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A Bibliometric Study of Communications Published in Journal of Informetrics from 2012 to 2016

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Abstract:

This research work exemplifies a bibliometric study of communications published in the Journal of Informetrics from 2012 to 2016. The main schema and source used for this study is the Web of Science domain. A bibliometric analysis of 459 records was conducted using MS Excel. The study indicated that the maximum number of articles were in the year 2016, representing 23% of total contributions. Top contributing organizations during the study period were Max Planck Society of Germany, Indiana University of USA, and University Roma Tor Vergata of Italy. Top contributing authors included Lutz Bornmann, Mike Thelwall, and Ludo Waltman. China led top contributing countries followed by the United States of America and Italy. Authorship collaboration was dominated by multi-authored contributions as 72.11% of the communications were multi-authored while 27.89% of communications were single-authored. The degree of collaboration of JOI communications was found to be 72.1%. The average number of authors for JOI communications was 2.44. The highest number of references and tables/figures were appended to the communications published in JOI during 2016. Most of the papers (76%) accepted for publication in JOI were published within two months. This study investigated papers published in the Journal of Informetrics during 2012- 2016 only. This paper is valuable for teachers, researchers, and librarians who want to see the contemporary trends of published articles in the Journal of Informetrics and seek possible areas for further research.

Keywords: Scientometrics; Top Contributing Authors; Top Contributing Organizations; Top Contributing Countries; The Degree of Collaboration; Journal of Informetrics.

Paper type: Research paper

1. Introduction

In the assessment of scientific performance, bibliometric and citation indicators are among the most critical impact measures of scientific literature (Davarpanah & Aslekia, 2008). An increasingly important way of measuring and evaluating the impact of research on individuals, groups of individuals or institutions becomes bibliometric analysis. This is because of the importance of the results of some bibliometric studies, and publications are being cited (A. Das & Saha, 2014; Nattar, 2009). The content analysis process is usually applied to single coherent sources of information, and it guides the work of rearranging systematically selected portions for condensation (Tigga, Lihitkar, & Rajyalakshmi, 2014). P. K. Das (2013) defined Informetrics as Studying quantitative aspects of information, including, regardless of form or origin, the manufacture, dissemination, collection, and measurement of data. Information literacy demands researcher's and author's concerns to recognize information needs and times. This is encouraging having the ability to locate, evaluate, and use the needed information effectively.

2. Literature review:

Bibliometrics is a valuable tool for describing and promoting scientific productivity (Tallolli, 2016). Its analysis and study focus on document publication patterns and bibliographic references. Khan (2016) defined scientometrics content to include all quantitative aspects of communication in science and related policy with an emphasis on the measurement of science. He argued that it is concerned with the growth, structure, interrelationship, and productivity of scientific disciplines. Alhamdi and Vaishali (2015) advocated that scientometrics is the branch of science that describes the output traits in terms of organizational research structure, resource inputs, and outputs for developing benchmarks to evaluate the quality of information output. Bhimappa and Mulla (2016) pointed out that government-funded institutions were more active in the outlined study and its related discipline.

Baier-Fuentes, Cascón-Katchadourian, Sánchez, Herrera-Viedma, and Merigó (2018) analyzed publications according to techniques such as bibliographic coupling, co-citations, the co-occurrence of keywords, an evolution of publications, citations, and analysis of most cited papers of the journal. The study of Davarpanah and Aslekia (2008) revealed that most authors wrote one article with an average number of authors per document, reaching 1.52. Mani (2014) reported an average number of authors per paper as 2.06. Hussain (2017) study addressed various aspects of the journal such as the distribution of article by year, authorship patterns, authors' degree of collaboration, authorship productivity pattern, distribution of citations by bibliographical forms, subject distributions, citation patterns, the rank of cited authors, and geographical distributions of authors. Gupta (2013) study analyzed research output on several parameters, including its growth and country publishers sharing the global research performance, country publishing sharing in different domestic and global topics, research communications patterns of core national and international publications, the geographical distribution of publications, and the national share of international collaborative publications.

Maharana, Das, and Choudhury (2014) applied Lotka's inverse square law when identifying the author's productivity for a Defense Science Journal. They observed that the author's distributions do not follow Lotka's law. They attributed this to the 'observed' authors and their respective productivity frequency to differ from the 'expected' frequency of authors and their productivity.

