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## Research Productivity of Journal of Documentation: A Bibliometric Analysis

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# RESEARCH PRODUCTIVITY OF JOURNAL OF DOCUMENTATION: A BIBLIOMETRIC ANALYSIS

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## ABSTRACT

*This study reflects the bibliometric analysis of 211 articles appeared in 'JDoc' from 2007 to 2011. Different parameters of bibliometrics such as the yearly distribution of publications; exponential growth rate, relative growth rate; doubling time of publications; authorship pattern; the degree of collaboration among authors; pagination pattern of publications; top ten keywords, countries, institutions & top ten most cited papers. The study reveals that the majorities of publications published in the 'JDoc' were research papers (87.05%) and rest were review papers (12.95%). The exponential growth rate remained between 0.97 to 1.04 with average relative growth rate (0.32) and with doubling time (1.61) during the research period. The present study reflects the dominance of multiple authors' publications with the degree of collaboration value 0.54. Information retrieval with 54 hits is the top keyword followed by 'Information Science' with 26 hits. The United Kingdom is top country with 32.70% publications followed by United State with 22.74% contribution.*

**Keywords:** - Bibliometrics; Journal of Documentation (JDoc); Publications, Authorship Pattern.

## 1. Introduction

Any academic & scientific literature helps scholars and scientists for intellectual discoveries. The major role of the literature is to record and disseminate the knowledge in any subject or field for advancement and development. Periodicals are the vital source of scientific literature through which scientists, academicians, researchers share or express their emerging ideas, thoughts and inventions. Therefore, to understand the updated complete representation of the growth of a discipline, a systematic evaluation of its scientific literature which is mostly contained as journal literature is

required. Journals since being the primary sources of information as such undertaking bibliometric study to assess the research growth in a particular discipline are always advisable. (Pandita, R. 2014).

Bibliometric studies are helpful to gain insight into the dynamic growth of knowledge in any discipline. These studies provide a quantitative description of the published literature and identify the properties and behavior of the information. The bibliometric studies are used to inform the managers to take the right decision at the right time. (Jena, K.L. 2012). Therefore, this study primarily intends to have a bibliometric study of one of the core journal of Library Science discipline entitled 'Journal of Documentations' (JDoc) to observe the publication pattern of this journal, recent trend in this discipline and to determine the actual utility and identification of this core documents for library science scientific community.

## **Bibliometrics**

'Bibliometric' term is a combination of two words 'Biblio' and 'Metrics'. Biblio is a Latin/Greek word refers 'books' and 'metric' refers 'measurement' which means the quantifying measurement to books or documents. The modern term 'Bibliometric' was coined by Alan Pritchard in his study published in 'JDoc' in 1969 and defined it as "the application of mathematical and statistical methods to books and other media of communication". Earlier, in the year 1922, Humes defined the term 'Statistical Bibliography' to describe the information use pattern.

Fairthron (1969) described bibliometrics as the "quantitative treatment of properties of recorded discourse and behaviour appearing to it."

The British Standard Institution (1976) described the term as the "application of mathematical and statistical methods in the study of the use of documents and publication patterns".

Bibliometric techniques are used to distinguish the patterns of scholarly literature to get an insight into the dynamics of the particular discipline. Broadly; it may be classified into two groups namely 'descriptive studies' and 'behavioral studies'. 'Descriptive studies' deal with various characteristics of a document or literature like frequency of publications, form, place, language, subject, timing etc. while 'behavioral studies' examine the relationship among the characteristics of a document like citations, bibliographic coupling, the interaction between the literature of various

countries, language, subjects, authors etc. But both types of studies are a complement to each other. Based on statistics provided by the descriptive studies the strength, nature and significance of behavioral studies can be assessed.

Nowadays, Bibliometrics is a well-established research tool based on various metadata elements related to scholarly publications within a discipline for the better evaluation, measurement and organization of literature.

### **Source journal**

‘JDoc’ which is founded in 1945 is a pioneering and one of well-established publication of Library Science published by Emerald Group Publishing of United Kingdom. It follows the double-blind peer review policy for its publications. It is a bimonthly journal since 2000 but primarily, it published quarterly from its inception, excluding 1997 to 1999 when there were five issues per year. This longest-established academic journal publishes scholarly articles, with recent methods or outputs of wide importance, in the information science-related discipline. The scope of the journal is broadly information sciences including librarianship and related discipline but not limited to it. JDoc establishes a relation between research, scholarship and professional practices. It also offers to contribute in the ‘Speculation in Documentation’ category which is a short contribution (up to 5000 words) of an original concept or aspect. Presently, Professor David Bawden, City University, London is the editor of this leading journal. Recently, one of the JDoc publications of 2019 has won the ALCTS outstanding publication award. This journal is indexed and abstracted in Clarivate Analytics, SSCI, Scopus, Proquest and many other world’s reputed scientific and academic research databases. Its 2019 impact factor is 1.725 and five-year impact factor (2019) is 1.615. The present study covers the bibliometric analysis of the journal between the year 2007 to 2011. The bibliometric analysis of this journal can be beneficial to researcher and practitioner of LIS community as well as the editorial team of JDoc for further development.

