

Authorship Pattern and Degree of Collaboration in Information Technology

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Abstract

The study presents the trends in authorship pattern and author's collaborative research in Information Technology with a sample of 17917 articles collect from LISA during 2000-2009. The average number of authors per article is 1.80. In the study the degree of collaboration (C) during the overall 10 years (2000-2009) is 0.71 but the year wise degree of collaboration is almost same in all the years of mean value 0.49. In the 10 years of period, the multi- authorship articles are higher and predominant on single authorship. The study found that the researches in Information Technology are keep toward team research or group research rather than solo research.

Keywords: Bibliometrics, Scientometrics, Scientometrics Analysis, Authorship Pattern, Degree of Collaboration, Information Technology, LISA

Introduction

Scientometrics study is a branch of bibliometrics. It is an important research tools for understanding the subjects it aims at measuring the utility of documents and relationships between documents and fields. The present study Information Technology: A Scientometrics Study is based on 10 volumes, 110 issues of Library and Information Science Abstracts (LISA) during 2000-2009. The article on Information Technology covered in LISA during 2000-2009 is taken into consideration.

Review of Literature

The number of authors contributing to scholarly publications in teems of authorship pattern is an instructing part of any bibliometric study. A count of number of authors contributing to articles offers some indication to degree of collaboration between authors. Cronin (2001) comment, authorship as" undisputed coin of the real in academic "and" absolutely central to the academic reward system".

However, the concept of authorship was evolved over the course of the 20th century, with a steady increase in collaboration. This trend was anticipated by Price (1963), who stated, “by 1980 the single-author paper will be extinct” and scholarly publication will “more steadily toward infinity of author per paper”. Collaboration research refers to a research in which any research project is being carried out by at least two people by engaging their efforts in mind and body. It is very common in the field of sciences as compare to humanities. As part of literature search, the author found various studies in different disciplines based on the authorship pattern and collaborative research. Some of the literatures are reviewed by the authors before conducting the current study. By observing the *Chemical Abstract* for the period of 1910-1960, Price (1963) was among the first to study the authorship pattern and opined that multi authored papers are gradually increasing with simultaneous reduction in single-authored papers.

Vimala and Pullreddy (1996) analyzed the doctoral theses in zoology of Venkateswara University, Tirupati and concluded that although multiple- authorship dominant, solo research also exists and degree of collaboration in zoology is 0.75 as a whole. O’Neill (1998) examined the authorship pattern in two theory based journals; one is from *American Journal Educational Theory* (1955-1994) and author from Canadian journal *Journal of Education Thought* (1970-1974) He found that majority of authorship were single in both the journals regardless of the data of publication against de Solla Price’s prediction that coauthor would eventually increase and single- author paper will be extinct.

Farahat (2002) examined the patterns of authorship in nineteen Egyptian journals of agricultural science and found that multiple- authorship was predominant and co-authored papers were accounted as 79% of the sample. Cronin, Shaw and Berre (2003) observed the co authorship and sub authorship collaboration in the scholarly journal literature of psychology and Philosophy as manifested in the 20th century and highlighted the rates of co authorship and importance of collaboration. They found that among a total of 2,707 articles of 2001,(74%)are single authored.

Pillai (2007) did a study of the trends in authorship pattern and collaborative research in physics with a sample of 11,412 journals and 1,328 book citations collected from the doctoral dissertations of IISc and found that team research is being preferred and average value of degree of collaboration in journals was 0.08. Lee, Jones and Downie (2009) analyzed the proceeding papers published in ISMIR proceeding of nine years and found that the amount of collaboration as reflected in co- authorship has increased. Zafrunnisha and Pullareddy (2009) studied the authorship pattern and degree of collaboration in Information Technology by sampling 17917 articles of LISA and found the predominance of the multi authored papers over single authored papers and degree of collaboration was 0.49. Here, the author made an attempt to study the authorship pattern and degree of collaboration on Information Technology published during the period 2000-2009 in LISA.

Information

Information in its most restricted technical sense is an ordered sequence of symbols that record or transmitted a message. It can be recorded. (Wikipedia).

Technology

Technology is the process by which humans modify nature to meet their needs and wants. Most people however think of technology in terms of its artifacts computers and software aircraft pesticide water treatment plants birth control pills and micro ovens to name a few but technology is more than these tangible product. (answer.com.)

Bibliometric

According to Sengupta

“Organization, classification and quantitative evaluation of publication patterns of all macro and micro communication along with their authorships by mathematical and statistical calculus”

According to Pritchard

“The Application of mathematics and statistical methods to books and other media of communication; Methodology of the information transfer process and its purpose is analysis and control of the process.

