



Scientometric Portrait of the Journal of Scientific and Industrial Research based on Papers Published during 2001–2020

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This study is carried out to understand dynamics of the journal using scientometric indicators. In this regard an analysis of 2,623 records published in Journal of Scientific and Industrial Research during 2001–2020 found that the share of articles published was highest (90%) followed by reviews (5%) and proceeding papers (1.9%). The chronological pattern of output indicates that the number of papers published declined after 2011. The total output was contributed by 47 countries located in different parts of the globe. Of these, India contributed about 38% papers followed by Turkey and China. Among all the prolific countries, Portugal had the highest value of Citation per Paper (CPP). The share of papers not cited (PnC) was highest for Saudi Arabia. Among the highly productive institutions, Anna University (Chennai) topped the list with 99 papers. Among the 26 highly productive institutions, CPP is highest (25.7) for CSIR-Central Leather Research Institute (Chennai). Highest share of PnC was for Andhra University. Most of the highly productive authors were located at highly productive institutions. Among the prolific authors, highest value of CPP was for P Vasudevan of the Indian Institute of Technology, New Delhi. Pattern of citation indicates that about 18% papers were not cited and 2% papers were cited more than 50 times. Of the 14 most cited papers, three papers were contributed by authors from Taiwan (2) and Portugal (1) and remaining 11 papers were contributed by Indian authors. Four highly cited papers were written in domestic collaboration and one in international collaboration. Highest share of papers published in the journal are multi-authored.

Keywords: Bibliometrics, Citation analysis, Citation indicators, JSIR

Introduction

Journal of Scientific and Industrial Research (JSIR) is a prestigious and oldest monthly academic journal founded in 1942 by the premier scientific agency of the country-the Council of Scientific and Industrial Research (CSIR). The CSIR kept it publishing under its academic control till June 1986. The responsibility of its publication was handed over to Publication & Information Directorate (PID), a constituent establishment of CSIR with effect from July 1986. PID was later renamed as National Institute of Science Communication (NISCOM). The NISCOM was later merged with Indian National Scientific Documentation Centre (INSDOC) in 2002. After merger of the two institutions, it was named as National Institute of Science Communication & Information Resource (NISCAIR). CSIR-NIScPR has been created as a new institute by amalgamating two erstwhile institutions viz. National Institute of Science, Technology and Development Studies (CSIR-NISTADS) and National Institute of Science Communication and Information

Resources (CSIR-NISCAIR). The responsibility of publishing JSIR now rests with the CSIR-NIScPR. In addition to the JSIR, the NIScPR also publishes other 14 academic journals, popular science books, magazines, encyclopaedias, and multimedia films.

The journal carries comprehensive reviews in different fields of Science & Technology (S&T) including industry, original articles, short communications and case studies, on various facets of industrial research & development, technology forecasting & management, instrumentation and analytical techniques. Special attention is paid on important features of direct relevance to industrial entrepreneurs, debates on key industrial issues and various industry related announcements. It covers all facets of industrial development. The journal acts as a rich platform for scientists, engineers, technologists and entrepreneurs to express their views and results derived from their rich laboratory experiments. It also carries diverse views by the S&T policy planners in the area of Science Technology & Society (STS). The broad areas on which the journal focuses are: Chemical Technology; Civil Engineering; Computer Science & Information Technology; Earth, Environment &

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Atmospheric Sciences; Electrical Engineering; Electronics & Telecommunications; Energy Technology & Management; Management of Industry & Policy Implementations; Mechanical Engineering; Microbiology and Biotechnology; Mining Engineering; Nanotechnology; R&D Management; Rural Development Technology; S&T Management; and Waste utilization & Management. The journal has been bestowed by one of the best editorial board members who were the learned scientists and founders of scientific agencies in the country like S S Bhatnagar, H J Bhabha, C V Raman, and M N Saha. The editorial board of the journal was further strengthened having the presence of noted scientists like J V Narlikar during 1980s, P J Lavakare and Y S Rajan during 1990s. The rejection rate of the papers in the journal in 2020 was 76.2% and in 2021 it was 79.9%. This indicates that the acceptance rate of the papers in the journal is about 20% only. This has been possible due to the role played by learned members of the editorial board of the journal.

The authors were motivated to undertake this study as no bibliometric study of the journal for such a long period and the impact of the output has been reported in literature. Thus, it may serve a useful purpose for framing long term policy for the journal by the editor.

Review of Literature

During the past two decades, several authors have developed scientometric portraits of several individual national and international journals in different discipline of science. For instance, Narang¹ evaluated 737 papers published in Indian Journal of Pure and Applied Mathematics and 8,396 citations appended to these articles published during 1998–2002. The study found that the number of contributions have increased in successive volumes. Highest number of papers was written in joint authorship. The most cited documents are articles from the research journals. The contributions to the journal from India and abroad were almost equal. Among the Indian states, Uttar Pradesh was the top contributor whereas among the Indian universities/institutes, University of Delhi topped the list. Jena² undertook the bibliometric study of papers published in Indian Journal of Fibre and Textile Research during 1996–2004. According to the study, contributions of articles to each volume started increasing from the year 1996 onwards. Highest number of articles published was three authored. Geographical distribution of contributors shows that maximum contributions were from India. Further

analysis of data indicates that Delhi, Haryana, West Bengal and Maharashtra together contributed 71.2% papers. Vijay and Raghvan³ analysed 779 articles published in the Journal of Food Science and Technology during 2000–2004. The study found an increase in the number of contributions in successive volumes with India being the major contributor both in the maiden volume as well as in the five volumes studied. The highest number of contributions was two authored.

