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Kunwar Singh Dr.

Department of Library and Information Science, Banaras Hindu University, Varanasi,
kunwar.singh@bhu.ac.in

Akhilesh Kumar Varma Dr.

Govt. Collage Jaitwara, Satna-485221, akhileshbhu23@gmail.com

Madan Singh

Banaras Hindu University, Varanasi, madanrawatgeit@gmail.com

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Research Productivity and Performance of Journals of Informetrics

Kunwar Singh^a Akhilesh Kumar Varma^b Madan Singh^c

ABSTRACT

This study explores the research productivity and performance of journals of informetrics (JOI) for selected 13 years between 2007-2019. The research productivity was evaluated based on a methodology followed and used in this study: Annual growth rate (AGR), relative growth rate (RGR) and doubling time (Dt); authorship pattern and Authors productivity, degree of collaboration (DC), collaborative index (CI), most productive Institutes, and countries, year-wise distribution of the publications. The Scopus database was consulted for collecting of required data for this study. A total of 978 publications were found during the study period. The study shows that the highest numbers of 106(10.84%) papers were published in 2017 and the lowest 33(3.37%) research articles were published in 2007. It was also observed from the study that multi-authors published the majority of documents. Further, it was revealed that out of 58 countries, the United States contributed (12.40%) alone compared to other countries. The finding exposed that out of six documents types, research articles 863(88.24%) were the more contributed item in this type. The present study shows that the journal of informetrics (JOI) has average performance because of continuous fluctuation in publications' annual growth.

Keywords: *Scientometri, Author productivity, Bibliometrics, Journals of Informetrics, Annual growth rate, degree of collaboration, Collaborative index, etc.*

Introduction

This present study aimed to explore the research productivity and performance of journals of informetrics (JOI) for selected 13 years between 2007-2019. Since its inception, Journals of informatics have served as a medium for publishing research articles in various fields such as bibliometrics, scientometric, webometric, potentiometry, altimetric, and research evaluation. It also includes theoretical and empirical work in the field of informatics. In general, case studies, such as bibliometric analyzes that focus on specific research areas or countries, are not suitable for publication in an Official Journal unless they contain elements of an innovative methodology (<https://www.journals.elsevier.com/journal-of-informetrics>).

^aDr. Kunwar Singh, Assistant Professor, Dept. of Lib. & Inf. Sc., BHU.

Email: kunwar.singh@bhu.ac.in

^bDr. Akhilesh Kumar Varma, Librarian, Govt. Collage Jaitwara, Satna-485221, India.
Corresponding author Email: akhileshbhu23@gmail.com

^cMadan Singh, Dept. of Lib. & Inf. Sc., BHU. Email: madanrawatgeit@gmail.com

Because we chose the computer journal as the source journal for bibliometric studies, well-known authors from the same journal in different periods also made it a secondary source. The researchers have selected 13 years to investigate growth rates and joint research activity, and many other sources for this study.

The research's success is related to productivity and field impact and reflects its importance and opinion (Glanzel and Schoepflin, 1999; Kostoff, 1998; Moed, 2005; Narin, 1976; Retzer and Jurasinski, 2009). Publication analysis reflects the field's research productivity, and the citation of the study demonstrates the field's research impact (Borgman, 1990). Scientometric is a science that measures and analyzes science (Hussain, 2017). Pathak (2020) examined the scientometric profile of the Indian Journal of Pharmaceutical Research 2007-2018. The study results showed that 997 articles with 1714 citations and 14 h-indexes were published during the study period. 30.2% of articles published in journals coming from foreign countries and Turkey following her 93 publications. Nine of the ten most-cited publications were published in 2011. Gutierrez-Rubio et al. (2019) performed a bibliographic analysis of the Journal of Philosophy of Education. The study's findings exposed that Low values of collaborative index and degree of collaboration have been found compared to other Social Science journals. Geographical co-operation is analyzed, as the countries' networks revolve around the United Kingdom. On the other hand, many authors studied the authorship pattern and degree of collaboration in their studies, Hajam(2017); Varma & Singh (2017); Varma & Singh (2017); Singh, Varma, and Pradhan (2017); Singh, Nayak, and Varma (2017); Singh, and Varma (2017); Varma and Singh, (2017); Geetha and Thilagavathy (2018).

Objectives of the study

The study's objectives were to examine the productivity and research performance of the Journal of Informetrics using Scientometric methods. The following objectives of the study are:

- To identify the year-wise distribution of publications during the study period 2007-2019;
- To examine the authorship pattern and authors productivity;
- To calculate the degree of collaboration (DC) and collaborative index (CI);
- To the Annual growth rate (AGR), relative growth rate (RGR), and doubling time (Dt);
- To analyse the institution-wise, country-wise, and year-wise citation, and
- To find out the types of publications.