Scientometric

Scientometrics is a formed structural part of science including, the complex of mathematical and statistical methods, used to analyze the quantitative characteristics of science as an enterprise (Veverience, 1994). Many types of scientometrics data can be presented as transaction matrix. In all cases the matrix consist of a set of items assigned to each row and column with each cell containing the level of transaction between the row and column items (Kretschmer, 1994)

Scientometric Analysis

Several quantitative characteristics of scientific change have been treated in scientometric investigation with the help of analysis models as well as empirical techniques citation and text the analysis sets of scientometric indicators (Elkana, 1978).

Library & Information Science Abstracts (LISA)

LISA is an international abstracting and indexing service designed for library professionals and other information specialists. LISA provides bibliographic information about past and present developments in librarianship, information science, online retrieval, and publishing and information technology. This database covers around five hundred periodicals from over sixty countries. It also includes unpublished academic and institutional research from the IRWI - Information Research Watch International database. LISA has an international perspective, and a diverse audience including researchers, students, library staff, and information professionals. LISA is established in the year 1969 published bi-monthly.

Objective of the Study

The objectives of the present study are:

To identify Language wise Distribution of Articles

To measure the year wise distribution of publication Growth of Literature.

To find out the Relative Growth Rate and Double time of Publication.

To examine the nature of authorship patterns in information Technology.

To determine degree of collaboration on information technology.

Methodology

Methodology means study of method or A. system of methods and rule applicant to research or work. It is connected basically with what principles and technique to be follow for collecting data information and material for a given research project. (Kothari, 1990).

For the present study quantitative research method is used.

Scope and limitation of the study

The present study is based on 12 volumes, 132 issues of the LISA during 2000-2009. The present study is based on over all 17917 articles appended in LISA on Information Technology during 10 years i.e. 2000-2009.

Data Collection

The term data refers to qualitative or quantitative attributes of a variable or set of variables. The data was collected from 10 volumes, 132 issues of 'LISA (Library and Information Science Abstracts)' on the subject Information Technology during 2000-2009 appended to 17917 articles which were further analyzed.

Data Analysis

Analysis of the data is essential part of any study .Data analysis is done for the purpose of huge volume of data is reduced into meaning full case report. Analysis of total 17917 articles on Information Technology covered under LISA during 2000-2009. It was done by using various parameters like to identify the core journals; ranking of journal, ranking of another, to find out geographical distribution of journals, to find out Year wise distribution, to find out form wise, language wise distribution, most productivity author. The data was analyzed and presented in the form of tables and graphs to show the result prominently.

Analysis and Results

According to the objective of the study, analysis and findings of the study are outline below.

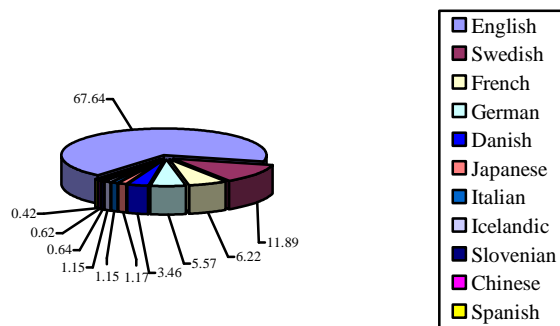
Language Wise Distribution

Attempts were made to find out language of the articles published on Information Technology which is presented in Table No.1 and Fig No.1.

Table No. 1: Language wise Distribution of Articles

Language	No. of Articles	Percentage
English	12120	67.64
Swedish	2131	11.89
French	1115	6.22
German	998	5.57
Danish	620	3.46
Japanese	210	1.17
Italian	205	1.15
Icelandic	205	1.15
Slovenian	115	0.64
Chinese	110	0.62
Spanish	88	0.42
Total	17917	100.00

Figure No. 1 Language Wise Distribution



The importance of language related to a specific field of knowledge change from time to time. English 12120 (67.64 %) is most important language found during the study undertaken. The other languages Swedish, French, German, etc. are found to be 23.64%. Attempts were made to analyze under the study according to their language of publication as shown in table since English speaking countries and maximum journals covering the articles on the subject under the study are published in English language. It means that English language dominates the others language for article publication in the journals.

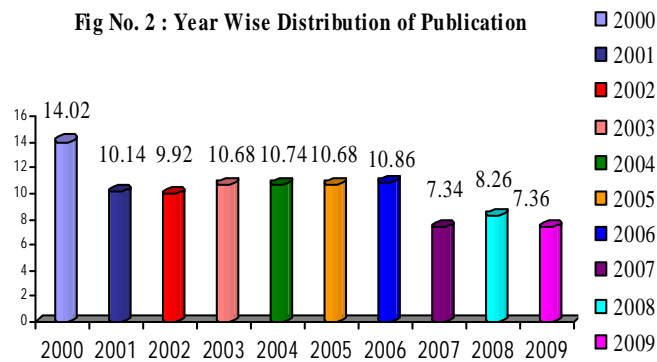
Growth of Literature (Year wise distribution of publication):

The year-wise distribution of publication is shown in Table No.2.