### **Objectives**

The study has been conducted by considering the following objectives:

- To explore the yearly distribution of publications of JDoc during 2007-2011 ;

- To investigate the exponential growth rate, relative growth rate and doubling time of publications;
- To investigate authorship pattern and degree of collaboration among authors;
- To find out the pagination pattern of publications;
- To find out the top ten keywords, top ten countries, top ten institutions and top ten most cited papers

## **2. Review of related literature**

The literature review is the mirror of the most previous studies on any topic. It is essential to clear the concept, to understand the strengths and weakness of any area, to gain the comprehensive knowledge of the topic, to decide the horizons of the research area, to know the recent trend of particular areas and to choose an effective design for the research. Neuman defined the literature review as it is “based on the assumption that knowledge accumulates and that we learn from and build on what others have done”. So to know the current status and further guidance, some studies are reviewed as follows;

Adeyinka Tella and Ayotola Aisha Olabooye (2014) in their bibliometric study entitled “Bibliometric analysis of African Journal of Library, Archives and Information Science from 2000-2012” analyzed the publication pattern and revealed that in authorship pattern majority of the articles with a total of 126 (57.8%) were single-authored, followed by two authors with 72 (33.03%) publications. The study in pagination pattern showed that out of total 86 (39.4%) publications were 6-10 pages in length followed by 84 (38.5%) containing 11-15 pages.

Bernard Sainte-Marie (2010) in a study entitled “The First 30 Years of The Journal of Crustacean Biology - A Bibliometric Study” examined the “Journal of Crustacean Biology” through 30 years of bibliometric analysis. The author found that articles of journals increased from 50 to 93 in the initial twenty years and then declined to around 70. The study examined that two most cited paper were published in early years 1981-1989, and revealed that most cited articles tended to be older.

Heidar Mokhtari et al. (2020) in their Scopus based research study “A bibliometric analysis and visualization of the Journal of Documentation: 1945–2018” revealed that in country wise distribution, the UK was in the lead with 949 (46.16%) contribution, followed by the USA at the

second position. The study identified that the contribution of developed countries to the journal was high and by developing countries and their affiliations, it was relatively low.

Roy and Basak (2013) in the research entitled "Journal of Documentations: a bibliometric study" have explored the bibliometric characteristics of JDoc between 2005-2010. They found that the degree of collaboration among authors was to be 0.51 during the study period and multi-authored publications were dominating in authorship pattern.

Tsay and Shu (2011) in their paper entitled "Journal bibliometric analysis: a case study on the Journal of Documentations" revealed that journals articles were the most cited documents in 'JDoc' publications. The study examined the interdisciplinary relation by citation analysis and found that 'information science' is a developing discipline with the contribution to multiple subject areas.

Dasgupta et al. (2018) in their Web of Science based paper entitled "A bibliometric analysis of publications published in the Journal of Documentation during 1991-2013" founded that in country-wise contribution, highest contribution was from England with 431 records.

Alhamdi et.al in their research paper entitled " Journal of Documentations: A bibliometric study (2001-2010)" found that mean relative growth rate for the last five years of study reduced from 0.319 to 0.167 whereas doubling time gradually increased from 1.199 to 5.974. The study revealed that as the rate of growth of articles was decreased, the corresponding doubling time was increased.