Garg, Sharma and Kumar⁴ developed a scientometric profile of the journal “Mausam” based on 369 items published in it during 2003–2006. It was observed that the researchers from the India Meteorological Department were the major contributors. The authors observed that the references cited by the papers were mostly international but majority of the citations were more than a decade old. Kumar *et al.*⁵ analysed articles published in “Pramana: A Journal of Physics” during 1982–2006. Authors found that the number of articles published in the journal and its impact factor also increased. Authors from University of Delhi (Delhi), Bhabha Atomic Research Centre (Mumbai), Physical Research Laboratory (Ahmedabad), Institute of Physics (Bhubaneswar), Indian Institute of Science (Bangalore), and Tata Institute of Fundamental Research (Mumbai) contributed most of the articles. One fourth of the total articles published in the journal were from outside India (the host country of the journal). The average number of references per articles was found to be 21.85. Nishy, Parvatharajan & Prathap⁶ examined the pattern of growth of the research papers published during 2005–2009, citations received by these papers, number of contributing authors, and papers contributed by Indian and foreign authors in Indian Journal of Chemistry Section B. The study found that contributions of Indian universities were more as compared to government, private, public and CSIR laboratories. Garg and Singh⁷ made a bibliometric analysis of 1,286 articles published in Indian Journal of Traditional Knowledge during 2002–2015 and found that the flow of articles submitted to the journal declined during the later period. The papers published in the journal were contributed by authors from 24 countries, most being from India. The Indian State of Uttar Pradesh contributed the highest number of papers. The Central Agricultural University, (Pasighat, Arunachal Pradesh) topped the list among the institutions. Based on the

keywords published in the journal *Ethno-medicine and traditional medicine* were the highest used keywords. Gap between the receipt and publication of the paper was 17 months, lowest being in the year 2004.

Singh and Madhu Bala⁸ developed a scientometric portrait of Indian Journal of Biochemistry and Biophysics based on papers published during 2009–2013. The study found that about 70% contributions were from India and half of the articles published were multi authored. Maximum number of contributors was from the academic institutions. Kalita⁹ analysed 8,335 papers published in the weekly journal “Nature” from 2006 to 2015. These papers were contributed by 107,334 authors scattered in 111 countries and affiliated to 2,369 organizations. USA and England were the top contributing countries with approx 70% and around 19% share of papers respectively. Japan and China were the only Asian countries which featured in the top 15 countries list. Among the institutions, University of California topped the list with 16.1% share of papers followed by Harvard University with 12.6% of papers. Das¹⁰ made a bibliometric study of papers published during 1987–1996 in the Journal of Chemical Sciences. The study revealed that the maximum number of articles were published in the year 1993 (127) and minimum in the year 1994 (21) articles. Authorship pattern of papers published indicate that 599 (83.5%) papers were joint authored and 16.5% were single authored papers. Most of the papers dealt with physical and theoretical chemistry followed by articles on inorganic and analytical chemistry. The review of literature found two bibliometric studies related to Journal of Scientific and Industrial Research. Dalai and Ramesh¹¹ analysed 333 papers published in JSIR during 1988–1993. The study found that more than three-fourth of the papers were authored by Indian authors. Academic and research institutions were the major contributors. Rajendran, Jeyshankar and Elango¹² examined 633 papers published in the journal during 2005–2009. The study found that highest share of papers was by Indian authors and 92% papers were multi-authored. The time period of both these quoted studies is too short, six years for the study by Dalai and Ramesh¹¹ and five years for the study by Rajendran, Jeyshankar and Elango.¹² These two studies also did not examine the citations received by the articles published in the journal.

This motivated the authors to develop a scientometric portrait of the papers published in the

journal during the 20 years period of 2001 to 2020, a longer time period than the above quoted two studies and also to examine the impact of the published papers using citation indicators which were also missing in the above quoted studies. So by this way the present study tries to bring out deeper insights of the JSIR consisting various bibliometric and scientometric indicators. The study may be useful to the readers, authors and it may also help the editor of the journal for framing a long term policy for the journal.

Objectives of the Study

The present study provides a detailed bibliometric analysis of the documents published in Journal of Scientific and Industrial Research during 2001–2020 (20 years) with the following objectives:

- (a) To examine the chronological distribution of output during 2001–2020 and the variation in the impact factor of the journal during 2001–2020 as reflected by the impact factor data in Journal Citation Reports (JCR);
- (b) To examine the geographical distribution of documents (national and international) and their impact as seen in terms of Citations Per Paper (CPP), Relative Citation Impact (RCI) and Papers not Cited (PnC);
- (c) Identification of most productive institutions and authors and impact of their productivity;
- (d) To assess the trend in citations received and identification of highly cited papers;
- (e) To assess the trend of authorship of the published papers.

