September 2021

Mapping the Research Output of "ISTL" (2010-2020): a single Journal Scientometric study

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Abstract

The present study aimed at finding out the research output of Issues in Science and Technology Librarianship (ISTL) during the period 2010-2020 through the scientometric analysis technique. For the analysis of the study, a total no of 35 issues of "ISTL Journal" published during the year 2010 to 2020 have been taken up for evaluation. After deep analysis, it is found that most of the articles in 130(42%) of the journals are Referred Articles (RA). In the journal, during the period a maximum number of 30(13.4%) articles published in 2010 followed by 2015 and 2011. The degree of collaboration in ISTL publication is highest in the year 2020 with a mean value of 0.8 followed by a mean value of 0.76 in the year 2016. The average author per paper is highest (2.77) in the year 2019 followed by 2020 with 2.60 and 2.13 in 2012. The subject 'Information Literacy' has covered the highest number of 35(16%) articles followed by 'Science and Technology Resources on the Internet' with 31(14%) and 'E-Resources' with 28(13%) articles.

Keywords: Scientometric; Research Output; Science Librarianship; Degree of collaboration; Information literacy; Authorship pattern.

Introduction

Since few decades it is proved that journal is an important media or channel for publishing scientific research output. According to (*University Glossary*, no date) the term 'Research output' means the production of work that may be wholly in written form or the form of a

composition, performance, exhibition or creative or other approved work (*University Glossary*, no date). Issues in Science and Technology Librarianship (ISTL) is one of the leading quarterly journals to publish research results of interest to science and technology librarian's science 1991 by the University of Alberta Libraries. It serves as a vehicle for sci-tech librarians to share successful initiatives and innovative ideas, and to publish peer-reviewed or board-accepted papers, including case studies, practical applications, theoretical essays, web/bibliographies, and research papers relevant to the functions and operations of science and technology libraries in all settings. Through its columns, ISTL also publishes reviews, opinions, and best practices. ISTL is an open-access journal. All content is freely available without charge. Users are allowed to read, download, copy, distribute, print, search, or link to the full text of the articles in this journal without asking prior permission from the publisher or the author. The journal is indexed in INSPEC, Library and Information Science Abstracts (LISA), Library Literature, and Scopus(*ISTL(2020)*, no date). Now a day's scientometrics is one of the truly interdisciplinary research fields extended to almost all scientific fields. Scientometrics applications are used to measure scientific activities, mainly by producing statistics on scientific publications indexed in databases. Scientometrics is the branch of science that describes the output traits in terms of organizational research structure, resource inputs, and outputs develop benchmarks to evaluate the quality of information output. Also, Scientometric studies characterize the disciplines using the growth pattern and other attributes. These applications are extremely valuable methods for evaluating research output, to know about the author productivity and citation analysis in science and technology(Satish and Khaparde, 2018). The current study aimed at finding out the research output of Issues in Science and Technology Librarianship (ISTL) during the period 2010-2020 through the scientometric analysis technique. To conduct the study entire data was collected from the website of ISTL

journal using excel software. For the analysis of the study, a total no of 35 issues of "ISTL Journal" published during the year 2010 to 2020 have been taken up for evaluation.