To assess the productivity of the author, Lotka's inverse square law of scientific productivity has been widely used in the bibliometric mapping of research output. Lotka's Law describes the frequency of publication by authors in any given field. It states that a fixed proportion of authors who publish a certain number of articles is the number of authors that publish a given article. The increasing number of published articles reduces the number of authors who publish such publications.

Anyi, Zainab, and Anuar (2009) studied Bibliometrics on journals grouped into fields of arts, humanities, and social sciences; medical and health sciences; sciences and technology and library and information sciences. Under each field, they classified them per their geographical location and studied elements of the journal's publication characteristics and indexation information; objectives; sampling and bibliometric measures used, and results observed. Warraich and Ahmad (2011) "studied issues of a journal based on different parameters, viz., author productivity, extent of authors' collaboration, authors' institutional affiliation, authors' geographic affiliation, type of publication, language of papers, number of citations used per article, length of documents and year-wise distribution of materials. This research work focused on the points mentioned above for detecting the scientometric profile for the Journal of Informetrics".

3. *Materials and methods*

Dataset researched in this article is related to the Journal of Informetrics (JOI) data. JOI publishes refereed articles on fundamental quantitative aspects of information science. Accepted items should contain good models and initial data sets (Egghe, 2012). Protocols discussed within the article addressed essential interrelated parameters that incorporated: year-wise analysis of papers and distribution, authorship pattern, ranking of contributing authors, research collaboration, geographical contributing authors, institutional affiliation of contributors, variations in bibliometric elements, frequency distribution of keywords, distributions of tables and figures, modifications of reference appended, citations received, time lag in publications, conclusions, and recommendations used. Further, the findings of the study and conclusion are shown related to gather data and relevant analysis.

Data and information were mainly downloaded from the Web of Science (WoS) belonging to *Clarivate Analytics*. This is because the WoS contains a compilation of several citation databases. As such, WoS is being transformed to be observed as the world's leading citation database that covers many high-impact journals. Other relevant citation databases, such as Scopus, EconLit, Scielo, Scival, etc. are not ignored. They are frequently used to rank journals in a discipline in terms of their productivity as well as the total citations received to indicate the journal's impact, influence, or prestige (Abrizah, Zainab, Kiran, & Raj, 2013).

Nonetheless, the primary schema and source used for this research work is the Web of Science domain as exported on 14th January 2019. A total number of records reached a value of 459. The year-wise distribution, institutional affiliation of the contributors, top contributing authors, geographical diversity of contributing authors, degree of collaboration among the contributors, distribution of communications by authorship, year-wise distribution of various bibliometric

elements, frequency distribution of keywords, and time-lag between acceptance and publication of a communication were calculated using MS Excel from data downloaded from the web of Science.



Figure (1): Carousel for research study elements of concern.

This research study adopted descriptive research and statistical pattern and approach using bibliometric analysis. This is for its nature as an exploratory investigation to describe the metadata elements of quantity, characteristics, and productivity of global publication and other intervening parameters of the Journal of Informetrics. Aspects of concern (as portrayed in figure 1) included: year-wise distribution, authorship pattern, ranking of contributing authors, research collaboration, contributing geographical authors, institutional affiliation of contributors, variations in bibliometric elements, frequency distribution of keywords, distributions of tables and figures, reference appended, citations received and time lag in publication.

4. Results and discussions

Table (1) depicts the year-wise distribution of publications associated with the Journal of Informetrics (JOI) data. Data indexed in WOS, covered the annual period 2012 to 2016. For each Year data and information covered volume number, Web of Science documents, and percentage of total papers. Table (1) outlined document type publication analysis, the web of science documents, and percentage of total papers. Document type covered the following: article, correction, editorial material, letter, and review. Articles dominated coverage (404 in totality), and others received low attention. Reviews had the lowest percent within the analysis process (less than 1 %).

Table (1) Year-wise Distribution of Types of Communications Published in JOI

Items	Year of Publication					Total	Percentage
	2012	2013	2014	2015	2016		
Article	70	93	82	80	79	404	88.02%
Correction	2	1	1	0	1	5	1.09%
Editorial Material	1	0	0	2	20	23	5.01%
Letter	5	7	7	2	2	23	5.01%
Review	0	2	0	0	2	4	0.87%
Total	78	103	90	84	104	459	100.00%

The top institutional and organizational affiliation of the JOI contributors were represented along Table (2). Max Planck Society of Germany ranked highest (4.64%) followed by Indiana University of USA (4.46%) whereas bottom three organizations were observed to be: Wolverhampton University of England (2.59%), National Taiwan University of Taiwan (2.77%) and National Research Council of Italy (3.03%) as per percentage of the total JOI contributors.