Methodology

Data for the study was downloaded from the Web of Science core collection using the journal title in the tag "publication name" for the year 2001 to 2020 on September 2, 2021 and citations were updated on April 7, 2022. Data was downloaded in plain text form which was converted into a dbase relational database. The data contained name of the authors, their institutional affiliations, type of documents and citations obtained by each article. Data was analysed to meet the objectives mentioned above. The study used the following indicators: Total number of Publications (TP) published during 2001–2020; Total number of Citations (TC) received by these papers during 2001–2022 (April 7, 2022); Citation per Paper (CPP), Relative Citation Impact (RCI); and percent of Papers not Cited (PnC). These indicators were used for comparing the output and

impact of different entities like countries, institutions and authors. CPP is the ratio of citations to publications or the average number of citations per paper. RCI is a “measure of both the influence and visibility of a nation’s research on the global perspective” and was first used by May.¹³ RCI is a ratio of a country’s share of world citations (percent citations) in a sub-specialty to country’s share of world publications (percent publications) in that sub-specialty. Here sub-specialty has been replaced by journal under study. $RCI = 1$ indicates that the country’s citation rate is equal to world citation rate; $RCI < 1$ indicate that country’s citation rate is less than world’s citation rate and $RCI > 1$ indicates that country’s citation rate is higher than world’s citation rate and also imply high impact research in that country. If the value of $RCI < 1$ for a country, this means that the impact of research of that country does not commensurate with their publication effort and *vice versa*. In the present study, the method of complete count or whole count has been used by the authors. This method inflates the total count of publications and citations, because, each country or institution or authors in multi-authored papers are given unit credit for their contributions, unlike first author count where only the first author gets the credit. Only articles, reviews and proceedings papers have been taken into consideration for analysis. In the present study also, the actual number of records (2,540) has inflated to 7,845 records

Results and Discussion

Type of Documents Published in the Journal

During the period of 2001–2020, the journal published 2,623 different types of documents. Of the 2,623 records, 2,361 (90%) were articles followed by 130 (5%) review articles and proceeding papers (1.9%). Remaining 83 records were editorial material (32), corrections (27), news items (22) and biographical items and letter consisting one each. Among all these document types, review articles received highest number (44.6) of citation per paper. The present study analysed 2,540 records and did not include 83 records published as editorial material, corrections, news items and biographical items and letter as these are rarely cited and dilute the impact of research output of countries, institutions and authors.

Chronological Growth of Output

The pattern of output of papers published in the journal during 2001–2020 is depicted in Fig. 1. The pattern of output indicates an increasing trend of output from 2003 onwards till the year 2011. The

number of papers published in the journal started declining from 2012 onwards with a jump in the number of papers in 2014 and 2017. The number of papers published has started increasing again from the year 2019, reaching a peak in the year 2020. Authors explored the reason for this decline in the number of publications from 2012 onwards. Three possible reasons behind the decline may be attributed to (i) lower inflow of papers submitted to the journal (ii) low acceptance rate of papers submitted to the journal and (iii) low impact factor of the journal. However, the first two points can only be verified with actual data if available in the records of the journal. Graph of the impact factor depicted in Fig. 2 indicates a decline in impact factor from 2012 to 2017. Since, Indian readers are very particular about the impact factor where they submit their papers, so the authors of papers might have stopped submitting their papers during this period resulting in low number of papers published.

Impact Factor of the Journal during 1998–2021

Impact factor (IF) is often used to rank journals and to judge its relative importance despite several recognized limitations. It measures citations; a journal receives for the articles published in it. It eliminates some of the bias of such counts which favour large journals over small ones, or frequently issued journals

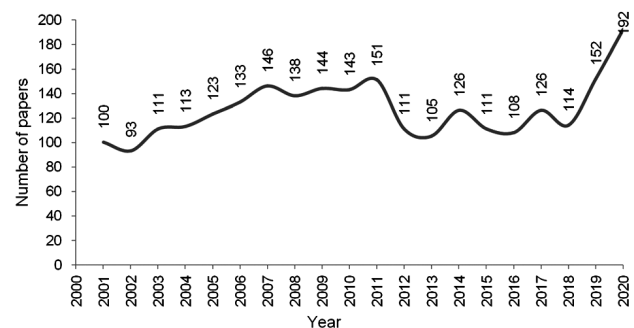


Fig. 1 — Number of papers published during 2001–2020

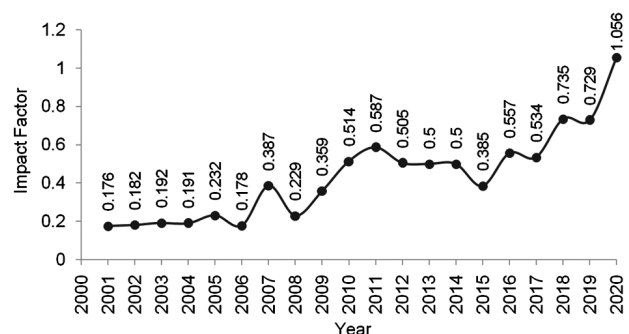


Fig. 2 — Trend of Impact Factor during 2001–2020

over less frequently issued ones, and of older journals over newer ones.¹⁴ The impact factor of a journal is available in the annual *Journal Citation Reports*, brought out by Clarivate Analytics (Formerly Institute of Scientific Information, USA.)

The trend of impact factor of the journal during 2001–2020 is shown in Fig. 2. The data indicate a highly fluctuating trend of impact factor during 2001–2020 with an increasing trend of impact factor. With the lowest value of 0.176 in the year 2001, it reached at the peak (1.056) in the year 2020. During the period of 2001–2020, the peaks in impact factor have also been observed in the years 2007 (0.387), 2011 (0.587), 2018 (0.735).