Methods

Search Strategy

The data were extracted in this present study was based on the Scopus database. A search was performed using the Scopus database (www.scopus.com), one of the world's most extensive peer-reviewed literature developed by Elsevier. In the basic search, the chosen keywords' results can be limited by publication date, subject area, and document type (Falagas et al., 2008). The keyword entered in the Scopus engine to achieve the study's objectives was "Journal of informetrics." The search string used for "SRCTITLE (journal AND of AND informetrics) AND (EXCLUDE (PUBYEAR, 2020))" on October 20, 2020. The researchers have collected a total of 978 data from 2007-2019. All the retrieved and collected data were subsequently examined, observed, analyzed, and tabulated for making observations.

Data analysis

For evaluating research productivity, the researchers have used the various scientometric measures to analyse the total contributions of authors submitted to the journal of informetrics between 2007-2019; (a) Annual growth rate (AGR), relative growth rate (RGR), and doubling time(Dt); (b) authorship pattern and Authors productivity; (c) degree of collaboration (DC); (d) collaborative index (CI); (e) most productive Institutes, and countries; (f) year-wise distribution of the publications to arrive at the relevant results. The flow chart of the search process is presented below in figure 1.

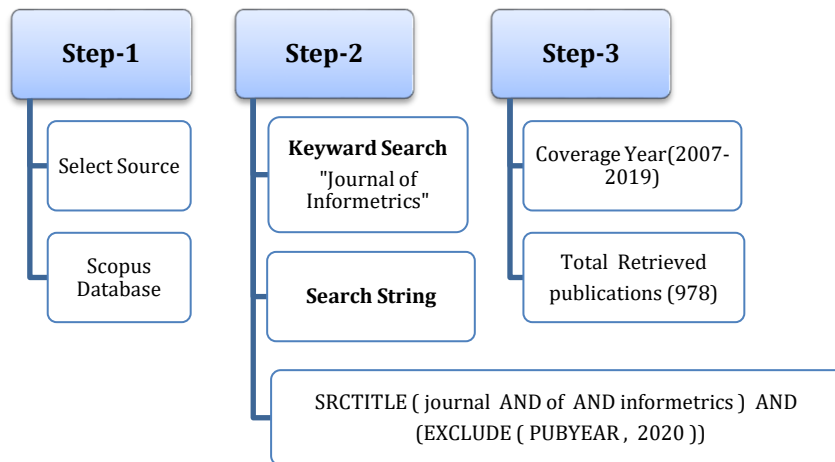


Figure.1: Search approachused for the study

Results and discussion

Year-wise distribution of documents

For this study, a total number of 978 published documents were found. Figure 2 shows an increase in trends in published research from 2007 to 2019. Out of the 978 publications, 106 (10.84%) are the highest in 2017, followed by the lowest 33 (3.37%) publications in 2007. The range of publications published annually during the study period ranged from 33 to 106. It concludes that the journal of informetrics (JOI) has average performance because of continuous fluctuation in research performance, as shown in the above figure. 2.

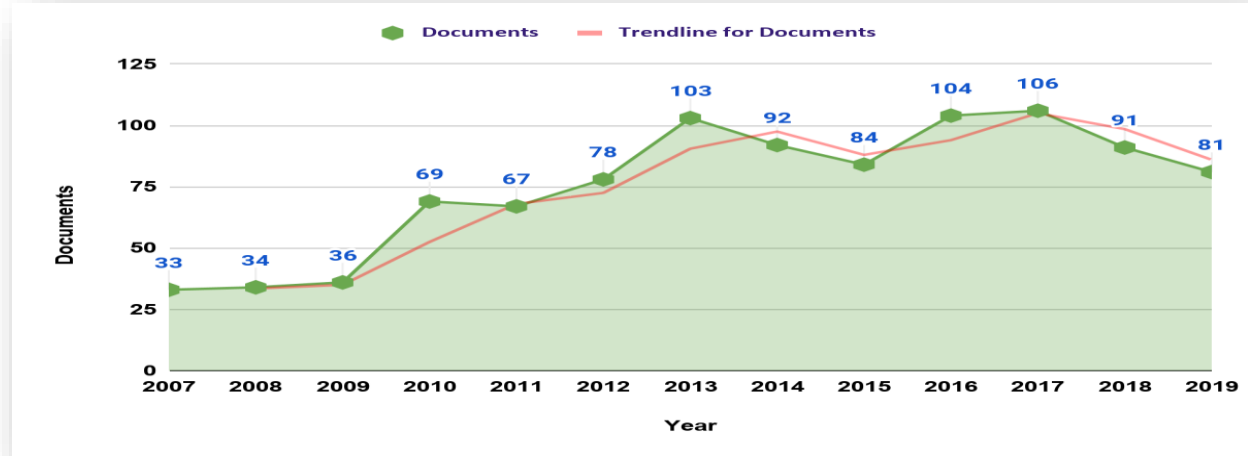


Figure 2: Year-wise distribution

Annual growth rate (AGR)