Related Work

Over the past many years, a large number of scientometric studies have been conducted. A little bit of some studies are hereunder: (Jabeen *et al.*, 2015), have highlighted the research productivity and scholarly communication of library and information science professionals during 2003–2012 by using Web of Science databases from 40 library and information science core journals. Data were interpreted by using two open-source software Vantage point (a powerful text-mining tool for discovering meaningful results from raw data) and CiteSpace II to visualize the library and information science growth and trends. Underlying results indicated that mainstream of authors (12,847, 69.9%) published their article as a single author from 2003–2009, this trend has declined and a collaborative number of publications trend has inclined during the last 3 years. The University of Illinois at Urbana-Champaign produced 95 (0.52%) of the total publications and stands at the leading position. The maximum number of publications was carried out by universities rather than non-academic institutions. This article identified that Asian countries, such as China, Taiwan, India, and Iran, are still in their infancy stage(Jabeen *et al.*, 2015). Gupta & Hasan, have conducted a scientometric analysis of 200 research articles published in the journal, "Metamorphosis: A Journal of Management Research" from its debut year 2002 to 2016. The study showed that most of the papers, 114 out of 200 (57per cent) were published by single authors whereas 86 out of 200 (43 percent) were contributed by joint authors. The overall average degree of collaboration, average collaborative index, and average citation per paper were 0.43, 2.35, and 25.59, respectively. They found that remarkable collaborative contributors are from India with 81.65 percent sharing(Gupta and Hasan, 2018). Davarpanah & Aslekia, have also conducted a scientometric analysis of

international LIS journals. They analyzed 894 contributions published in 56 LIS journals indexed in SSCI during the years 2000–2004. They found that an overwhelming majority (89.93%) of them wrote one paper. The average number of authors per paper is 1.52. All the studied papers were published in English. The sum of research output of the authors from the USA and UK reaches 70% of the total productivity. Most papers received few citations. Each article received an average of 1.6 citations and the LIS researchers cite mostly the latest articles. About 48% of citing authors tended to self-citation(Davarpanah and Aslekia, 2008). (Nattar, 2009) had done a Scientometric analysis of 829 articles published in the Indian Journal of physics during the year 2004- 2008. The result indicated that the highest number of papers have been written by co-authors. The contributions in this journal from India are slightly more than those from the other countries. The growth and popularity of this journal are found to show an upward trend(Nattar, 2009).(Rajendran, Jeyshankar and Elango, 2011) have studied scientometric analysis of 633 research articles published in Journal of Scientific and Industrial Research has been carried out. Five Volumes of the journal containing 60 issues from 2005 – 2009 have been taken into consideration. Out of 633 contributions, only 51 are single-authored, and the rest by multi-authored with the degree of collaboration 0.92 and week collaboration among the authors. The pattern of Co-Authorship revealed that the improving trend of co-authored papers. The study revealed that the author productivity is 0.34 and dominated by the Indian authors(Rajendran, Jeyshankar and Elango, 2011). Ranganathan & Balasubramani conducted a scientometric study on the publication of "Green Chemistry". research in India. The records are collected from Scopus Database between 1999 and 2013. A total of 1448 papers were identified in the Scopus database. The study reveals that most researchers preferred to publish their research results in journals; as such 88.47% of articles were published in journals. More numbers (328, 25.60%) of articles were published in 2012.The degree of collaboration in Green Chemistry was 0.95. The authorship trend shows that, out of a total of 1448 literature

published, 96% of them or published under the joint author of publications in Green Chemistry research output. It is observed that author productivity is not in agreement with Lotka's law, but productivity distribution data partially fits the law when the value of Chi-square to 218.72(Ranganathan and Balasubramani, 2013). Rathinasabapathy & Rajendran, analyzed publication output in the field of camel research as indexed in the CAB Direct Online database covering the period 1963 – 2012. It is observed that a total of 4,923 publications were published during the year 1963 to 2012 as per CAB Direct Online. The highest number of papers i.e., 256 was published in the year 2012. India is the top producing country with 354 papers (7.19%) followed by Egypt with 284 papers (5.76%). The top five most preferred journals by the scientists were: Journal of Camel Practice and Research with 641 papers (13.02%) followed by Assiut Veterinary Medical Journal with 193 papers 3.92%), Indian Journal of Animal Sciences with 186 papers (3.77%), Indian Veterinary Journal with 164 papers (3.33%) and Revue d'Ejevage et de Medecine Veterinaire des Pays Tropicaus with 92 papers 1.87%). English was the most predominant language used by the scientists for communication with 4496 papers (91.32%). The prolific author is Gahlot, T.K. who contributed 173 papers (3.51%) followed by Faye, B. with 108 papers (2.19%)(Rathinasabapathy and Rajendran, 2015). Velmurugan also conducted scientometric analysis: annals of library and information studies publications output during 2007- 2012. It was observed from the study that the highest number of contributions i.e., 43 (21.19%) were published in the year 2010. Most of the contributions are found by double authored i.e., 88 (43.35 %.). The degree of collaboration (i.e.,131out of 203) was high in terms of authorship pattern was 0.64. After conducting a thorough literature review it is observed that no research studies have been conducted to find out the research output of ISTL journal during 2010-2020. This article would be the new perception for the LIS researchers(Velmurugan, 2013).