Most Productive Countries and Impact of Their Output

Analysis of data indicates that 67 countries contributed 7,845 papers. Data on the distribution of output and its impact in terms of CPP, RCI and PnC % for 25 countries which contributed 10 or more papers is given in Table 1. These 25 prolific countries contributed slightly more than half (53.6%) of the total output. Among the most productive countries listed in Table 1, India, the publishing country of the journal produced the maximum number of papers

contributing about 38% of the total publications. The remaining 24 countries contributed about 19.7% of the total publications output. The publication output for different countries indicates a highly skewed distribution of output as it varied in between 10 to 50 papers for 16 countries.

Impact of output has been examined using CPP, RCI and PnC %. The CPP for the overall output is 7.7. Table 1, indicates that India, Turkey, Taiwan, USA, Portugal, England, Brazil, Japan, Pakistan and Columbia had a higher CPP than the overall CPP (7.7). Among these ten countries, Portugal had the highest value of CPP followed by Brazil and Columbia. For remaining 15 countries, CPP is less than the overall CPP. The value of CPP is lowest for Saudi Arabia followed by Nigeria, Egypt and China respectively. The value of RCI also follows a similar trend. The low value of RCI for different countries indicates a low citation impact for these countries as compared to world average. Based on the values of PnC %, it is observed that of the 7,845 papers published during 2001–2020, 806 (18.7%) papers were not cited. Share of uncited papers was highest for Saudi Arabia followed by Spain, Nigeria, South Korea, and Egypt in that order. Share of uncited papers was lowest for South Africa (4.2%) followed by Italy (7.1%), Brazil (8.3%), and Serbia (8.6%) respectively.

Table 1 — Geographical distribution of output and its impact

	Country	TP	TC	CPP	RCI	PnC	PnC (%)
1	India	2958	21724	7.3	1.1	588	19.9
2	Turkey	147	1200	8.2	1.2	16	10.9
3	China	135	516	3.8	0.5	22	16.3
4	Malaysia	128	759	5.9	0.8	13	10.2
5	Taiwan	124	995	8.0	1.1	23	18.5
6	Egypt	117	424	3.6	0.5	26	22.2
7	Iran	87	532	6.1	0.9	9	10.3
8	Saudi Arabia	66	167	2.5	0.4	21	31.8
9	Mexico	54	239	4.4	0.6	10	18.5
10	South Korea	44	211	4.8	0.7	11	25.0
11	Spain	42	173	4.1	0.6	12	28.6
12	Serbia	35	222	6.3	0.9	3	8.6
13	USA	33	349	10.6	1.5	3	9.1
14	Portugal	28	537	19.2	3.0	5	17.9
15	Nigeria	27	68	2.5	0.3	7	25.9
16	England	27	195	7.2	1.0	3	11.1
17	Thailand	24	67	2.8	0.3	5	20.8
18	Brazil	24	306	12.8	1.7	2	8.3
19	South Africa	24	141	5.9	0.8	1	4.2
20	Japan	16	122	7.6	1.0	2	12.5
21	Pakistan	15	138	9.2	1.7	0	0.0
22	Italy	14	57	4.1	0.7	1	7.1
23	Bangladesh	13	36	2.8	0.3	3	23.1
24	Algeria	11	44	4.0	0.3	2	18.2
25	Columbia	10	123	12.3	2.0	0	0.0
	Sub-total	4203	29345	7.0	1.1	788	18.8
	Others	3642	30933	8.5	0.9	18	17.1
	Total	7845	60728	7.7	1.0	806	18.7

Highly Productive Institutions and Impact of their Output

Total of 1,141 institutions from India and abroad produced the total output. Out of that data for institutional productivity for 26 prolific institutions consisting of 12.2% of the total output is shown in Table 2. Citations received by these institutions were about 10.1% of all the citations. The remaining 1,115 institutions produced more than three-fourth (87.8%) of the total output and received about 89.9% of all citations. Of the 26 prolific institutions, 18 are from India and remaining eight are from abroad. Of the 26 highly productive institutions four were funded by the Council of Scientific and Industrial Research (CSIR) and two by Indian Council of Agricultural Research (ICAR). Among all the prolific institutions, Anna University topped the list with 99 papers, followed by Indian Institute of Technology (New Delhi) with 88 papers. The overall value of CPP for the papers published in the journal is 7.7. However, for prolific institutions the value of CPP is 6.4. Value of CPP for 18 prolific institutions is less than the overall value of CPP. Among all the prolific institutions, value of CPP is highest (25.7) for CSIR-Central Leather Research Institute (Chennai)