Author characteristics, productivity, and co-authorship pattern are of significance. Author properties of influence incorporate gender, profession, rank, academic title, geographical affiliations (institution types and academic or professional specialty), and location (region, country, district). Such information helps provide a picture or profile of the authors, the institutions or state they are affiliated to, and the degree of collaboration that exists. Author's productivity may point to a rank list of core and active authors and authorship productivity patterns that may be tested with Lotka's law of authorship distribution. This data would help to identify the critical authors in a field and estimates whether the distribution of author productivity is different in the various subject areas. Co-authorship patterns may include types of co-authored works, the degree of collaboration, local and foreign collaboration activities among authors by country and institution, and internationalization status of the journal. Such data would aid in highlighting the

preferred authorship number, the size of the research group in a field, and percentage of foreign versus local contributions (Anyi et al., 2009).

Table (2) Institutional Affiliation of the JOI Contributors

Rank	Institute Name - Country	Type	Frequency	Percentage	Cumulative Percentage
1	Max Planck Society, Germany	R I	52	4.64%	4.64%
2	Indiana University, USA	UNIV	50	4.46%	9.10%
3	University Roma Tor Vergata, Italy	UNIV	46	4.10%	13.20%
4	Katholieke University Leuven, Belgium	UNIV	45	4.01%	17.22%
5	Dalian University of Technology, China	UNIV	43	3.84%	21.05%
6	University of Antwerp, Belgium	UNIV	40	3.57%	24.62%
7	Leiden University, Netherlands	UNIV	34	3.03%	27.65%
7	National Research Council, Italy	R I	34	3.03%	30.69%
9	National Taiwan University, Taiwan	UNIV	31	2.77%	33.45%
10	Wolverhampton University, England	UNIV	29	2.59%	36.04%
	Another 295 institutions		717	63.96%	100.00%
Total = 305 institutions from 47 countries			1121	100.00%	

Table (3) shows the top 10 contributing authors clearly stating rank, author name, authorship in communications, the total number of communications by the authors, and their total weight. Lutz Bornmann headed the list with a total weight of 17.917 followed by Mike Thelwall with a total weight of 12.033. Ronald Rousseau ranked 7th and 8th for his communications from KU Leuven (total weight 9.133) and the University of Antwerp (total weight 8.533). Both Marek Kosmulski and Michael Schreiber ranked 9th with a total weight of seven.

The geographical diversity of contributing authors of the JOI is portrayed with a table (4). Top contributing countries, as shown in Table (4) is being led by China (16% of contributors) and the United States of America (12% of contributors). In many disciplines, this is an expected common trend Hadimani et al. (2015) finding revealed that researchers are more likely to collaborate with authors of the United States, Germany, England, Italy, etc.

Table (5) displays the collaboration trend (degree of collaboration (DC) among the contributors) within the Journal of Informatics. The highest number of non-collaborative papers were published in JOI in 2013 (35) followed by 2016 (31) whereas the highest number of collaborative papers were published in 2016 (73) followed by 2015 (69). The highest degree of collaboration was seen during the year 2015 (82.1%).

Table (3) List of Top 10 Authors (Based on Weighted Value of Contributions)

Rank	Author Name	Authorship in Communications									Total Commu nications	Total Weight
		Single	Two	Three	Four	Five	Six	Seven	Eight	Ten		
1	Bornmann, Lutz	5	18	8	5	0	0	0	0	0	36	17.917
2	Thelwall, Mike	6	11	1	0	1	0	0	0	0	19	12.033
3	Waltman, Ludo	6	6	3	2	0	0	0	0	0	17	10.500
4	Leydesdorff, Loet	3	7	8	3	0	0	0	0	0	21	9.917
5	Abramo, Giovanni	0	8	16	0	0	0	0	0	0	24	9.333
6	D'Angelo, Ciriaco Andrea	0	8	16	0	0	0	0	0	0	24	9.333
7	Rousseau, Ronald (KU Leuven)	3	5	7	4	1	0	0	0	1	21	9.133
8	Rousseau, Ronald (University of Antwerp)	3	4	7	4	1	0	0	0	0	19	8.533
9	Kosmulski, Marek	7	0	0	0	0	0	0	0	0	7	7.000
9	Schreiber, Michael	7	0	0	0	0	0	0	0	0	7	7.000
Total authors = 1121 (Unique authors = 638)		128	138	106	60	16	3	5	2	1		252.098