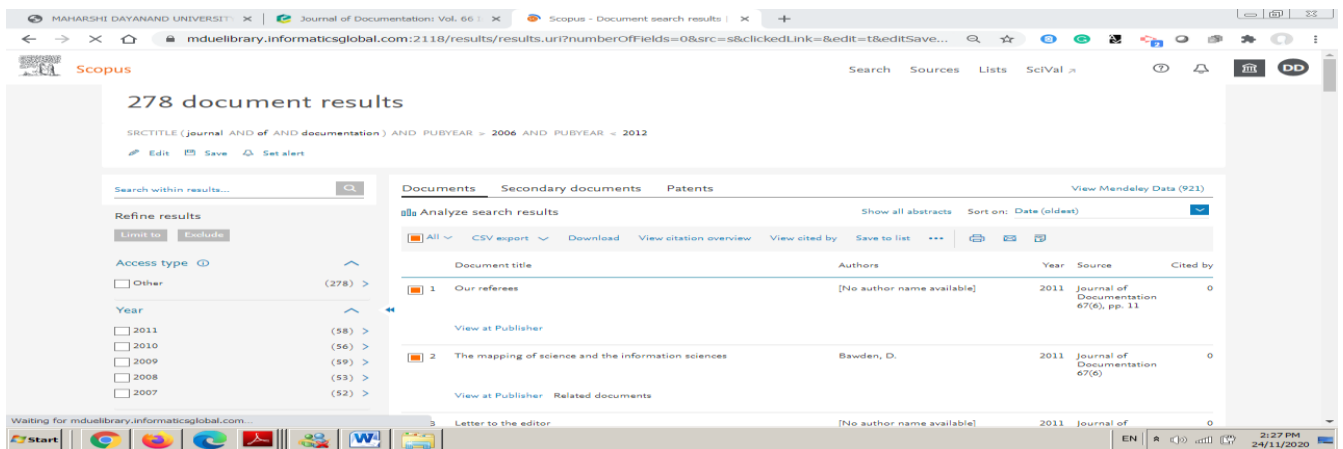
Nebelong-Bonnevie, E. & Frandsen, T.F. (2006) in their study entitled "Journal citation identity and journal citation image: a portrait of the journal of documentations" portrayed the JDoc by using two bibliometric indicators, Journal citation identity and the journal citation image and found that journal prefers to Western Europe, and it is an increasing tendency in JDoc.

Some other studies of DeHart, F.E. (1992), Parmar and Siwach (2018), Bansal (2019) and Kumari, D. et al. (2019) were also consulted for interpreting and analysis of data.

### **3. Data selection & methodology**

In the present study, publications of JDoc from 2007 to 2011 have been analyzed. The data has been extracted from the largest abstracting and citation database of peer-reviewed literature i.e. Scopus

database. The data was extracted from the Scopus in November 2020 using the strings ‘journal of documentations’ with data range limit from 2007 to 2011. As a result, 278 total documents appeared. Out of 278 documents, 242 were articles and 36 were reviews. The study was confined to articles as shown in Scopus categories. But after cross-checking the table of contents from JDoc at Emerald insight, only 211 articles were selected which match from the JDoc’s ‘article’ category by excluding Introduction, review, book review, editorial, awards etc. as per journal categorization itself. An integrated list was saved as per categorization. All analysis was done on this integrated publication list which was saved in the Scopus database account.



*Figure 1: Screenshot of ‘JDoc’ total research output webpage of Scopus)*

**Table 3.1: Data-selection**

Scopus data		Selected data for the study
Article	242 (87.05%)	211
Review	36 (12.95%)	
<b>Total</b>	<b>278</b>	<b>211</b>

A data set of 211 publications was exported in .csv file including all citation information, bibliographical information with abstract & keywords information. All analysis was done on this data-set. The data was shifted to MS-Excel for analysis i.e. authorship and pagination pattern of publications and presented in tabular form for further interpretations. VosViewer has been used for keyword visualization.

## Ratio of growth

To derive the yearly Ratio of Growth (RoG) which is calculated using the prior year as a support for expressing percentage shift from one year to the next year, the following formula was used.

$$\text{Ratio of Growth} = \frac{\text{No. of publications of present year}}{\text{No. of publications of prior year}}$$

## Relative growth rate & doubling time

The relative growth rate transfers growth in the condition of a rate of increase in the size of publications/pages per unit of time. The growth of publications can be analyzed by using two structure RGR and DT Mahapatra (1985). The Mean relative growth rate(R) over the specific period can be estimated as per the following formula:

$$R = \frac{\text{Log}_e W_2 - \text{Log}_e w_1}{T_2 - T_1}$$

Where,

R = Mean relative growth rate over the specific period

$\text{Log}_e w_1$  = Natural log of the initial number of articles

$\text{Log}_e w_2$  = Natural log of the final number of articles after a specific period

$T_2 - T_1$  = The unit difference between the initial time and the final time.