The growth rate is a measurement that is essential in any field. In meaning, the growth of the number of publications in a particular discipline is often a measure of the annual increase or decrease. Here, the AGR is determined according to the formula below. In our study, the final score was 34 in 2008, the first score was 33 in 2007, and the AGR in 2008 was 3.03. Table 1 provides the AGR of the number of research articles between 2007 and 2019. The formula is as given here:

$$AGR = \frac{EndValue - FirstValue}{FirstValue} \times 100$$

$$AGR_{2008} = \frac{34-33}{33} \times 100 = 3.03$$

Relative growth rate (RGR)

The relative growth rate and doubling time of publications have been measured based on RGR and Dt model, Mahapatra developed the particular model in 1985. On the observation of table 1, the average RGR has been recorded at a rate of 0.28, while a maximum RGR of 0.71 has been recorded in the year 2008, and a minimum RGR of 0.09 has been counted in the year 2019. So, it can be concluded that the RGR has decreased 0.71 to 0.09 from 2008 to 2019.

$$RGR = \frac{W2 - W1}{T2 - T1}$$

Where,

W1 = Natural logarithms of no. of publications published until the previous year

W2 = Natural logarithms of no. of publications published until the present year.

T2 - T1 = Difference between the initial year and the final year.

$$RGR_{2008} = \frac{4.20-3.50}{2008-200} = 0.71$$

The formula of corresponding Dt for contributions and page measurement.

Doubling time (Dt)

$$Dt = \frac{0.693}{R}$$

Where R= Relative growth

$$Dt_{2008} = \frac{0.693}{0.71} = 0.98$$

Table 1 observed that the average doubling time (Dt) was 3.56, while the maximum Dt was recorded at 8.02 in 2019 and minimum in 2008.

Table 1: AGR of research documents

Year	TNP	NC	W1	W2	AGR	RGR	Dt
2007	33	33	0	3.50	-	-	-
2008	34	67	3.50	4.20	3.03	0.71	0.98
2009	36	103	4.20	4.63	5.88	0.43	1.61
2010	69	172	4.63	5.15	91.67	0.51	1.35
2011	67	239	5.15	5.48	-2.9	0.33	2.11
2012	78	317	5.48	5.76	16.42	0.28	2.45
2013	103	420	5.76	6.04	32.05	0.28	2.46
2014	92	512	6.04	6.24	-10.68	0.20	3.50
2015	84	596	6.24	6.39	-8.7	0.15	4.56
2016	104	700	6.39	6.55	23.81	0.16	4.31
2017	106	806	6.55	6.69	1.92	0.14	4.92
2018	91	897	6.69	6.80	-14.15	0.11	6.48
2019	81	978	6.80	6.89	-10.99	0.09	8.02

*TNA=Total no. of publications, NC=Cumulative AGR=Annual growth rate,
RGR=Relative Growth Rate, Dt= Doubling time

Authorship pattern

As figure 3 denotes that the maximum number of the research publications were published by double authors 300(24.55%), followed by single author 252(10.31%), and the minimum number of contributions were published by five authors that is, 27(7.65%). We observed from the study that Multi-authors published the majority of publications.