Objectives

The objectives of the study are as follows:

1. To verify various forms of publications in ISTL journals from 2010 to 2020.

2. To study the year-wise distribution of articles.

3. To find out the authorship pattern of the articles.

4. To find out the degree of collaboration.

5. To analyze year-wise author's productivity.

6. To study the subject-wise classification of articles.

7. To study the institute-wise distribution of papers.

8. To find out highly cited authors.

Methodology

To conduct the study entire data was collected from the website of ISTL journal using excel software. For the analysis of the study, a total no of 35 issues of "ISTL Journal" published during the year 2010 to 2020 have been taken up for evaluation. It is necessary to mention here that when the data collected the researcher found only one issue in the year 2020. It may be due to the covid 19 situation. After collecting data, it was organized and analyzed using Ms-Excel spreadsheets. For the sake of convenience, this was informed that the researcher has found a total of 310 articles in various forms during this period. But for the data analysis purpose, the author has rejected some forms of articles. Such as Book Reviews, Tips from the experts, viewpoints, ACRL Science and Technology Sections, editorials, and letters. Last of all 224 articles have been selected and reject 86 articles.

Analysis

To analyze data for the present study all the collected has put into excel format to calculate

simple operations like addition, substruction, multiplication, division, average, percentage, etc.

Up to two decimal place value has been considered for executing percentage and mean value.

Forms of publication

Table 1: Forms of Publication by Year

Forms of publications	Total Articles	Percentage (%)
BAA	28	9
RA	130	42
BR	26	8
STRI	31	10
SLSJ	1	0
WLG	1	0
TFE	26	8
VP	18	6
ERR	10	3
DRR	2	1
TAT	16	5
SC	5	2
ACRL -STS	2	1
ETDL	12	4
LETTER	2	1
Total	**310**	**100**

Here, BAA=Board-Accepted Articles; **RA**=Refereed Articles; **BR**= Book Reviews; **STRI**= Science and Technology Resources on The Internet; **SLSJ**= Science Librarianship and Social Justice; **WLG**= Webliographies; **TFE**= Tips from The Experts; **VP**= Viewpoints; **ERR**=Electronic Resources Reviews; **DRR**=Database Reviews and Reports; **TAT**= There's an App for That; **SC**= Short Communications; **ACRL-STS**=ACRL Science and Technology Sections; **ETDL**= Editorials.

Table 1 shows year-wise different forms of publications. There are 310 articles available in the

journal of Issues in Science and Technology Librarianship from the year 2010 to 2020 onwards.

These are categorized in various forms as shown in the table in short form and again repeated

the full form of each under the table. It is seen from the table that, the highest number of

130(42%) articles are Referred Articles (RA) followed by 31(10%) articles are in the form of Science and Technology Resources on The Internet (STRI) and 28(9%) articles are Board Accepted Articles (BAA). The number of Book Reviews (BR) articles and Tips from The Experts (TFE) is the same i.e., 26(8%) each. On the other hand, the minimum number of 1 each article is found in the forms of Science Librarianship and Social Justice (SLSJ) and Webliographies (WLG). It is also seen from the table that the new forms of articles named There's an App for That (TAT) started from the year 2014 and continues. Another two forms of articles viz, Short Communications (SC)and ACRL Science and Technology Sections (ACRL-STS) continue from the year 2015 each.