There exist a direct relationship between the relative growth rate and doubling time. If the number of articles/pages of a subject doubles during a given period then the difference between the logarithm of numbers at the beginning and end of this period must be the logarithm of the number 2. If natural logarithm is used this difference has a value of 0.693. Thus the corresponding doubling time for each specific period for articles can be measured by the following formula;

$$\text{Doubling Time}(Dt) = \frac{0.693}{R}$$

## Degree of collaboration



To derive the degree of collaboration to determine the strength of the author’s collaboration in any publication the following formula, suggested by K. Subramanyam(1983) has used;

$$DC = \frac{N_m}{N_m + N_s}$$

Where,

DC= Degree of collaboration

$N_m$ = Number of multiple authors’ articles

$N_s$ = Number of single authors’ articles

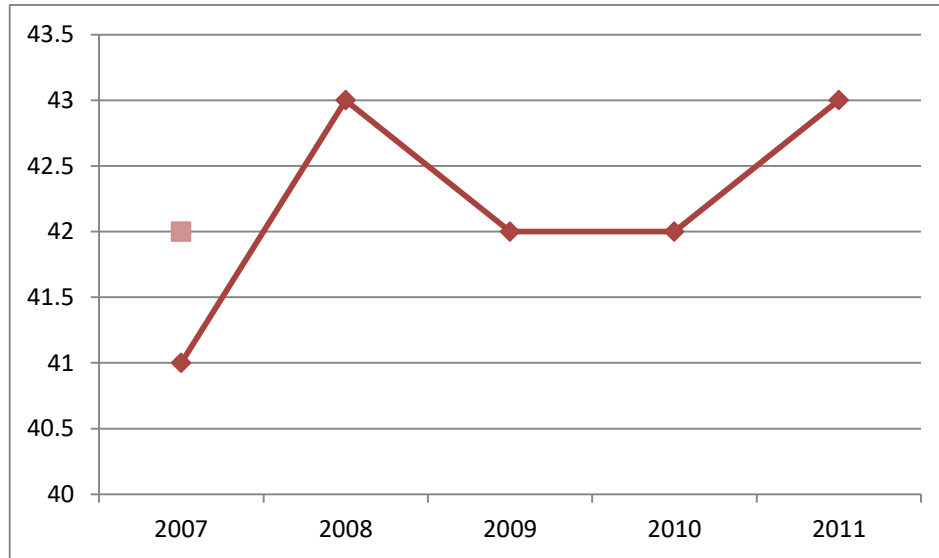
#### 4. Data analysis

##### 4.1 Yearly distribution of ‘JDoc’ publications

Table 4.1 shows the year-wise distribution of articles of ‘JDoc’ from 2007 to 2011. The table shows that there was not accountable increase in the percentage of growth of publication during the period under study, as the total output of publications for the period remained between 19.43 per cent to 20.38 per cent. However, most productive years were 2008 and 2011 with 43 (20.38%) publications and the least productive year was 2007 with 41(19.43%) publications.

**Table 4.1: Yearly distribution of ‘JDoc’ publications**

<b>Year</b>	<b>NP</b>	<b>%</b>	<b>Cumulative Total</b>	<b>Cumulative%</b>
2007	41	19.43	41	19.43
2008	43	20.38	84	39.81
2009	42	19.90	126	59.71
2010	42	19.90	168	79.61
2011	43	20.38	211	100
<b>Total</b>	<b>211</b>	<b>100%</b>		



*Figure 2: Yearly distribution*

#### 4.2 Arithmetic Mean

The arithmetic mean of all publications for the study period 2007-2011 has been calculated to be 42.2. It reveals that during the study period on an average 42 publications were published per year.

**Table 4.2: Arithmetic Mean**

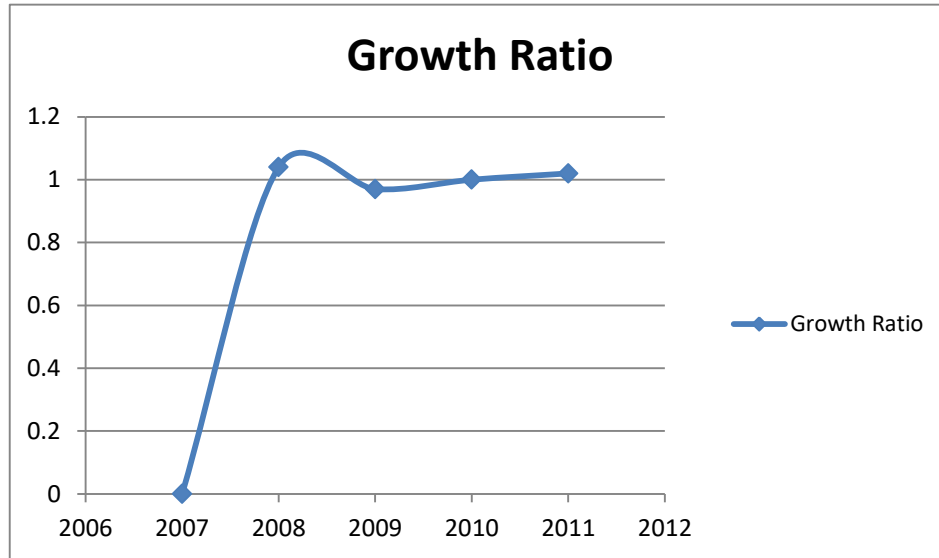
<b>Year</b>	2007	2008	2009	2010	2011	<b>Total</b>	<b>Avg.</b>
<b>Publications</b>	41	43	42	42	43	<b>211</b>	<b>42.2</b>