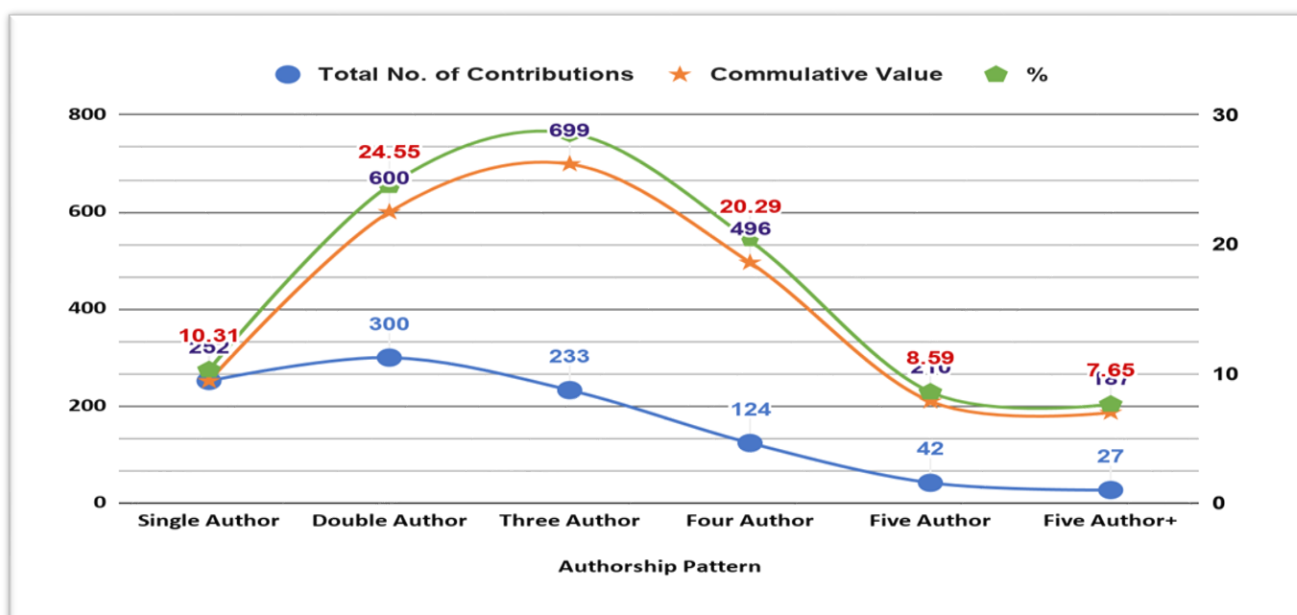


Figure 3: Authorship pattern

Single and co-authorship pattern

Figure 4 demonstrates the authorship pattern of single and joint contributions during the study period. The maximum numbers (74.23%) of contributions were by joint authors, and the rest of the 28(25.77%) contributions were made by a single author.

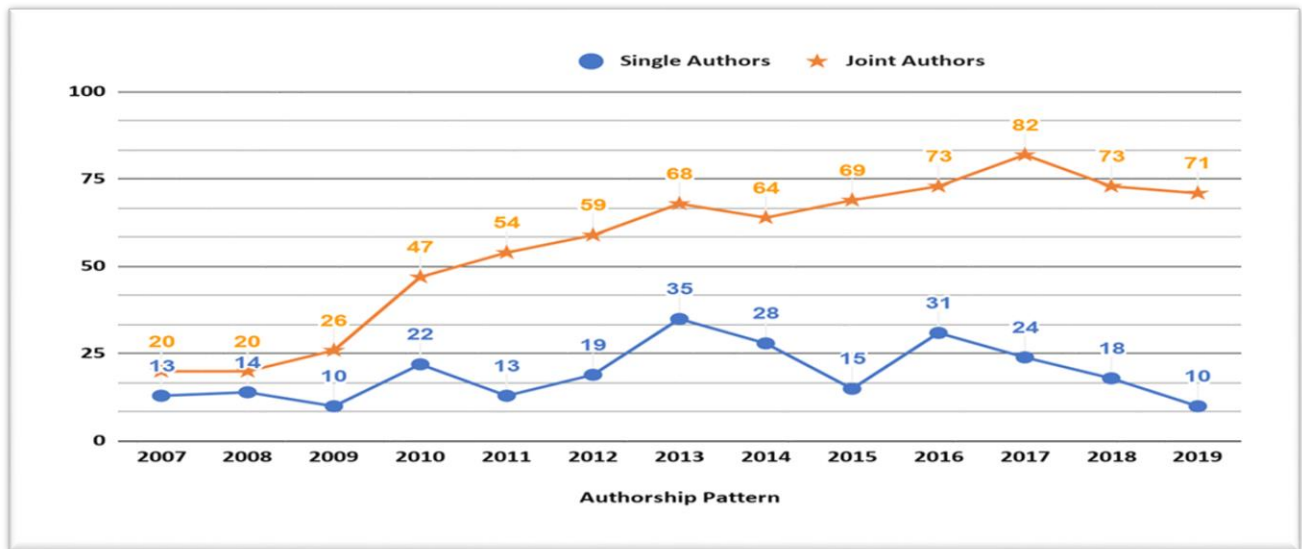


Figure 4: Authorship pattern of solo and co-authorship

Author productivity

It can be observed from Table 2 depicts that the analysis associated with authors productivity of Journals of Informetrics (JOI) that identified the total average number of authors per publication that is 2.50 and the average productivity per author is 0.42. The highest number of author productivity, 279(2.63), was published in 2017.

Table 2: Author productivity of journals of informetrics

Year	TNP	TNA	AAPP	AP	Year	TNP	TNA	AAPP	AP
2007	33	72	2.18	0.46	2014	92	220	2.39	0.42
2008	34	64	1.88	0.53	2015	84	214	2.55	0.39
2009	36	91	2.53	0.4	2016	104	264	2.54	0.39
2010	69	145	2.1	0.48	2017	106	279	2.63	0.38
2011	67	173	2.58	0.39	2018	91	237	2.6	0.38
2012	78	191	2.45	0.41	2019	81	255	3.15	0.32
2013	103	239	2.32	0.43	Total	978	2444	2.5	0.4

*TNP= Total no. of publications, TNA= Total no. of authors,

AAPP=Average author per publications,AP=Author productivity

$$\text{Author Productivity} = \frac{\text{Total no. of Publications}}{\text{Total no. of authors}}$$

$$\text{Author Productivity} = \frac{33}{3723} = 0.46$$

Single Versus Multi-Authored Papers (Year-wise)

The per capita publications = Number of items/Number of authors = 978/726 = 1.35.

The per capita publication works out to 1.35.