Distribution of the articles by year

Table 2: Distribution of Articles by Year

Year	Articles by Year	Percentage
2010	30	13.4
2011	27	12.1
2012	24	10.7
2013	13	5.8
2014	26	11.6
2015	29	12.9
2016	17	7.6
2017	14	6.3
2018	17	7.6
2019	22	9.8
2020+	05	2.2%
Total	**224**	**100.00%**

Table 2 shows the year-wise distribution of articles in ISTL journals. Only 224 articles have been selected and reject 86 articles. The reason behind this has already described in the methodology part. Out of 224 articles, the maximum number of 30(13.4%) articles published in 2010 followed by 2015 with 29(12.9%) and 2011 with 27(12.1%) articles has published. Very least number of 05(2.2%) articles has found in 2020 followed by 2013 with 13(5.8%) and 2017 with 14(6.3%) articles has published. There is a miracle in the journal that the same number of 17(6.3%) articles have published in the year 2016 and 2018.

Authorship pattern

Table 3. Year-wise authorship pattern of articles

Year	Issue No.	Single Author	Two Authors	Three Authors	More Than Three Authors	Total Articles	Total authors
2010	4	18	6	2	4	30	59
2011	4	17	6	2	2	27	45
2012	4	8	10	3	3	24	51
2013	3	9	3	0	1	13	19
2014	4	11	8	6	1	26	50
2015	4	20	5	3	1	29	44
2016	3	4	10	2	1	17	34
2017	2	7	4	1	2	14	27
2018	3	9	6	2	0	17	27
2019	3	9	7	2	4	22	61
2020+	1	1	2	1	1	5	13
Total	**35 Issues**	**113**	**67**	**24**	**20**	**224**	**430**
Percentage	**NA**	**50%**	**30%**	**11%**	**9%**	**100**	**-**

Table 3 is restricted to authorship pattern and distribution of authorship pattern wrap up the issues of journal volumes under study. Single author contribution during the whole duration persists at 50% obsess the highest position compared to the benefaction of two author articles which continued to be 30%. On the other hand, 11% contribution of the articles offered jointly by three authors and only 9% contribution of the articles were offered by more than three authors together. The crucial aspect which is seen from the table is that 224 articles have been authored by 430 persons.

Degree of Collaboration (DC)

Degree of Collaboration (DC) represents the potency of collaborative research. The DC of the ISTL publications can be measured by using Subramanyam's (1983) formula as shown below:

$$DC = \frac{Nm}{Nm + Ns}$$

Where, DC = degree of collaboration; NM = number of multi-authored papers, and NS = Number of single-authored papers(Subramanyam, 1983).

Table 4: Degree of Collaboration

Sl. No	Year	Single Authored (NS)	Multiple Authored (NM)	Total (NS+NM)	Degree of Collaboration
1	2010	18	12	30	0.40
2	2011	17	10	27	0.37
3	2012	8	16	24	0.67
4	2013	9	4	13	0.31
5	2014	11	15	26	0.58
6	2015	20	9	29	0.31
7	2016	4	13	17	0.76
8	2017	7	7	14	0.5
9	2018	9	8	17	0.47
10	2019	9	13	22	0.59
11	2020	1	4	5	0.8
Total		113	111	224	0.50 (Mean value)

It is seen from Table 4 that the degree of collaboration in ISTL publication is highest in the year 2020 with a mean value of 0.8 followed by a mean value of 0.76 in the year 2016. As the DC crossed mean value 0.5, it can be said that the collaborative research in these years is found to be expedited. It is also seen from the table that the year 2010, 2011, 2013, 2015, and 2018 are unable to touch the standard DC (0.5) point. Overall, the degree of collaboration in ISTL publications is 0.5 i.e., equal to the standard DC. It means the progress of collaborative research neither slow nor so fast. It is in a balanced position.