#### 4.3 Exponential growth rates of JDoc publications

The exponential growth rate of “JDoc” during 2007-2011 has been calculated and shown in Table 4.3. The table shows that the growth rate remained between 0.97 to 1.04 during the study period. The growth rate was highest during the year 2008 (1.04) and least during the year 2009 (0.97).

**Table-4.3: Exponential growth rate of publications**

S. No.	Year	NP	EGR ( $y_{t1}/y_{t0}$ )
1	2007	41	-
2	2008	43	1.04
3	2009	42	0.97
4	2010	42	1
5	2011	43	1.02
	<b>Total</b>	<b>211</b>	



*Figure 3: Exponential growth rate*

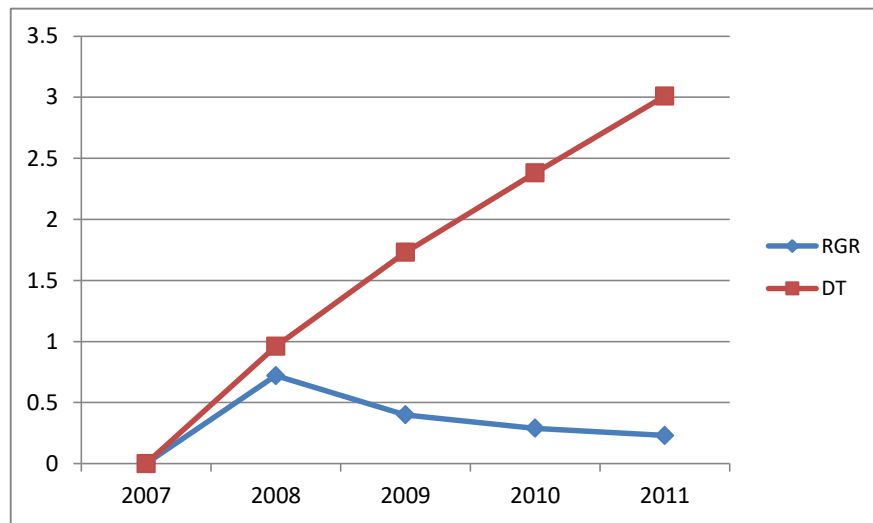
#### **4.4 Relative growth rate and doubling time of 'JDoc' publications**

Table 4.4 presents the relative growth rate and doubling time of "JDoc" publications during 2007-2011. The maximum relative growth rate is determined for the year 2008 with 0.72 growth frequency and minimum for the year 2011 with 0.23 frequencies. The average growth rate of research publications works out to 0.32.

The doubling time is to determine the range from 0.96 to 3.01. It is to the found maximum in the year 2011 with 3.01 doubling time-frequency and minimum at 2008 with 0.96 doubling time-frequency. The doubling time is gradually increased year by year from 0.96 to 3.01 during 2007-2011. Average doubling time works out to 1.61.

**Table 4.4: Relative growth rate and doubling time of the ‘JDoc’**

Year	NP	Cum. Total	Log <sub>e</sub> w <sub>1</sub>	Log <sub>e</sub> w <sub>2</sub>	RGR w <sub>2</sub> -w <sub>1</sub>	Mean RGR (R)	DT= 3/R	Mean DT
2007	41	41	-	3.71	-		-	
2008	43	84	3.71	4.43	0.72		0.96	
2009	42	126	4.43	4.83	0.4	0.32	1.73	1.61
2010	42	168	4.83	5.12	0.29		2.38	
2011	43	211	5.12	5.35	0.23		3.01	
<b>Total</b>	<b>211</b>					<b>0.32</b>		<b>1.61</b>



*Figure 4: Relative growth rate*

#### 4.5 Yearly authorship pattern of ‘JDoc’ publications

Table 4.5 presents the year wise authorship pattern of ‘JDoc’ articles during 2007-2011. Single authored produced 95 articles (45.02%), followed by 77 (36.49%) two authors publications, 19 (9%) three authors publications, 14 (6.63%) four authors publications and 6 (2.84%) more than four authors publications. Table 4.5 shows that the highest numbers of articles are published by single authors and minimum numbers of papers are published by more than four authors. Overall, multiple-authored publications are leading in “JDoc”.