Table No. 2: Year wise distribution of Publication

Year	No. of Articles	Percentage
2000	2513	14.02 %
2001	1817	10.14 %
2002	1778	9.92 %
2003	1915	10.68 %
2004	1926	10.74 %
2005	1915	10.68 %
2006	1947	10.86 %
2007	1310	7.34 %
2008	1476	8.26 %
2009	1320	7.36 %
Total	17917	100.00

Fig No. 2 : Year Wise Distribution of Publication



The year wise distribution of 17917 articles published from 2000-2009 in LISA is presented in the table no 3.1. It is seen that the number of articles published is highest in the year 2000 with 2513(14.02%) articles, however 1947(10.86%) of them were published in the year 2006, 1926 (10.74%) of them were published in the year 2004, however 1915 (10.68%) of them were published in the year 2003 & 2005, 1817 (10.14%) of them were published in the year 2001. Were as 1310 (7.34%) of them were published in the year 2007 respectively.

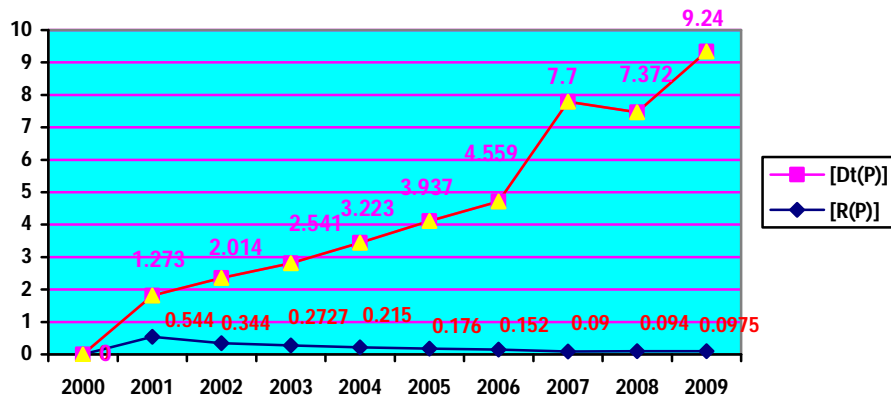
Relative Growth Rate and Double Time of Publication

The Relative Growth Rate [R(P)]and Doubling Time [Dt(P)] of Publication in Table No.2. It can noticed that the Relative Growth Rate of Publication[R(P)] decrease from the rate of 0.544 in 2001 to 0.075 in 2009. The mean relative growth for the first five years (i.e. 2000 to 2004) showed a growth rate of 0.2751 whereas the mean relative growth rate for the last five years (i.e. 2005 to 2009) reduced to 0.587. The corresponding Doubling Time for different years [Dt(P)] gradually increased from 1.273 in 2001 to 9.24 in 2009.The mean Doubling Time for the first five years (i.e. 2000 to 2004) was only 1.8102 which was increased to 6.5616 during the last five years (i.e. 2005 to 2009). Thus as rate of growth of publication was decreased the corresponding Doubling Time was increased.

Table No.3: Relative Growth Rate and Double Time Publication:

Year	No. of Articles	Cumulative No. of Articles	Log _e 1 ^c	Log _e 2 ^c	[R(P)]	Mean [R(P)]	[Dt(P)]	Mean [Dt(P)]
2000	2513	2513	-	7.829	-	0.2751	-	1.8102
2001	1817	4330	7.829	8.373	0.544		1.273	
2002	1778	6108	8.373	8.7173	0.344		2.014	
2003	1915	8023	8.7173	8.990	0.2727		2.541	
2004	1926	9949	8.990	9.205	0.215		3.223	
2005	1975	11864	9.205	9.381	0.176	0.587	3.937	6.5616
2006	1947	13811	9.381	9.533	0.152		4.559	
2007	1310	15121	9.533	9.623	0.09		7.7	
2008	1476	16597	9.623	9.717	0.094		7.372	
2009	1320	17917	9.717	9.793	0.075		9.24	

Fig No.3:Relative Growth Rate and Double time Publication



Authorship Patterns

Authorship pattern of the articles is presented in the Table No.4 the study reveals that of the total 32,264 authors have contributed 17,917 articles having the different frequencies of authors.