Subramanyam (1983) formula may be used to determine the degree of collaboration in quantitative terms. The method is a proxy mathematical measure for research collaboration among the contributors (A. Das & Saha, 2014; Nattar, 2009). It relates the Degree of Collaboration to Number of Multi-authored papers (collaborative contributions) and the Number of single-authored documents as presented in the following formula.

$$DC = (N_M / (N_M + N_S)) * 100$$

Where

DC = Degree of Collaboration, %

N_M = Number of Multi-authored papers (collaborative communications), dimensionless

N_S = Number of single-authored papers (discussions published in a communication channel during a specified period), dimensionless

$N_M + N_S$ = total number of research contributions published in the discipline during a certain period, dimensionless

Table (4) Geographical Diversity of Top Contributing Authors of the JOI

Rank	Country Name	Regions	The frequency of author occurrence	Percentage	Cumulative Percentage
1	China	Asia	177	15.79%	15.79%
2	USA	North America	131	11.69%	27.48%
3	Italy	Europe	115	10.26%	37.73%
4	Germany	Europe	87	7.76%	45.50%
5	Spain	Europe	80	7.14%	52.63%
6	Netherlands	Europe	74	6.60%	59.23%
7	Belgium	Europe	59	5.26%	64.50%
8	England	Europe	48	4.28%	68.78%
9	Taiwan	Asia	44	3.93%	72.70%
10	South Korea	Asia	35	3.12%	75.83%
	Another 37 countries		271	24.17%	100.00%
Total	47 countries		1121	100.00%	

Table (5) Collaboration Trend (Degree of Collaboration (DC) among the Contributors)

Year	Non-collaborative (NS)	Percentage	Collaborative (NM)	Percentage	DC %
2012	19	4.14%	59	12.85%	75.6
2013	35	7.63%	68	14.81%	66.0
2014	28	6.10%	62	13.51%	68.9
2015	15	3.27%	69	15.03%	82.1
2016	31	6.75%	73	15.90%	70.2
Total	128	27.89%	331	72.11%	72.1

For the present study, the following computation may be performed:

$$N_M = 331$$

$$N_S = 128$$

$$N_M + N_S = (331 + 128) = 459$$

Thus $DC = (331/459) * 100 = 72.1 \%$, which clearly indicates the dominance of multi authored Contributions.

Table (6) Distribution of JOI Communications by Authorship

Year	Total Commu nications	Authorship in Communications					Total Authors	Average Authors Per Communication
		Single	Two	Three	Four	> 4		
2012	78	19	25	24	6	4	191	2.45
2013	103	35	26	25	13	4	239	2.32
2014	90	28	26	20	10	6	214	2.38
2015	84	15	35	14	15	5	214	2.5
2016	104	31	26	23	16	8	263	2.53
Total	459	128	138	106	60	27	1121	2.44
Percentage		11.42%	24.62%	28.37%	21.41%	14.18%	100.00%	

Table (6) shows the distribution of JOI communications by authorship in conversations for the period 2012-2016. This is reflected in overall discussions, several authors in communications, the total number of authors, and the average authors. The table reveals that preference goes for two authorship scenarios. This finding contradicts that of Tallolli (2016), who indicated that most single-author publications had covered the contribution of articles throughout their study. Singh, Nayak, and Varma (2017); (Sushma, 2017) arrived at a similar conclusion. However, this research finding supports that of Mani (2014); (Verma, Devi, & Brahma, 2018), who reported that the majority (65%) of analyzed papers had been written in joint authorship. Jayaprakash and Kannappanavar (2015) also showed that most of the scientists preferred to publish research papers in joint authorship that too, in the journals.

Jabeen et al. (2017) results indicated that the local research community is engaged in focusing on cross-national collaboration to establish their international existence and form a colleague relationship with foreign researchers. They pointed out that national researchers have enough knowledge to conduct research, both as single authors and through internal academic collaboration between senior and junior researchers.