**Table 4.5: Year-wise authorship pattern of articles**

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>&gt;4</b>	<b>Total</b>
2007	14	17	5	5	0	41
2008	18	18	5	2	0	43
2009	26	7	3	3	3	42
2010	17	19	2	2	2	42
2011	20	16	4	2	1	43
<b>Total</b>	<b>95</b>	<b>77</b>	<b>19</b>	<b>14</b>	<b>6</b>	<b>211</b>
<b>%</b>	<b>45.02</b>	<b>36.49</b>	<b>9.00</b>	<b>6.63</b>	<b>2.84</b>	<b>100%</b>

#### 4.6 Degree of collaboration

Table 4.6 shows the year-wise degree of collaboration among authors of ‘JDoc’. The degree of collaboration varies from 0.38 to 0.66 during the study period. The table shows the dominance of multiple authors’ publications with the degree of collaboration value 0.54.

**Table 4.6: Degree of collaboration**

<b>Year</b>	<b>Single</b>	<b>Multiple</b>	<b>N<sub>m</sub>+N<sub>s</sub></b>	<b>DC</b>
2007	14	27	41	0.66
2008	18	25	43	0.58
2009	26	16	42	0.38
2010	17	25	42	0.59
2011	20	23	43	0.53
<b>Total</b>	<b>95</b>	<b>116</b>	<b>211</b>	<b>0.54</b>

#### 4.7 Year-wise pagination pattern of 'JDoc' publications

Table 4.7 shows the length of publications appeared in 'JDoc' during 2007-2011. This Table shows that nearly half of the articles 101 (47.87%) were published in the page range from 21-30, followed by 92 (43.60%) articles with 11-20 pages. Only 2 papers have more than 40 pages. It shows that more than 90% of JDoc publications have 11-30 pages.

**Table 4.7: Year-wise pagination pattern of 'JDoc' publications**

<b>Pages</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>Total</b>	<b>%</b>
1-10	1	2	2	1	0	6	2.84
11-20	14	23	16	20	19	92	43.60
21-30	25	15	22	19	20	101	47.87
31-40	1	2	2	2	3	10	4.74
Above 40	0	1	0	0	1	2	0.95
<b>Total</b>	<b>41</b>	<b>43</b>	<b>42</b>	<b>42</b>	<b>43</b>	<b>211</b>	<b>100%</b>

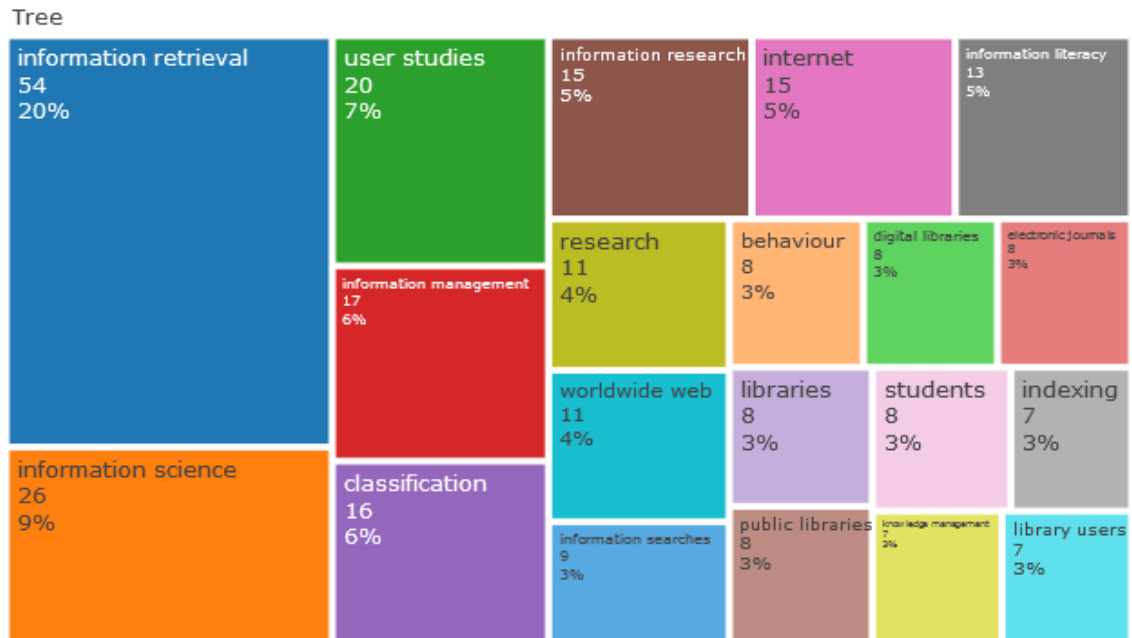
#### 4.8 Top ten keywords

Table 4.8 shows the top ten keywords that appeared in the 'JDoc' publication during the study period. A total number of 388 author keywords were produced by the Scopus database during the study period. The keywords 'information retrieval' leads to a maximum of 54 (13.91%) hits followed by 'information science' with 26(6.70%) hits, 'user studies' with 20 (5.15%) hits and other top keywords with their corresponding hits are mentioned in the table.