Table 2 — Highly productive institutions and impact of their output

#	Institutions	TP	TC	CPP	RCI	PnC (%)
1	Anna University, Chennai	99	512	5.2	0.7	17 (23.2)
2	Indian Institute of Technology, New Delhi	88	1057	12.0	1.7	8 (9.1)
3	PSG College of Technology, Coimbatore	59	213	3.6	0.5	11 (18.6)
4	Indian Institute of Technology, Roorkee	54	327	6.1	1.0	3 (11.1)
5	Universiti Teknologi Kuala Lumpur, Malaysia	52	218	4.2	0.6	9 (17.3)
6	CSIR-CSIO, Chandigarh	50	113	2.3	0.3	13 (26.0)
7	King Saud University, (Saudi Arabia)	41	91	2.2	0.3	15 (36.6)
8	*JNTU, Hyderabad	40	127	3.2	0.4	7 (17.5)
9	*ICAR-IARI, New Delhi	39	433	11.1	1.6	2 (5.1)
10	Jadavpur University, Kolkata	34	154	4.5	0.6	5 (14.7)
11	National Research Centre, Cairo (Egypt)	34	90	2.6	0.4	9 (26.5)
12	University of Science & Technology, Beijing	34	117	3.4	0.5	7 (20.6)
13	National Institute of Technology, Tamil Nadu	31	110	3.5	0.6	3 (9.7)
14	*K. B. C. North Maharashtra University, Jalgaon	29	303	10.4	1.4	3 (10.3)
15	Jain University, Bangalore	27	105	3.9	0.5	2 (7.4)
16	National Chiao Tung University, Taiwan	27	133	4.9	0.7	4 (14.8)
17	CSIR-National Physical Laboratory, New Delhi	26	215	8.3	1.2	4 (15.4)
18	*CSIR-CLRI, Chennai	24	617	25.7	3.5	2 (8.3)
19	*CSIR-CRRI, New Delhi	23	184	8.0	1.2	3 (13.0)
20	*CSIR-CIMFR, Dhanbad	23	183	8.0	1.2	5 (21.7)
21	Chaoyang University of Technology, Taiwan	22	226	10.3	1.6	0 (0.0)
22	*GBPUAT, Pantnagar	22	161	7.3	1.0	29 (0.1)
23	Andhra University, Visakhapatnam	21	129	6.1	0.8	9 (42.9)
24	*CSR Technology Applications, Egypt	20	95	4.8	0.6	2 (10.0)
25	Jiwaji University, Gwalior	20	119	6.0	0.8	3 (15.0)
26	Universidad Autónoma de Querétaro, Mexico	20	121	6.0	0.8	0 (0.0)
	Sub-total	959	6153	6.4	0.9	157 (16.4)
	Others (1141-26 = 1115)	6886	54575	7.9	1.02	641 (9.3)
	Total	7845	60728	7.7	1.0	798 (10.2)

*Abbreviations of Institutions: ICAR-IARI (Indian Agricultural Research Institute, New Delhi); JNTU (Jawaharlal Nehru Technological University, Hyderabad); KBC (Kavayitri Bahinabai Chaudhari) North Maharashtra University, Jalgaon; CSIR-CLRI (CSIR-Central Leather Research Institute, Chennai) CSIR-CRRI (CSIR-Central Road Research Institute, New Delhi); CSIR-CIMFR (CSIR-Central Institute of Mining & Fuel Research, Dhanbad); CSR Technology Applications (City Science Research & Technology Applications, Egypt)

distantly followed by Indian Institute of Technology (New Delhi) and Indian Agricultural Research Institute (New Delhi). Among the foreign institutions, only Chaoyang University of Technology (Taiwan) had a higher value of CPP than the overall value of CPP. Relative Citation Impact (RCI) also followed similar trend like CPP. The value of RCI is also highest (3.5) for CSIR-Central Leather Research Institute (Chennai). Authors also examined the proportion of papers that were not cited for different institutions. Of the total 7,845 papers, 798 (10.2%) papers were not cited and rest were cited one or more times. Highest (42.7%) share of papers not cited was for Andhra University (India) followed by King Saud University (Saudi Arabia), resulting low value of CPP for these institutions. The share of papers not cited was more than 20% for CSIR-Central Scientific Instruments organization (India), National Research Centre Cairo, CSIR-Central Institute of Mining & Fuel Research (India).

Most Prolific Authors and the Impact of Their Output

The total output was contributed by 7,845 authors. A lists of 22 authors who published 10 or more papers is given in Table 3. These 22 authors published 343 (4.4%) papers. Rest 95.6% papers were contributed by 7,502 authors indicating a highly skewed distribution of output among the authors. Of the 22 prolific authors, nine authors were from abroad and remaining 13 were Indian authors. Among all the authors, *El Enshasy H A* of the Universiti Teknologi Kuala Lumpur, Malaysia, topped the list with 31 papers followed by *El Sayed E A* of the King Saud University, Riyadh, Saudi Arabia. The authors examined the impact of the output of the prolific authors using CPP and PnC%. The average value of CPP was 7.7. Among the 22 authors, only two authors had a higher value of CPP than the overall CPP. These two authors were *Vasudevan P* of Indian Institute of Technology, New Delhi with a CPP value of 11.4 followed by *Mahulikar P P* of Kavayitri Bahinabai