Table 3:Year-wise single and multi-authored publications

Year	Publications (%)		TNP	TNP (%)	Year	Publications (%)		TNP	TNP (%)
	Ns	Nm				Ns	Nm		
2007	13(5.16)	20(2.75)	33	3.37	2014	28(11.11)	64(8.82)	92	9.41
2008	14(5.56)	20(2.75)	34	3.48	2015	15(5.95)	69(9.90)	84	8.59
2009	10(3.97)	26(3.58)	36	3.68	2016	31(12.30)	73(10.06)	104	10.63
2010	22(8.73)	47(6.47)	69	7.06	2017	24(9.52)	82(11.29)	106	10.84
2011	13(5.16)	54(7.44)	67	6.85	2018	18(7.14)	73(10.06)	91	9.3
2012	19(7.54)	59(8.13)	78	7.98	2019	10(3.97)	71(9.78)	81	8.28
2013	35(13.89)	68(9.37)	103	10.53	Total	252(100.00)	726(100.00)	978	100

Note: Ns -Single authors, Nm -Multi-authors

Table 3 represents the data about single and multi-authored publications. A total of 252 publications (25.77%) have been contributed by a single author and 726 contributions (74.23%) by multiple authors. It was observed that multi-authored publications made the maximum number of contributions.

Degree of collaboration (DC)

Degree of Collaboration (DC) is defined as the ratio of the number of joint publications to the number of research publications in a discipline during a given period. It is proposed by (Subramanyam 1983) as:

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

Where C - DC is in a scientific discipline,

Nm - this is the number of research publications by various authors in a scientific field published in one year

Ns - This is the number of publications by unique authors of the same year's discipline. Using this formula, DC is set.

$$C = \frac{726}{726+252} = 0.74$$

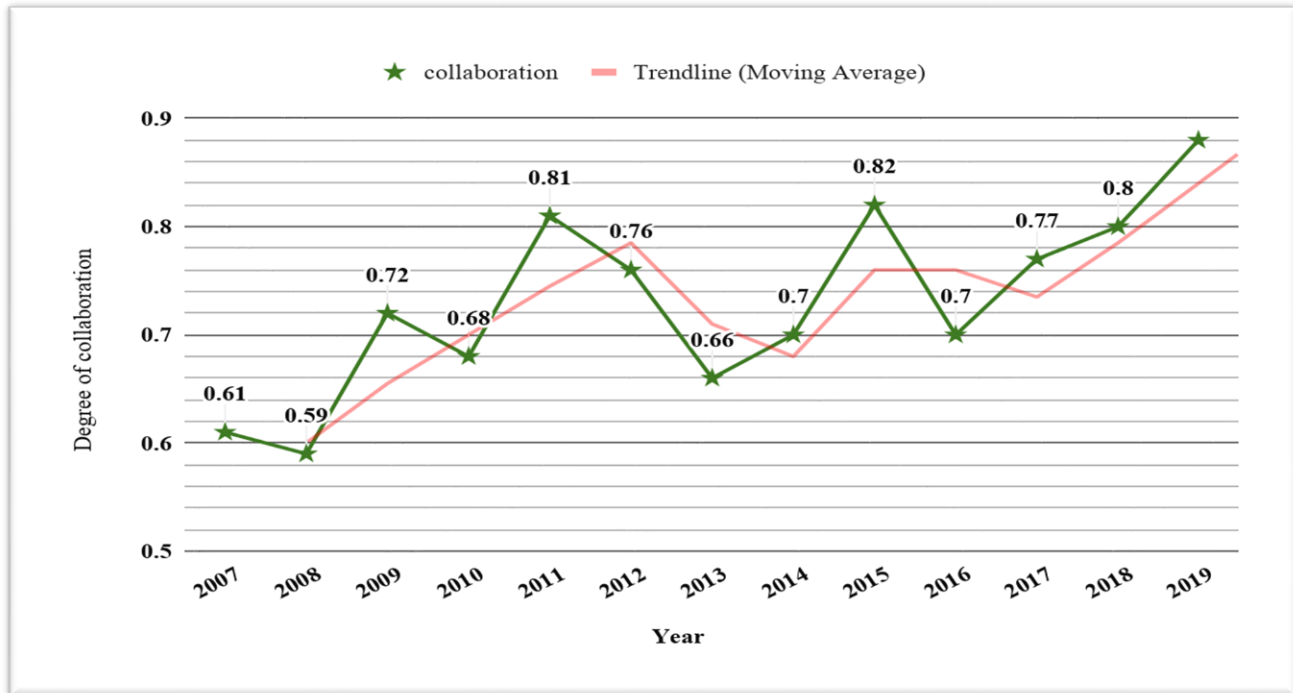


Figure 5: Degree of collaboration

Collaboration index (CI)

It is the mean number of authors per joint publications. For this analysis, we have omitted the single-authored publications, which are equal to 1 always. To determine the mean number of authors per jointly authored publications, the following formula has been used.