Author's productivity

Table 5: Year Wise Author Productivity

Year	Total no of papers	Total no of authors	Average author/ paper	Productivity per author
2010	30	59	1.97	0.51
2011	27	45	1.67	0.60
2012	24	51	2.13	0.47
2013	13	19	1.46	0.68
2014	26	50	1.92	0.52
2015	29	44	1.52	0.66
2016	17	34	2.00	0.50
2017	14	27	1.93	0.52
2018	17	27	1.59	0.63
2019	22	61	2.77	0.36
2020	5	13	2.60	0.38
Total	224	430	21.56	5.83

Table 5 shows the year-wise author's productivity under study. The average author per paper is highest (2.77) in the year 2019 followed by 2020 with 2.60 and 2.13 in 2012. But the highest productivity per author was found in the year 2013 with 0.68% followed by 0.66% in 2015. On the other hand, the lowest productivity per author (0.36%) was found in 2019.

Subject-wise classification of articles

Table 6: Subject- wise classification of articles

Subject Name	No. of Articles	Percentage
Information Literacy	35	16%
Science and Technology Resources on the Internet	31	14%
E-Resources	28	13%
Citation Analysis	20	9%
Data Management	20	9%
Library Related APP	16	7%
Information Retrieval	12	5%
Collection Management	10	4%
Bibliometric Analysis	9	4%
Academic Library	9	4%
Short Communication	10	4%
Bibliography	7	3%
Webliography	6	3%
Publishing Practice	6	3%
Library Management	3	1%
Science Librarianship	2	1%
Total	224	100

Table 6 covered the subject-wise classification of articles collected from ISTL journals during the study period. To do this the title of each article is analyzed properly and find out subject coverage. To pick out the actual subject coverage of the articles Sometimes the author has taken the help of the OCLC website (http://classify.oclc.org/classify2/). It is seen from the table that the subject 'Information Literacy' has covered the highest number of 35(16%) articles followed by 'Science and Technology Resources on the Internet' with 31(14%) and 'E-Resources' with 28(13%) articles. The subject 'Citation Analysis' and 'Data Management' got the same number of 20(9%) articles each. The remarkable matter is that though the journal ISTL aims at science librarianship, the subject coverage under 'Science Librarianship' is very nominal i.e., only 1 percent.

Institute-wise distribution of papers

Table 7: Top ten prolific institutions with a number of papers

Name of the Institution	No. of Articles	Percentage	Rank
Indiana University	34	15.18%	1
University of Florida	25	11.16%	2
University of Illinois	18	08.04%	3
University of Minnesota	16	07.14%	4
Purdue University	14	06.25%	5
University of Maryland	13	05.80%	6
Pennsylvania State University	10	04.46%	7
University of California	9	04.02%	8
Massachusetts Institute of Technology	8	03.57%	9
Oregon State University	8	03.57%	9
University of British Columbia	8	03.57%	9
University of Tennessee	8	03.57%	9
California State University	7	03.13%	10
Case Western Reserve University	7	03.13%	10
Northern Illinois University	7	03.13%	10
University of Saskatchewan	7	03.13%	10
University of Texas	7	03.13%	10

Table 7 represents Top ten prolific institutions with a number of papers contributed by themselves under study. Out of 224 paper 'Indiana University' itself contributed 34(15.18%) articles and got 1st rank followed by 'The University of Florida', 'University of Illinois', 'University of Minnesota', 'Purdue University, 'University of Maryland', 'Pennsylvania State University' and 'University of California' are on 2nd, 3rd, 4th, 5th, 6th, 7th and 8th rank having 25(11.16%), 18(08.04%), 16(07.14%), 14(06.25%), 13(05.80%), 10(04.46%) and 9(04.02%) contributions respectively. On the other hand, four institutions ranked 9th by contributing 8(03.57%) articles each and five Universities got 10th (lowest) rank.

