	**5**
4		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
5		**2**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**
6		**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
Total		**12**	**15**	**3**	**7**	**11**	**4**	**13**	**12**	**77**

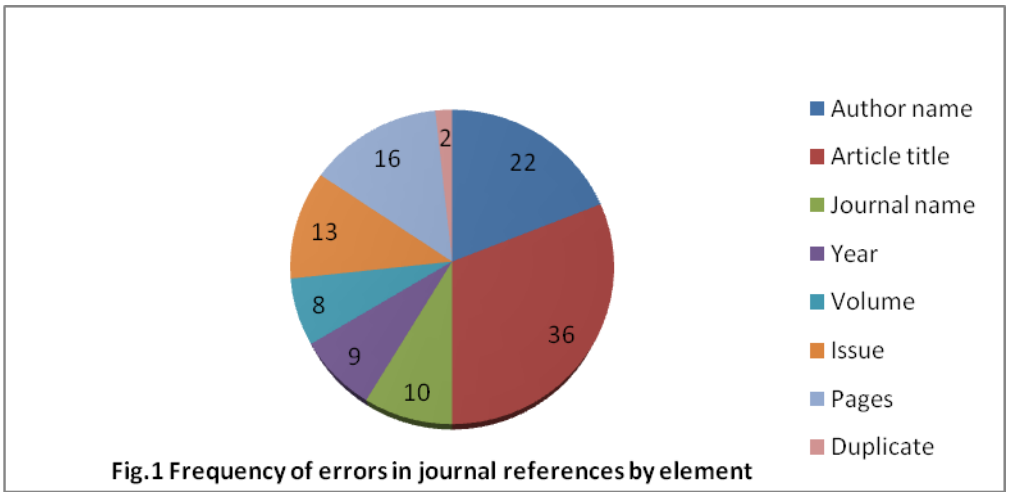

Fig.1 Frequency of errors in journal references by element

Table 5. Frequency of citation errors in JSR

Citation elements	Types of errors	Frequency	Percentage
Author(s) name	Missing author(s)/initials	11	
	Extra author(s)/ initials	1	
	Spelling errors	2	
	Wrong author(s)/initial	7	
	Punctuation errors	1	
	Total citations with author errors	**22**	**18.97%**
Article title	Word(s) addition/omission	3	
	Spelling errors	6	
	Punctuation errors	7	
	Capitalization errors	20	
	Total citations with title errors	**36**	**31.03%**
Journal name	Missing name	2	
	Incomplete name	3	
	Wrong name	2	
	Punctuation errors	1	
	Capitalization errors/abbreviated errors	2	
	Total citations with Journal errors	**10**	**8.62%**
Year	Missing	0	
	Wrong	6	
	Word added	3	
	Total citations with Year errors	**9**	**7.76%**
Volume no.	Missing	4	
	Wrong	4	
	Total citations with Volume errors	**8**	**6.9%**
Issue no.	Missing	11	
	Wrong	2	
	Total citations with Issue errors	**13**	**11.21%**
Pages	First Page- wrong	5	
	First Page- missing	2	
	Last Page- wrong	4	
	Last Page- missing	3	
	Article no.- missing	2	
	Total citations with page/article no. errors	**16**	**13.79%**
Duplicate references		**2**	**1.72%**
Total errors		**116**	**100%**
Average number of errors in citations is 116/174= 0.67			

CONCLUSION

Scientometricians and LIS researchers submitting their scientific articles to the JSR should realize the significance of accurate referencing. Accurate referencing not only eliminates the possibility of charges of plagiarism but also regulates several ethical issues related to the journal publication (Gupta & Kumar, 2019). Notwithstanding, scientometricians are familiar with references and reference lists, so high error rate in references is unacceptable. Each and every article's manuscript should be meticulously

examined before accepting and sending it to the publication in JSR. A flawless reference list undeviatingly indicates the researcher, reviewer, and editor's knowledge of subject as well as deep understanding of pattern of referencing style. Whatever reference style is selected for preparing reference list, it is paramount that not only bibliographic elements but also the capitalization and punctuation marks consistently used to the whole reference list. A strong editorial process should be designed to develop a flawless system of scholarly communication.

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APPENDIX A. Some cases of citation errors in JSR (article wise)

In A1

1. May RM. He scientific wealth of nations. Science. 1997;275(5301):793-6.
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[Spelling error in author name]

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2. Csomós G. A spatial scientometric analysis of the publication output of cities worldwide. Journal of Informetrics.2018;12(2):547-66. doi:10.1016/j. joi.2018.05.003
[Year, volume, issue, first and last page]

1. Malecki E. Everywhere? The geography of knowledge. Journal of Regional Science. 2010;50(1):293-513.
2. Malecki EJ. Everywhere? The geography of knowledge. Journal of Regional Science. 2010;50(1):493-513.
[Author initial missing, first page error]

In A2

1. Ben-Shlomo Y, Evans S, Ibrahim F, *et al*. The risk of prostate cancer amongst black men in the United Kingdom: The Process cohort study. European Urology. 2008;53(1):99-105.
2. Ben-Shlomo Y, Evans S, Ibrahim F, Patel B, Anson K, Chinegwundoh F, *et al*. The risk of prostate cancer amongst black men in the United Kingdom: The process cohort study. European Urology. 2008;53(1):99-105.
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In A3

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2. Mahapatra RK, Sahoo J. Doctoral dissertations in library and information science in India 1997-2003: A study. Annals of Library and Information Studies. 2004;51(1):58-63.
[Article title incomplete, journal title and issue missing]

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In A4

1. Tripathi H, Garg KC. Scientometrics of Indian crop science research as reflected by the coverage in Scopus, CABI and ISA databases during 2008-2010. Annals of Library and Information Studies. 2014;61(1):41-8.
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