$$CI = \frac{\text{Total authors}}{\text{Total joint papers}}$$

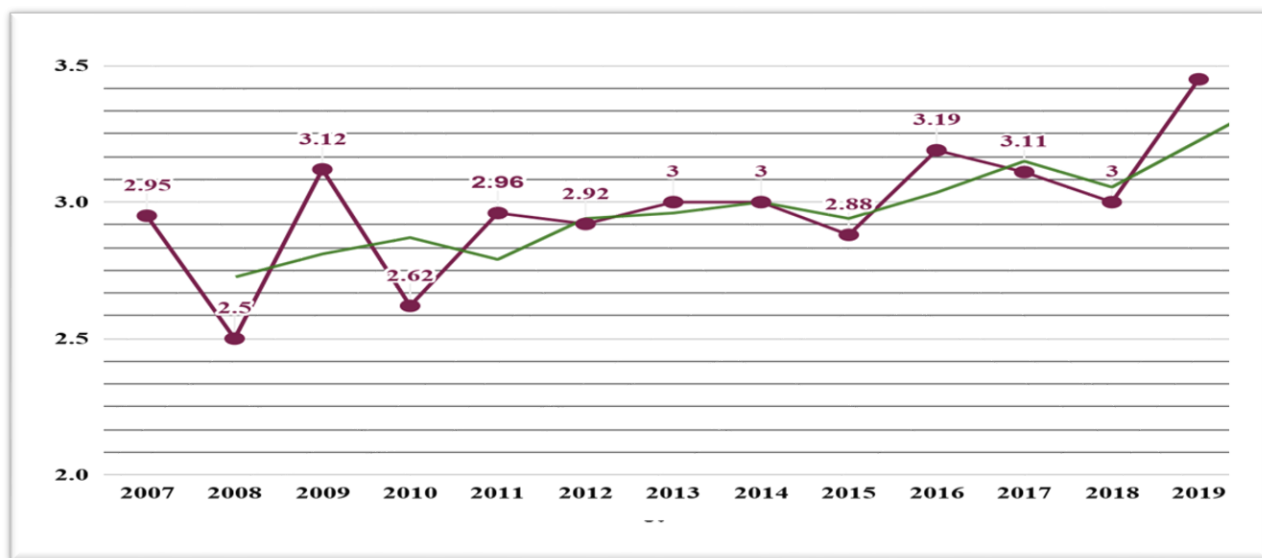


Figure 6: Collaborative index of articles

Figure 6 provide the year wise mean number of publications per jointly authored publications. CI ranges from 2.50 to 3.45, with an average of 3.02 per jointly written publications

Country-wise distribution of publications

Table 4 explains that out of 978 contributions, the majority of 12.40% contributions made by the United States alone and secured the first position, followed by 10.99% were contributed by China is the second position, 8.61% of contributions came from the Netherlands is the third position, 7.57% of contributions came from Spain, 7.20% from Germany and Italy; 6.98% from Belgium; 6.24% from the United Kingdom; 3.04% from Switzerland; 2.52% from Canada; 2.08% from Taiwan; 2.00% from Poland and Sweden; 1.93% from South Korea; 1.78% from Australia; 1.34% from Denmark; 1.26% from France; 1.19% from Hungary and 1.11% from Brazil. However, it was inferred that out of the 58 countries mentioned above, the United States prioritizes research compared with other countries.

Table4: Country-wise distribution

Rank	Country	TNP	%	Rank	Country	TNP	%
1	United States	167	12.40	22	Japan	7	0.52
2	China	148	10.99	22	Portugal	7	0.52
3	Netherlands	116	8.61	23	Turkey	6	0.45
4	Spain	102	7.57	24	Malaysia	5	0.37

5	Germany	97	7.20	24	Pakistan	5	0.37
5	Italy	97	7.20	24	Russian Federation	5	0.37
6	Belgium	94	6.98	24	Singapore	5	0.37
7	United Kingdom	84	6.24	25	Hong Kong	4	0.30
8	Switzerland	41	3.04	25	Ireland	4	0.30
9	Canada	34	2.52	25	Romania	4	0.30
10	Taiwan	28	2.08	26	Slovakia	3	0.22
11	Poland	27	2.00	26	Thailand	3	0.22
11	Sweden	27	2.00	27	Benin	2	0.15
12	South Korea	26	1.93	28	Chile	2	0.15
13	Australia	24	1.78	28	Mexico	2	0.15
14	Denmark	18	1.34	29	New Zealand	2	0.15
15	France	17	1.26	30	Argentina	1	0.07
16	Hungary	16	1.19	30	Croatia	1	0.07
17	Brazil	15	1.11	30	Ecuador	1	0.07
18	Czech Republic	11	0.82	30	Georgia	1	0.07
18	South Africa	11	0.82	30	Lebanon	1	0.07
19	Finland	10	0.74	30	Lithuania	1	0.07
19	Israel	10	0.74	30	Luxembourg	1	0.07
20	Norway	9	0.67	30	Macao	1	0.07
21	Greece	8	0.59	30	Saudi Arabia	1	0.07
21	India	8	0.59	30	Serbia	1	0.07
21	Iran	8	0.59	30	Tunisia	1	0.07
21	Slovenia	8	0.59	30	Ukraine	1	0.07
22	Austria	7	0.52	30	United Arab Emirates	1	0.07