Table No. 4: Authorship Pattern

Sr. No.	No. of authors (units)	No. of articles	Total no of authors	% of articles	% of authors	Cum. % of articles
1	Single	9325	9325	52.04	28.90	52.04
2	Two	3625	7250	20.23	22.47	72.27
3	Three	2646	7938	14.76	24.60	87.03
4	Four	1810	7240	10.12	22.43	97.15
5	Author Name not Mentioned	511	511	2.84	1.60	100
	Total	17917	32264	100	100	

Fig.No.4: Authorship Pattern

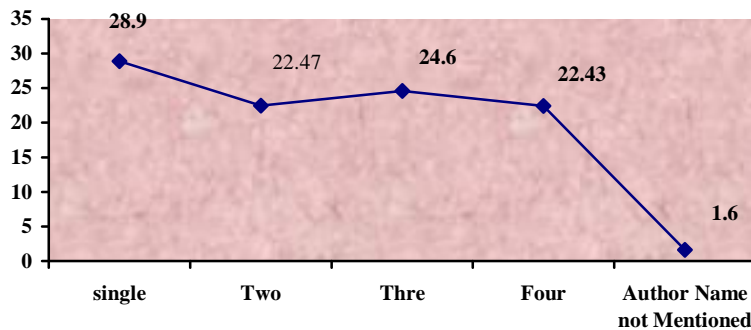


Table no.4 shows the authorship pattern of articles. Among 17917 articles, 9325 (52.04%) articles are written by single author, 3625 (20.23%) articles are written by two authors, 2646 (14.76%) articles are written by three authors, 1810 (10.12%) articles are written by three and 511 (2.84%) articles are not mentioned by authors. It can be seen that single authors are predominant, than multi authors. The authorship pattern reveals a remarkable different between the number of single author and multiple authors. Very less number of articles are written by multi author the study reveals that single authorship research is predominant as compare to information technology in LISA. The study opined that team research is favored in Information technology in LISA.

Degree of Collaboration

Various methods have been the degree methods proposed to calculate the degree of research collaboration. Here in this study the formula proposed by Subramanyam (1983) has been used.

$$\text{The degree of collaboration } C = \frac{Nm}{Nm + Ns}$$

- Where, C = Degree of collaboration in a discipline
- Nm = number of multi authored papers in the discipline
- Ns = number of single papers in the discipline
- Hear Nm = 22939
- Ns = 9325

$$C = \frac{22939}{22939 + 9325} = 0.71$$

Thus the degree of collaboration (C) during the overall 10 years (2000-2009) is 0.71. But when we calculate the year wise degree of collaboration for 10 years the results arise different.

Table No. 5: Year wise degree of collaboration

Year	Total no. of articles	Total no. of authors	No. of single authors articles	% of articles	No. of Multi authored Articles	% of articles	Degree of collaboration
2009	1320	2271	780	4.35	540	3.02	0.40
2008	1476	2656	786	4.38	69	3.85	0.47
2007	1310	2236	778	4.34	532	2.97	0.41
2006	1947	3528	978	5.46	969	5.42	0.40
2005	1915	3440	965	5.38	950	5.30	0.5
2004	1925	3426	979	5.46	946	5.28	0.49
2003	1915	3576	920	5.14	995	5.55	0.52
2002	1778	3125	1018	5.68	760	4.24	0.43
2001	1817	3431	815	4.55	1002	5.59	0.55
2000	2514	4548	1306	7.30	1208	6.74	0.48
Total	17917	32264	9325	52.04	8592	47.96	0.49 (Mean)

The Table No. 5 represents the year wise number of multi-authored articles and their degree of collaboration. In the study, the degree of collaboration of all years is almost same of the mean value as 0.49. Table shows that in the 10 years of period the multi authorship articles are higher and predominant than single authorship. The single authored articles are also different in all years. The multi authored articles 1208 (6.74%) are highest in the year 2000.

Conclusion

Concluding results from the analysis of collected data appended to 17917 articles in 10 volumes of LISA are presented in a manner corresponding to objectives of the study. English 12120 (67.64 %) is most important language found during the study undertaken. The other languages Swedish, French, German, etc. are found to be 23.64%. In the Year-wise distribution, 17917 articles were published during 2000-2009 LISA. Maximum numbers of articles were published in the year 2000 with 2513(14.02%) articles and minimum number of articles published in 2007 with 1310(7.34%) articles. The mean relative growth for the first five years (2000-2004) showed a growth rate of 0.2751 where as the mean relative growth rate for the last five years (2005-2009) reduced to 0.587. The corresponding Doubling Time for different years [Dt(P)] gradually increased from 1.273 in 2001 to 9.24 in 2009. In Authorship pattern, of the total number of the 17917 articles, 9325 (52.04%) articles are written by single author, 8592 (47.95%) articles are written by multi author. In the degree of collaboration of all years i.e. from 2000-2009 is almost same of the mean value as 0.49 whereas the degree of collaboration during the overall 10 years is 0.71.

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