**Table 4.8: Top ten keywords published in 'JDoc'**

<b>Keywords</b>	<b>Frequency</b>	<b>%</b>
Information Retrieval	54	13.91
Information Science	26	6.70
User Studies	20	5.15
Information Management	17	4.38
Classification	16	4.12

Information Research	15	3.87
Internet	15	3.87
Information Literacy	13	3.35
Research	11	2.83
World Wide Web	11	2.83



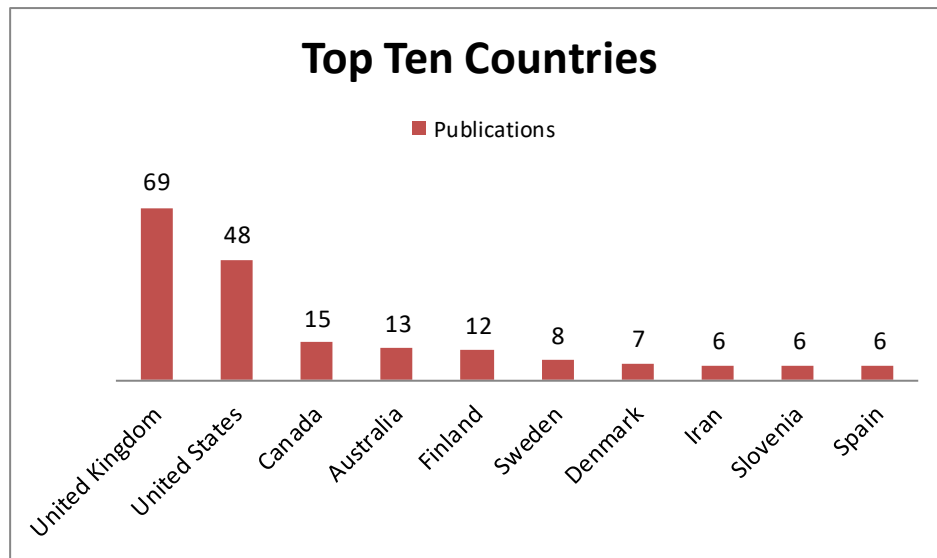
*Figure 5: Treemap of top twenty keywords of 'JDoc'*

#### 4.9 Top ten countries in JDoc publications

Table 4.9 shows the productivity of the top ten countries in 'JDoc' during the study period 2007-2011. This table shows that the United Kingdom contributed around one-third share of total publications (32.70%), followed by the United States (22.74%), Canada 7.11 per cent, Australia 6.16 per cent, Finland 5.69 per cent, Sweden 3.80 per cent Denmark 3.32 per cent and Iran, Slovenia & Spain contributed an equal share of research output in JDoc i.e. 2.84 per cent each.

**Table 4.9: Top ten countries**

Country	TP	% of TP
United Kingdom	69	32.70
United States	48	22.74
Canada	15	7.11
Australia	13	6.16
Finland	12	5.69
Sweden	8	3.80
Denmark	7	3.32
Iran	6	2.84
Slovenia	6	2.84
Spain	6	2.84