Top ten collaborative Affiliations

Researchers have used measures to analyzewise affiliation collaboration in publishing scientific research publications during the study period. In this way, Table 10 illustrates the status of the research output. The maximum number of 60 research publications was published by the Administrative Headquarters of the Max Planck Society. The minimum number 39 was published by Indiana University Bloomington and The Amsterdam School of Communications Research -ASCoR.

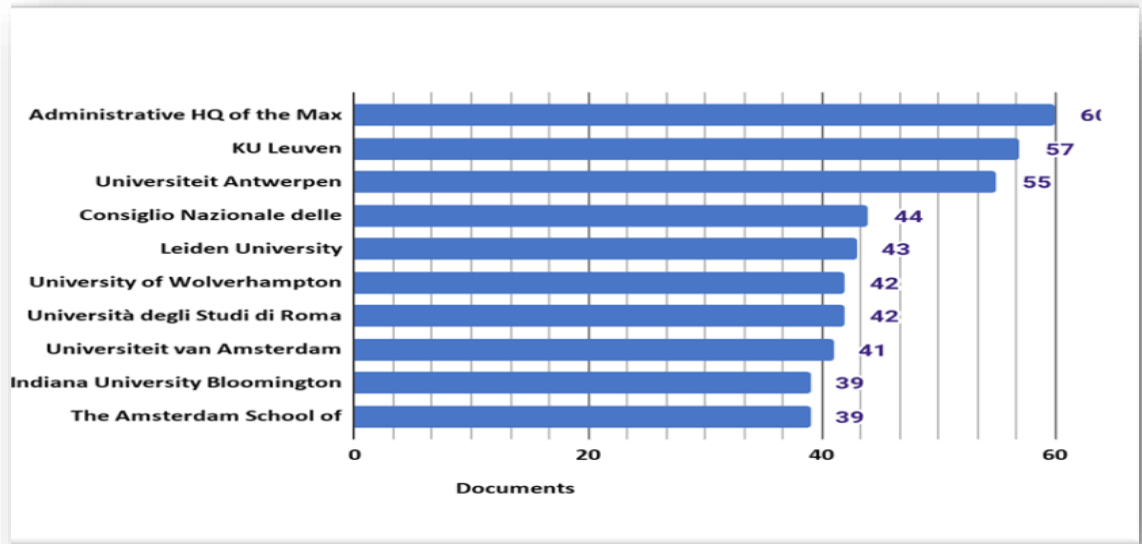


Figure 7: Top ten collaborative affiliation

Year-wise distributions of citation

Figure 7 represent the year wise numbers of references that the authors cited in their publications. There were 978 publications with 24,297 complete citations during the period 2007-2019, and it shows that the distribution of citations by volume shows that the maximum number of citations was 3265 (13.44%) in 2011, while the minimum number of citations was 279 (1.15%) in 2019.

