Survey of Authors' Collaboration Rate in Scientometrics Journal Articles during 2004 to 2008

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Abstract

There are evidences of the relationship between collaboration rate and quality of articles. The more the number of authors, the more qualified the article. Study of the collaboration rate among researchers is essential for strategic planning and research policy in major.

The main objective of this research is to determine the authors' collaboration rate in the articles of *Scientometrics* journal. Other aims are determination of the number of articles of the journal during the mentioned year, the most prolific authors, the most prolific organizations and research centers, etc. The type of research is descriptive survey. Data was gathered via check list and analyzed through Excel.

The most articles have been published in 2006 and the least in 2004. The mean number for each article is 2.33 authors. The collaboration coefficient is 0.60. Wolfgang Glänzel, Ronald Rousseau, and Leo Egghe are 3 writers who had the most articles and also the more collaboration during the mentioned years.

Katholieke Universiteit Leuven (Belgium) with 71 articles, University of Granada (Spain) with 49 articles and Hungarian Academy of Sciences (Hungary) with 33 articles are the centers which had the most collaborations.

Keywords: Collaboration, Scientometrics Journal, Library and Information Science

Introduction

Research is the main field for development and construction. In other words, the scientific development of each country is evaluated through its scientific activities. So, understanding and evaluating the scientific activities is essential for making research

policies (Aminpour, 2006).

Survey of researchers' collaboration is necessary for strategic planning of research policies. It can help to plan and evaluate research activities in various areas and determine the advantages and disadvantages and the quality of research activities in order to solve problems in the way of collaboration (Danesh & et. al., 2006).

Collaboration in producing scientific publications is a routine process in the most academic fields. Researchers' collaboration leads to the development of scientific works and the achievement of more results. The importance of collaboration in writing scientific papers is especially clear in today's complicated world in which everything is based on knowledge. The evidences show the importance of quality and even quantity of scientific productions produced in collaboration.

So, researchers in any field of science are almost unable to carry out research individually and team work research is an effort to share thoughts of two or more researchers to use the experiments of each other (Osareh & Marefat, 2005).

Significance of the Study

Creating networks of e-mails and advancement of information and communication technologies have caused the increase of communication and cooperation among researchers and experts in recent years. There are evidences in the scientific texts that indicate the existence of meaningful relationships between the amount of collaboration and better quality of the scientific work. Thus, the more the collaboration of groups of researchers the better the quality of the work (Hart, 2000).

Researchers' collaboration leads to the development of scientific works and the achievement of more results. The importance of collaboration in writing scientific papers is especially clear in today's complicated world in which everything is based on knowledge. Study of the collaboration rate among researchers is essential for strategic planning and research policy in major.

It is important to know if researchers in the fields of Scientometrics, Webometrics, Infometrics, Computer and Library and Information Science are also interested in joint collaborations. One of the most accredited journals in this area is *Scientometrics*. It is published electronically and is indexed and abstracted in the most important indexes of the world such as SCI, SSCI, LISA, SCOPUS etc, and has the Impact Factor of 1.472. So, analyzing author collaboration of this journal can lead us to very useful results.

As *scientometrics* is one of the most accredited journals in the field of Scientometrics and collaboration is a subheading of this area, this paper is a survey of authors' collaboration rate.

The main goal of this paper is to determine authors' collaboration in *Scientometrics* journal articles during 2004 to 2008.

Research Objectives

1. To determine the frequency distribution of articles based on date.
2. To determine the organizations which have the most collaboration.
3. To determine the frequency distribution of articles based on countries.
4. To determine the authors who have the most collaboration.
5. To determine collaboration rate in articles.

Methodology

This research is a descriptive survey. Scientometric methods have been used in this paper. The Collaboration Coefficient formula was used to identify the collaboration rate.

Collaboration Coefficient was calculated according to the following formula:

$$cc = 1 - \left\{ \sum_{j=1}^{k} \left(\frac{1}{j} \right) * \frac{Fj}{N} \right\}$$

Fj= the number of articles with "j" author

J= articles (one author, two authors, three authors…)

N= the whole number of authors in an article. (Koteswara & Raghavan, 2004)

The society of this study comprises of all 615 articles written by 1435 authors in *Scientometrics* journal articles during 2004 to 2008.

Review of Literature

There are many researches on the collaboration among scientific productions.

Hart (2000) found that the collaboration rate in Library and Information Science authors is more in core journals than the other journals.