A general observation depicts that in many institutions' decision-makers (persons of authority) or high ranked members are included at the end of the publication author list as has been pointed out by (Devi, Kumar, & Rohit, 2018). As per the ethics of publishing, it is not proper to include the names of those who helped in gathering data, providing facilities, or assisted in typing. Devi et al. (2018) stressed that their help must be acknowledged at the end of the paper. Their decision solely considering the names of the first three authors as the primary authors contributing to a named study is justified and acceptable.

Table (7) Year-wise Distribution of Various Bibliometric Elements of JOI

Year (Vol)	Total Communications	Keywords Used	Tables and Figures	References Appended	Citations Received	Impact Factor
2012 (V6)	78	313	617	2222	1389	4.153
2013 (V7)	103	446	791	3180	1550	3.580
2014 (V8)	90	395	730	3017	1024	2.412
2015 (V9)	84	377	858	3240	834	2.373
2016 (V10)	104	378	928	4013	813	2.920
Total	459	1909	3924	15672	5610	
Average		4.16	8.55	34	12.22	3.088

Table (8) Top Frequency Distribution of Keywords Appended

Rank	Keyword	Frequency	Percentage	Cumulative Percentage
1	Citation analysis	52	2.73%	2.73%
2	Bibliometrics	48	2.52%	5.24%
3	h-index	39	2.05%	7.29%
4	Research evaluation	31	1.63%	8.91%
5	Co-authorship	16	0.84%	9.75%
6	Citations	15	0.79%	10.54%
7	Hirsch index	14	0.73%	11.27%
8	Altmetrics	13	0.68%	11.96%
8	Citation network	13	0.68%	12.64%
8	Journal impact factor	13	0.68%	13.32%
8	Scientometrics	13	0.68%	14.00%
8	Universities	13	0.68%	14.68%
Other Unique Keywords = 1135		1627	85.32%	100.00%
Total = 1147		1907	100%	

Table (7) shows constituents of significance to the year-wise distribution of various bibliometric elements of JOI that include total communications, keywords used, tables and figures, references

appended, citations received, and impact factors. It is observed that the most relevant keywords used, and citations received occurred for volume 7 of JOI in the year 2013. References attached were highest within volume number ten (4013), whereby it also hosted the highest number of tables and figures.

Table (8) depicts the frequency distribution of keywords appended with emphasis on frequency, percentage, and cumulative percentage. Top keyword appended included citation analysis, bibliometrics, h-index, research evaluation, co-authorship, citations, Hirsch index, altmetrics, citation network, journal impact factor, scientometrics, and universities. Citation analysis received the highest frequency (52) and chief percentage (3%).

Time-lag frequency distribution is displayed along with the table (9). The highest frequency (183) and the most significant percentage (40%) was observed for "up to one month," followed by "up to two months" (166, 36%). This shows that more than three-quarters of the communications are published in JOI within two months of the acceptance, which is a reasonable time for processing of the journal.

Table (9) Time-lag Frequency Distribution

Time lag (Duration)	Frequency	Percentage	Cumulative Percentage
Up to 1 month (30 days)	183	39.87%	39.87%
Up to 2 months (from 31 to 60 days)	166	36.17%	76.03%
Up to 3 months (from 61 to 90 days)	51	11.11%	87.15%
Up to 4 months (from 91 to 120 days)	14	3.05%	90.20%
Up to 5 months (from 121 to 150 days)	8	1.74%	91.94%
Up to 6 months (from 151 to 180 days)	1	0.22%	92.16%
Up to 7 months (from 181 to 210 days)	1	0.22%	92.37%
More than 8 months (>240 days)	1	0.22%	92.59%
Others (Time-Lag Not Available)	34	7.41%	100.00%
Total	459	100.00%	

5. Conclusions

From the results presented above, we can conclude that JOI has not fixed many communications to be published in a particular volume because there was a variation of communications published in different years. Authors from scientifically advanced countries like Germany, USA, Italy, Belgium, and China are regularly contributing to JOI. Communications published in JOI originate

from geographically diverse areas showing a representation of 47 countries around the globe. JOI prefers to publish the communications with collaborative efforts as various skills, and knowledge of authors helps in a better quality of research output. Well-referenced research communications presenting data in the form of tables and figures are considered for publication in JOI, and communications published cover all areas of informetrics. The publication process of JOI is fast, as the majority of the communications are published in a short time after acceptance.

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