Highly cited authors

Table 8: Top ten highly cited authors

Authors name	No. of authors	Cites	Cites per year	Cites per author
AB Wagner	1	144	44.4	144
R Gilmour, L Cobus-Kuo	2	108	12	54
VF Scalfani, J Sahib	2	53	7.57	27
C Hightower, C Caldwell	2	47	4.7	24
D Dietrich, T Adamus, A Miner, G Steinhart	4	47	5.88	12
JE Gray, MC Hamilton, A Hauser, MM Janz…	5	42	4.2	8
SR Gonzalez, DB Bennett	2	36	4.5	18
Y Zhang, R Beckman	2	34	5.67	17
LN Miller	1	30	3.33	30
J Jeffryes, M Lafferty	2	29	3.22	14

Table 8 expresses the top ten highly cited authors. As per the table, AB Wagner is the highly cited author getting 144 citations. He got 44.4 cites per year. On the other hand, two authors namely, J Jeffryes, M Lafferty are getting the lowest cites of 3.22 per year.

Findings

1. Most of the articles 130(42%) of the journals are Referred Articles (RA) followed by 31(10%) articles are in the form of Science and Technology Resources on The Internet (STRI) and 28(9%) articles are Board Accepted Articles (BAA).

2. In the journal, during the period a maximum number of 30(13.4%) articles published in 2010 followed by 2015 and 2011.

3. Single author contribution during the whole duration persists at 50% obsess the highest position compared to the benefaction of two author articles which continued to be 30%. On the other hand, 11% contribution of the articles offered jointly by three authors and only 9% contribution of the articles were offered by more than three authors together.

4. The degree of collaboration in ISTL publication is highest in the year 2020 with a mean value of 0.8 followed by a mean value of 0.76 in the year 2016. Overall, the degree of collaboration in ISTL publications is 0.5 i.e., equal to the standard DC. It means the progress of collaborative research neither slow nor so fast.

5. The average author per paper is highest (2.77) in the year 2019 followed by 2020 with 2.60 and 2.13 in 2012.

6. The subject 'Information Literacy' has covered the highest number of 35(16%) articles followed by 'Science and Technology Resources on the Internet' with 31(14%) and 'E-Resources' with 28(13%) articles.

7. Out of 224 paper 'Indiana University' itself contributed 34(15.18%) articles and got 1st rank followed by 'The University of Florida', 'University of Illinois', 'University of Minnesota', 'Purdue University, 'University of Maryland', 'Pennsylvania State University' and 'University of California' are on 2nd, 3rd, 4th, 5th, 6th, 7th and 8th rank having 25(11.16%), 18(08.04%), 16(07.14%), 14(06.25%), 13(05.80%), 10(04.46%) and 9(04.02%) contributions respectively.

8. AB Wagner is the highly cited author getting 144 citations.

Conclusion

Issues in Science and Technology Librarianship (ISTL) is one of the oldest and prestigious journals and a vehicle for sci-tech librarians to share successful initiatives and innovative ideas, and to publish peer-reviewed or board-accepted papers, including case studies, practical applications, theoretical essays, web/bibliographies, and research papers relevant to the functions and operations of science and technology libraries in all settings. It started it journey in 1991. The present bibliometric study from the period 2010-2020 of the journal aims to reveal the image of the journal in the field of library science. This may be helpful for the librarian to

decide on their acquisition policy. After completion of the study, it is found that there are 310 articles available in the journal during the year 2010 to 2020 onwards in various forms. Out of these only 224 articles have been selected for the study. After deep analysis, it is found that the progress of publication in the journal gradually decline. It may be due to its publication policy. The editor of the journal published articles that are most probably related to science librarianship. As most of the authors are from USA therefore the standard DC unable to touch standard point (0.5) in some years. As a result, the cooperation among authors is not satisfactory. Besides these constraints, it can be said that the Journal is no doubt a prestigious one. Just it needs to change some of its publication policies.

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