**Figure 6: Top ten countries**

#### **4.10 Top ten institutions in JDoc publications**

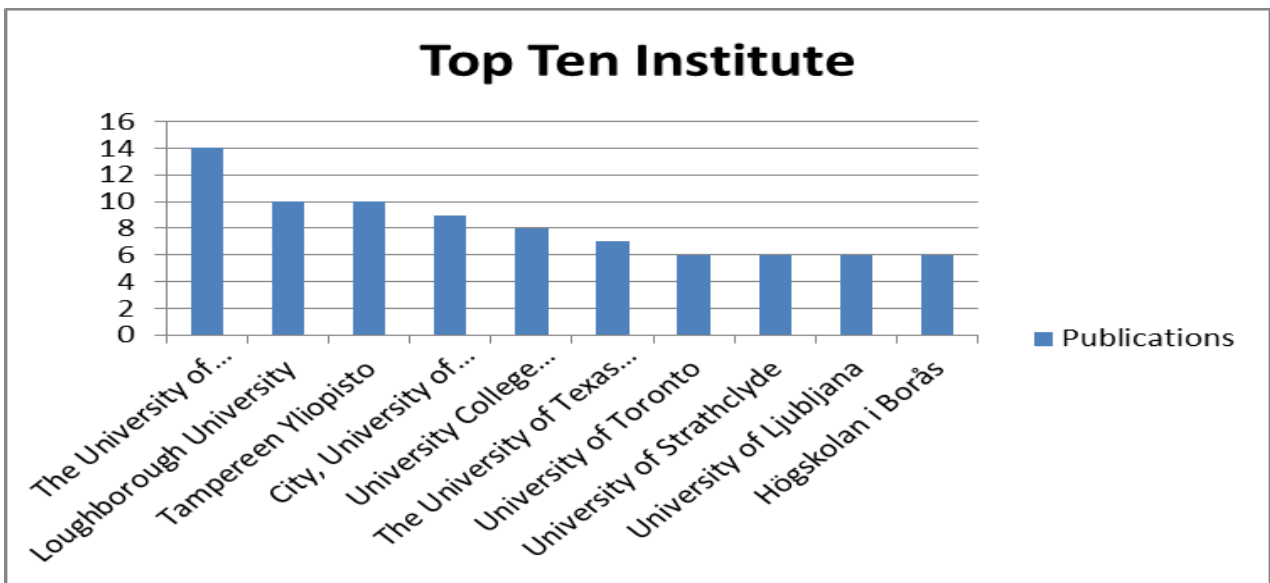
Table 4.10 shows the top ten institutions that produced 82 (38.86%) papers in all. The University of Sheffield contributed the highest number of papers (14) which was 6.64 % share of the total contribution, followed by 10 publications each (4.74%) by Loughborough University & Tampereen



Yliopisto, City, University of London (4.27%), University College London (3.80%), The University of Texas at Austin (3.32%) and three institutes have an equal share of 2.84 % each.

**Table 4.10: Research contribution of top ten institutions**

Sr. No.	Institutions	TP	% of TP
1	The University of Sheffield	14	6.64
2	Loughborough University	10	4.74
3	Tampereen Yliopisto	10	4.74
4	City, University of London	9	4.27
5	University College London	8	3.80
6	The University of Texas at Austin	7	3.32
7	University of Toronto	6	2.84
8	University of Strathclyde	6	2.84
9	University of Ljubljana	6	2.84
10	Högskolan i Borås	6	2.84



**Figure 7: Top ten institutions**

## 4.11 Most cited papers

Table 4.11 shows ten highly cited papers of ‘JDoc’. The paper titled 'What do citation counts measure? A review of studies on citing behavior' authored by Bornmann L., Daniel H. published in the year 2008 is on top by receiving the highest number of citations (665) followed by an article authored by Ross C., Terras M., Warwick C., Welsh A. with 133 citations and the paper at 10<sup>th</sup> position entitled ‘Gender differences in the online reading environment’ written by Liu Z., Huang X. received 67 citations.

**Table 4.11: Most cited papers**

Author	Title	Year	Citations
Bornmann L., Daniel H.	What do citations count measure? A review of studies on citing behavior.	2008	665
Ross C., Terras M., Warwick C., Welsh A.	Enabled backchannel: Conference Twitter use by digital humanists	2011	133
Prabha C., Connaway L.S., Olszewski L, Jenkins L.R	What is enough? Satisfying information needs	2007	116
Boon S., Johnston B., Webber S.	A phenomenographic study of English faculty’s conceptions of information literacy	2007	105
Lloyd A.	Framing information literacy as information practice: Site ontology and practice theory	2010	97
Neuhaus C., Daniel H.	Data sources for performing citation analysis: An overview	2008	88
Lloyd A.	Information practice: Information experiences of ambulance officer in training and on-road practice	2009	83
Oakleaf M.	The information literacy instruction assessment cycle: A guide for increasing student learning and improving librarian instructional skills	2009	82
Yi K., Mai Chan L.	Linking folksonomy to Library of Congress subject headings: An exploratory study	2009	68

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## 5 Conclusion

The present study found evidence of a significant increase in research productivity of JDoc during the study period. This trend is reflected not only in the number of publications but also in the impact factor of JDoc. The authorship pattern demonstrates the joint authorship trend of JDoc publication and country-wise analysis showed the dominance of developed countries over developing countries. Keyword analysis clearly showed that ‘Information retrieval’ is the trending topic among JDoc publications during the study period.

Though the study explores the various publication trend of JDoc a few questions remained unaddressed like comparison with other scientific field journals and the measurement of interdisciplinary nature of JDoc. In Future, some bibliometric studies can conduct to answer these unaddressed issues also as bibliometric methods can answer these and another important aspect.

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