Table 3 — Prolific authors and impact of their output

#	Author	TP	TC	CPP	PnC (%)
1	El Enshasy H A; Universiti Teknologi Kuala Lumpur Malaysia	31	126	4.1	7 (22.6)
2	Elsayed E A; King Saud University, Riyadh, Saudi Arabia	26	74	2.9	8 (30.8)
3	Dutt D; Indian Institute of Technology Roorkee, India	25	125	5.0	1 (4.0)
4	Tyagi C H, Indian Institute of Technology Roorkee, India	21	105	5.0	1 (4.8)
5	Vasudevan P, Indian Institute of Technology, New Delhi, India	20	224	11.2	1 (5.0)
6	Lin Grace T R; National Chiao Tung University, Taiwan.	18	66	3.7	3 (16.7)
7	Hao R; University of Science & Technology, Beijing	17	83	4.9	3 (17.7)
8	Jain R; Jiwaji University, Gwalior, India	17	104	6.1	2 (11.8)
9	Upadhyaya J S; Indian Institute of Technology, Roorkee, India	17	62	3.7	0 (0.0)
10	Osornio-Rios R A; Universiti Autonoma Queretaro, Qro, Mexico	15	74	4.9	1 (6.7)
11	Malik R S; Indian Institute of Technology Roorkee, India	14	91	6.5	0 (0.0)
12	Feng M; University of Science & Technology, Beijing China	13	41	3.2	2 (15.4)
13	Romero-Troncoso R J; University Guanajuato, Mexico	13	64	4.9	1 (7.7)
14	He W; University of Science & Technology, Beijing	12	54	4.5	3 (25.0)
15	Saraswat M; Indira Gandhi Delhi Technical University for Women, New Delhi, India	11	11	1.0	6 (54.6)
16	Santos Jose Antonio C; University of Algarve, Faro, Portugal	11	35	3.2	2 (18.2)
17	Kapadi U R; Kavayitri Bahinabai Chaudhari North Maharashtra, Jalgaon, India	11	82	7.5	1 (9.1)
18	Hundiwale D G; Kavayitri Bahinabai Chaudhari North Maharashtra University Jalgaon, India	11	82	7.5	1 (9.1)
19	Dhanalakshmi R; HCL Technologies, Madras, Tamil Nadu, India	10	21	2.1	3 (30.0)
20	Parthiban P; National Institute of Technology, Tamil Nadu, India	10	23	2.3	2 (20.0)
21	Selvaraju N; National Institute of Technology Calicut, India	10	32	3.2	3 (30.0)
22	Mahulikar P P; Kavayitri Bahinabai Chaudhari North Maharashtra University Jalgaon, India	10	94	9.4	0 (0.0)
Sub-total		343	1673	4.9	51 (14.9)
Others		7502	58605	7.8	1335 (17.8)
Total		7845	60728	7.7	1386 (17.7)

Chaudhari North Maharashtra University Jalgaon with a CPP value of 9.4. The value of CPP was equal for the overall value of CPP for *Kapadi U R* and *Hundiwale D G* both from Kavayitri Bahinabai Chaudhari North Maharashtra University Jalgaon. Of the 7,845 papers published during the study period, 1,386 (17.7%) papers were not cited. The proportion of papers not cited was more than 25% for five authors. Authors with highest number of papers not cited were *Saraswat M* (Indira Gandhi Delhi Technological University for Women, New Delhi), *EL Sayed E A* (King Saud University, Riyadh, Saudi Arabia), *Dhanalakshmi R* (HCL Technologies, Madras, Tamil Nadu), *Selvaraju N* (National Institute of Technology, Calicut, Kerala) and *He W* (University of Science & Technology, Beijing, China). The proportion of papers not cited for these authors were 54.6%, 30.8%, 30.0%, 30.0% and 25% respectively. Of the 22 prolific authors, 13 were from most prolific institutions listed in Table 3. Highest number (4) of prolific authors were from Indian Institute of Technology (Roorkee) followed by Kavayitri Bahinabai Chaudhari North Maharashtra University (Jalgaon) and University of Science & Technology (Beijing) three each. One prolific author each was from Indian Institute of Technology, New Delhi, Universiti Teknologi Kuala Lumpur, Malaysia, King Saud University, Riyadh (Saudi Arabia), National Institute of

Table 4 — Pattern of citations

Range of Citations	Number of Papers	Percent of Papers	Cumulative Percent of Papers	Total citations
0	473	18.6	18.6	0
1	355	14.0	32.6	355
2	322	12.7	45.3	644
3	231	9.1	54.4	693
4	167	6.6	61.0	668
5	139	5.5	66.5	695
6–10	413	16.2	82.7	3135
11–20	260	10.2	92.9	3740
21–50	131	5.2	98.1	3921
51–99	35	1.4	99.5	2412
> 99	14	0.6	100.0	3222
Total	2540	100.0		19485

Technology, Tamil Nadu, and National Chiao Tung University, Taiwan.

Pattern of Citations

Citation counts are an indicator of the impact of an article published in a journal. The impact was examined by counting the number of times a document is cited by other documents. Citation counts estimates the visibility and impact of a document. Greater the citation, higher may be the influence and visibility. The citation pattern of documents published in the journal during the study period as seen in the first week of April 2022 has been depicted in Table 4. During this period, 2,540 papers

received 19,485 citations. Of the total papers included in the analysis 473 (18.6%) papers were not cited and rest were cited one or more times. Of the total cited papers, slightly less than half (47.9%) were cited between 1–5 times. The remaining papers were cited more than five times. About two per cent papers were cited more than 50 times and only 14 papers were cited more than 99 times.