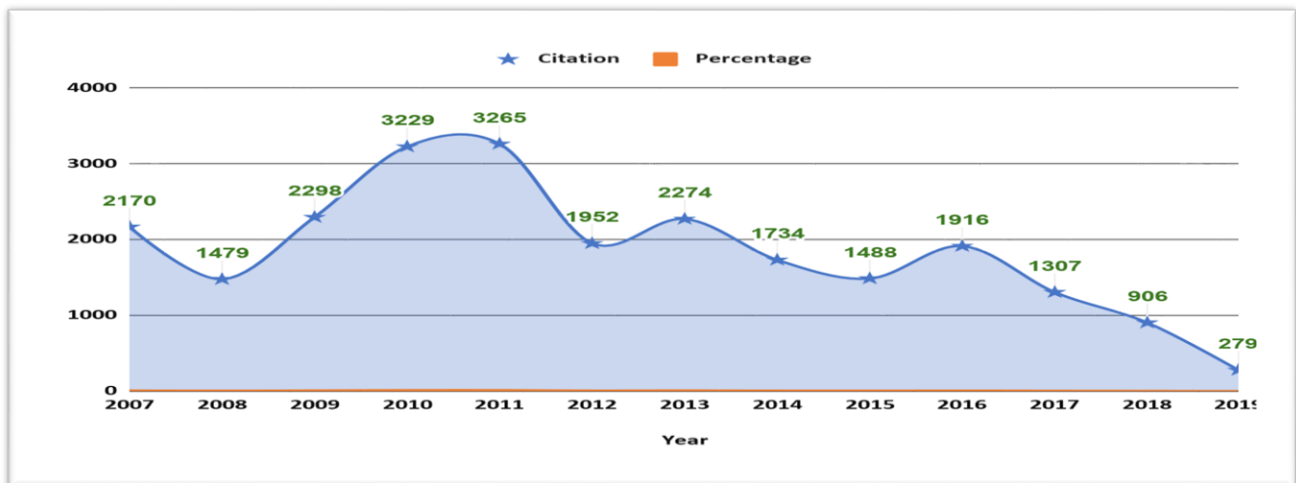


Figure 8: Contributions of citations

Types of documents

It is evident from figure nine that the highest number of publications published were research articles 863(88.24%), followed by Letter 87(8.90 %), Review 11(1.12%), Editorial 8(0.82%), Erratum 6(0.61%) and minimum 3(0.31%) for Conference Paper.

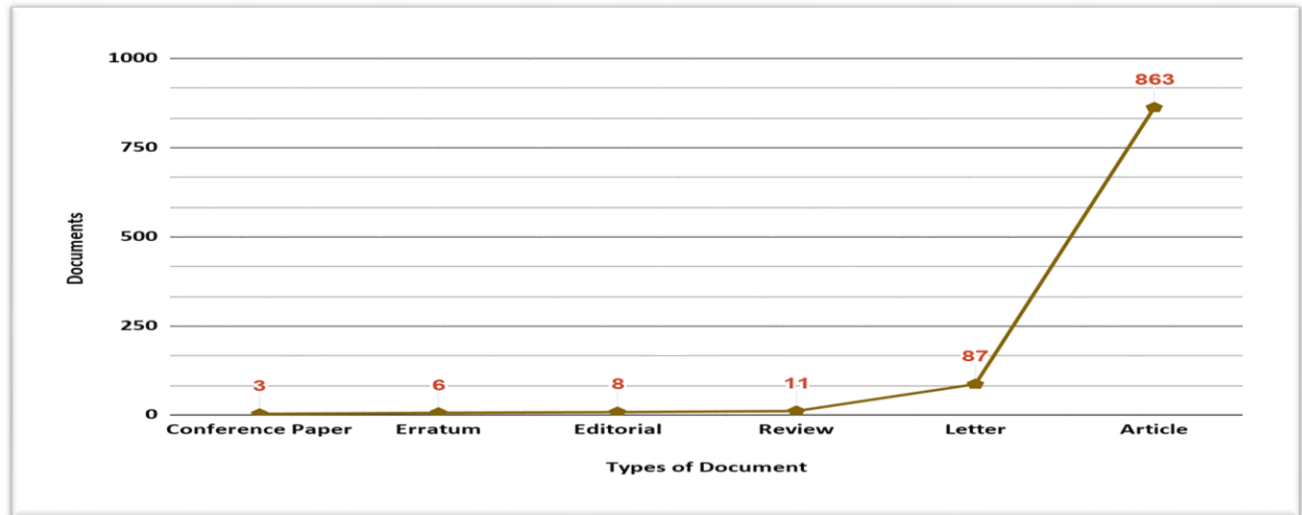


Figure 9: Types of Document

Significant findings of the study

The significant results of the study are as follows:

- ❖ The highest number of 10.84% of publications was published in 2017, and the lowest number of 3.37% of research publications in 2007.
- ❖ The authors investigated the AGR in which the negative change of -2.90% in 2011 and an increase of 91.67% in the year 2010. The average AGR was 9.7974% during the period.
- ❖ The majority of contributions were by joint authors(74.23%), followed by the rest of the single authors $28(25.77\%)$.
- ❖ The average number of authors per publication, 2.50, and the average productivity per author is 0.40. The highest number of author productivity, 279 (2.63), was published in 2017.
- ❖ The degree of collaboration (DC) in journals of informetrics (JOI) was 0.74 between 2007 and 2019.

- ❖ The majority of contributions came from the United States(12.40%), which secured the first position, followed by China (10.99%) in the second position, 8.61% of contributions came from the Netherland in the third position, and 7.57% of contributions came from Spain, etc.
- ❖ The maximum number of citations was 3265(13.44%) found in 2011, whereas the minimum number of citations was 279(1.15%) found in 2019.

CONCLUSION

The present study aimed to explore the research productivity of journals of informetrics (JOI) for selected 13 years between 2007 to 2019. The various scientometric indicators were used to analyze the data and interpretation, such as degree of collaboration, collaborative index, and annual growth rate. The Journal of Informetrics (JOI) publishes high-quality intensive research on the quantitative aspects of information science. Because this scholarly journal covers theoretical and empirical work in information science, this journal is very informative. It publishes quality research publications to meet the user community's needs, such as students, faculty, and information professionals in bibliometrics, Scientometrics, webometrics, and other patents and research evaluation. Based on this research, it was found that the maximum number of publications was published in 2017. It was recognized that the joint-authors contributed more than a single author. Finally, it is known that most researchers use excerpts from journal articles because journal articles are the primary means of disseminating emerging information.

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