Highly Cited Papers

Of the 2,540 papers published during the period of 2001–2020, 14 papers were cited more than 99 times for which bibliometric details has been shown in Table 5. Of these 14 papers, three papers were contributed by authors from abroad, of which two were from Taiwan and one from Portugal. Remaining 11 highly cited

Table 5 — Highly Cited Papers published during 2001–2020

S. No.	Highly Cited Papers	Citations	CPY	Rank by CPY
1	Dutta P K, Dutta J & Tripathi V S, Chitin and Chitosan: Chemistry, properties and applications (Review Paper), JSIR 63(1) (2004) 20–31. Motilal Nehru National Institute of Technology, Allahabad, Uttar Pradesh, India.	797	49.8	1
2	Carvalho F, Duarte L C & Gírio F M, Hemicellulose biorefineries: A review on biomass pretreatments, JSIR 67(11) (2008) 849–864. Instituto Nacional de Engenharia, Lisbon, Portugal.	462	38.5	2
*3	Kumar S, Dhar D N & Saxena P N, Applications of metal complexes of Schiff bases - A review, JSIR 68(3) (2009) 181–187. Hi Tech Institute of Engineering & Technology, Ghaziabad, India; Indian Institute of Technology, Kanpur, Uttar Pradesh, India; Bareilly College, Bareilly, Uttar Pradesh, India.	290	26.4	3
4	Sukumaran R K, Singhanian R R & Pandey A, Microbial cellulases - Production, applications and challenges (Review paper), JSIR 64(11) (2005) 832–844. National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram, Kerala, India.	269	17.9	5
*5	Mohapatra D, Mishra S & Sutar N, Banana and its by-product utilisation: An overview (Review Paper), JSIR 69(5) (2010) 323–329. Anand Agricultural University, Anand, Gujarat, India; College of Agricultural Engineering and Post Harvest Technology, Imphal Central Agricultural University, Gangtok, India.	224	22.4	4
6	Padamwar M N, Pawar A P, Silk sericin and its applications: A review, JSIR 63 (4) (2004) 323–329. Poona College of Pharmacy, Pune, (Bharati Vidyapeeth Deemed University), Poona, Maharashtra, India.	167	10.4	9
*7	Nalawade P, Aware B, Kadam V J & Hirlekar R S, Layered double hydroxides: A review, JSIR 68(4) (2009) 267–272. College of Pharmacy, CBD Belapur, Navi Mumbai; Bharati Vidyapeeth Deemed University, Maharashtra, India.	160	14.5	6
8	Gnanasekaran D, Madhavan K & Reddy B S R, Developments of polyhedral oligomeric silsesquioxanes (POSS), POSS nanocomposites and their applications: A review, JSIR 68(6) (2009) 437–464. CSIR-Central Leather Research Institute, Chennai, Tamil Nadu, India.	152	13.8	7
*9	Gopalsamy B M, Mondal B & Ghosh S, Taguchi method and ANOVA: An approach for process parameters optimization of hard machining while machining hardened steel (Research Article), JSIR 68(8) (2009) 686–695. CSIR-Central Mechanical Engineering Research Institute, Durgapur, India; National Institute of Technology, Durgapur, India.	D139	12.6	8
10	Patel M & Naik S N, Gamma-oryzanol from rice bran oil - A review, JSIR 63(7) (2004) 569–578. Indian Institute of Technology, New Delhi, India.	127	7.9	12
11	Kanagaraj J, Velappan K C, Babu N K C & Sadulla S, Solid wastes generation in the leather industry and its utilization for cleaner environment - A review, JSIR 65(7) (2006) 541–548. CSIR-Central Leather Research Institute, Chennai, Tamil Nadu, India.	122	8.7	10
12	Mehta N, Applications of chalcogenide glasses in electronics and optoelectronics: A review, JSIR 65(10) 2006 777–786. Pranveer Singh Institute of Technology, Kanpur, Uttar Pradesh, India.	110	7.9	12
**13	Saratale G D, Chen S D, Lo Y C, Saratale R G & Chang J S, Outlook of biohydrogen production from lignocellulosic feedstock using dark fermentation - a review, JSIR 67(11) (2008) 962–979. National Cheng Kung University, Tainan, Taiwan; Shivaji University, Kolhapur, Maharashtra, India.	103	8.6	11
14	Ju Y H & Vali S R, Rice bran oil as a potential resource for biodiesel: A review, JSIR 64(11) (2005) 866–882. National Taiwan University of Science & Technology, Taipei, Taiwan.	100	6.7	13

*Papers in domestic collaboration, **Papers in International collaboration

Table 6 — Pattern of Authorship

Year Blocks	Number of Authors per Paper								Total Papers	CC
	Single Authored		Two Authored		Multi Authored		Mega Authored			
	Papers	%	Papers	%	Papers	%	Papers	%		
2001–2004	67	16.1	126	30.2	186	44.6	38	9.1	417	0.54
2005–2008	48	8.9	156	28.9	273	50.6	63	11.7	540	0.59
2009–2012	23	4.2	174	31.7	253	46.1	99	18.0	549	0.63
2013–2016	14	3.1	164	36.4	212	47.1	60	13.3	450	0.62
2017–2020	28	4.8	172	29.5	295	50.5	89	15.2	584	0.62
Total	180	7.1	792	31.2	1219	48.0	349	13.7	2540	0.60

papers were contributed by Indian authors. Of the 14 papers, four papers were written in domestic collaboration and one in international collaboration.

Citations received by a paper vary according to the citation window for which citations are calculated. To overcome the problem in variation of citations, authors have calculated Citation per Year (CPY) used earlier by Garg and Tripathi.¹⁵ Based on the values of CPY, it is observed that the rank of authors arranged by total citations received changes slightly if arranged by CPY. The ranking of first three authors remained unchanged while it changed for remaining 11 authors. For instance, the author ranked at # 6 changed to rank 9 if arranged by CPY. The rank of other papers also changed slightly.

Pattern of Authorship

The pattern of authorship has been examined by dividing the data into four categories. These are single, two, multi (3–4 authors per paper) and mega (more than 4 authors per paper) authored papers. The data for the pattern of authorship has been shown in Table 6 and Fig. 3. It indicates that the share of multi-authored papers was highest (48%) followed by two authored papers (31.2%). The proportion was lowest for single authored papers. Graphical representation of data for pattern of authorship indicates that the share of single authored papers has decreased in the last four blocks of 2005–2008 to 2017–2020, while the share of multi-authored papers has increased in last three blocks resulting in high value of collaborative coefficient (CC).

Conclusions

The present study examined the chronological distribution of publication output and the variation in the impact factor of Journal of Scientific and Industrial Research during the 20 years period of 2001–2020. Analysis of data indicates a decreasing trend of output for the journal after 2011 and

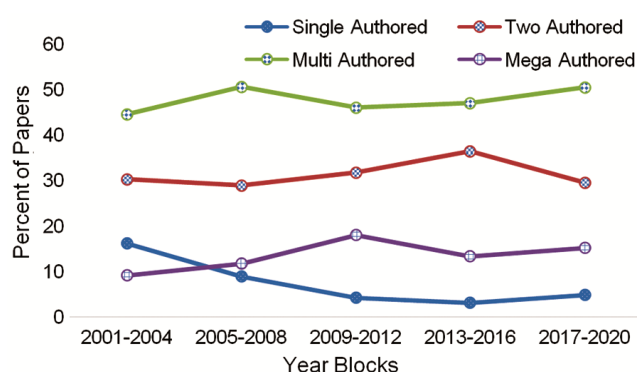


Fig. 3 — Pattern of Authorship

increasing trend of impact factor during later period. Based on the pattern of geographical distribution of output, it is observed that most of the research contributions to the journal are from Asian region mainly dominated by India and other developing nations. Distribution of research output is highly skewed for countries, institutions and authors. Portugal had the best performance indicators in terms of CPP, RCI and PnC%. Academic institutions from India followed by CSIR institutions contributed the highest number of papers. Most of the prolific institutions and authors were from India. CSIR-Central Leather Research Institute (Chennai) had the highest value of CPP. Of the 14 highly cited papers four papers were written in domestic collaboration and one in international collaboration. Three most cited papers were authored by authors from abroad and remaining 11 were contributed by Indian authors. Pattern of authorship indicate that the share of multi-authored papers has increased in last three blocks resulting in high value of collaborative coefficient (CC).

The present study could be useful for all the stakeholders of the journal like the Editor-in-Chief, Editors, Editorial Board members, authors and readers of the journal.

References

- 1 Narang A, Indian journal of pure and applied mathematics: A bibliometric study, *Ann Libr Inf Stud*, **51(1)** (2004) 28–38.
- 2 Jena K L, A bibliometric analysis of the journal “Indian journal of fibre and textile research, 1996–2004”, *Ann Libr Inf Stud*, **53(1)** (2006) 22–30.
- 3 Vijay K R & Raghvan I R, Journal of food science and technology: A bibliometric study, *Ann Libr Inf Stud*, **54(4)** (2007) 207–12.
- 4 Garg K C, Sharma P & Kumar S, Scientometric profile of the journal Mousam, *Ann Libr Inf Stud*, **55(1)** (2008) 76–80.
- 5 Kumar A, Prakashan E R, Kalyane V L, Kumar & Pramana V, A journal of physics: A scientometric analysis, *Ann Libr Inf Stud*, **55(1)** (2008) 52–61.
- 6 Nishy P, Parvatharajan P & Prathap G, Visibility and impact of the Indian journal of chemistry, Section B during 2005–2009 using scientometric techniques, *Indian J Chem Sect B*, **51B** (2012) 269–284.
- 7 Garg K C & Singh R K, Indian journal of traditional knowledge: A bibliometric study, *Library Herald*, **55(4)** (2017) 488–502.
- 8 Bala M & Singh M P, A scientometric study of journal of biochemistry and biophysics (JBB), *Libr Philos Pract* (e-journal), (2014) 1168.
- 9 Kalita D, The scientometrics of Nature, *J Scientometric Res*, **5(2)** (2016) 123–134.
- 10 Das D, Bibliometric study of journal of chemical sciences: 1987–1996, *Eur J Mol Clin Med*, **7(9)** (2020) 2055–2063.
- 11 Dalai B K & Ramesh D B, Publication pattern in scientific and industrial research in India-A bibliometric study, *Ann Libr Inf Stud*, **42(1)** (1995) 35–38.
- 12 Rajendran P, Jeysankar R & Elango B, Scientometric analysis of contributions to journal of scientific and industrial research, *Int J Digit Library Serv*, **1(2)** (2011) 79–89.
- 13 May Robert M, The scientific wealth of nations, *Science*, **275(5301)** (1997) 793–796, doi: 10.1126/science.275.5301.793.
- 14 Garfield E, Citation analysis as a tool in journal evaluation, *Science*, **178(4060)** (1972) 471–479. <http://www.garfield.library.upenn.edu/essays/V1p527y1962-73.pdf>
- 15 Garg K C & Tripathi H K, Addendum to bibliometrics and scientometrics in India during 1995–2014: An overview of studies during 1995–2014, *Ann Libr Inf Stud*, **64(3)** (2017) 204–208, [https://www.niscair.res.in/jinfo/ALIS/ALIS%2064\(3\)%20\(Addendum\).pdf](https://www.niscair.res.in/jinfo/ALIS/ALIS%2064(3)%20(Addendum).pdf)