Bahr & Zemon (2000) state that university librarians who published 69 percent of the articles in *College & Research Libraries* and the *Journal of Academic Librarianship* between 1986 and 1996, contributed almost 90 percent of the coauthored research in those core journals.

In another study, Farajpahloo (2004) said that Iranian Library and Information Science authors had an average of 2.04 authors for each article; this shows a low collaboration among them in this field.

Kretschmer & et. al. (2004) found that one of the general empirical results is that a high percentage (78%) of all bibliographic multi- authored publications become visible through search engines in the web.

Osareh & Marefat (2004) studied 2695 articles written by 9373 Iranian authors in the field of Medical Sciences during 1976 to 2003. There was the average of 3.4 authors for each article.

Lee & Bozerman (2005) show that in the presence of moderating variables such as age, rank, grant, gender, marital status, family relations, citizenship, job satisfaction, perceived discrimination, and collaboration strategy, the simple number ('normal count') of peer-reviewed journal papers is strongly and significantly associated with the number of collaborators.

Osareh (2005) in a survey of scientific collaboration among authors in articles of Astronomy database in Science Direct during 2000 to 2004 found that the most collaboration has occurred during the latest two years and there were considerable numbers of authors per article. 6. 6 people were collaborating in writing an article on average.

Abdolmajid (2006) studied 553 articles of all Iranian scientific journals in the field of Library and Information Science. Coefficient collaboration was 0.09 in those authors, which showed a low rate.

Danesh & et. al. (2007) carried out a research on the collaboration rate among the researchers of Isfahan University of Medical Sciences during 2001 to 2006. Findings showed that the number of researchers in each research project was 4.47 persons. The collaboration coefficient was 0.26.

Research Findings

Mean number of authors per paper in specialized conferences was the first objective. Research findings related to the mean number of articles and authors are shown in Table 1.

Table 1

Frequency Distribution of Articles and Mean of the Authors based on the Year of Publication

Year	Number of articles	Number of authors	Mean of authors in each article
2004	96	205	2.14
2005	107	258	2.41
2006	154	354	2.30
2007	129	329	2.55
2008	129	289	2.24
sum	615	1435	2.33

Table 1 shows that during 2004 to 2008 a total number of 615 articles from 1435 library professionals authors are presented in the *Scientometrics* and the mean number of authors per article in these years is 2.33. The most is in 2007.

Findings were analyzed to determine the organizations that had the most collaboration. Table 2 shows the results of organizations' collaboration.

Table 2

Frequency Distribution of Organizations based on the Most Collaboration in their Articles

Organizations and research centers	Number of articles					sum
	1 Author	2 Authors	3 Authors	4 authors	>4 authors	
Katholieke Universiteit Leuven, Belgium	7	19	28	9	8	71
University of Granada, Spain	2	6	4	15	22	49
Hungarian Academy of Sciences	4	10	7	12	0	33
Spanish Council for Scientific Research (CSIC)	0	16	12	0	1	29
King Mongkut's University of Technology Thonburi, Thailand	0	0	3	8	13	24
Leiden University, Netherlands	9	7	3	5	0	24
Taipei Medical University, Taiwan	2	6	5	20	0	23
Harbin Institute of Technology, China	0	6	15	0	0	21
Universidad Politécnica de Valencia	1	0	0	12	7	20
Bhabha Atomic Research Centre, India	4	8	3	0	5	20
National Institute of Science Technology and Development Studies (NISTADS), India	4	8	3	0	5	20
University of Barcelona, Spain	0	0	6	6	5	17
Peking University, Beijing	0	4	4	7	0	15
Wuhan University, China	0	0	9	5	0	14
University of Wolverhampton, UK	0	8	1	5	0	14
University of Western Ontario, Canada	2	6	6	0	0	14
University of Amsterdam	4	8	2	0	0	14
Institute of Scientific and Technical Information of China (ISTIC)	0	3	0	0	11	14
University of Sussex, UK	3	7	1	1	0	12
Beijing University of Aeronautics & Astronautics (SOM, BUAA), China	0	12	0	0	0	12
National Taiwan University	0	0	6	3	2	11

These are the universities and research centers which had the most collaborated articles. As Table 2 shows, Katholieke Universiteit Leuven (Belgium) has had the most collaboration with 71 articles. Of Course, this has been a long table of organizations but it

is limited to some of the most collaborating ones.

To determine the frequency distribution of articles based on countries and to answer the third question of study, Table 3 was designed. The results are shown as follows:

Table 3

Frequency Distribution of Articles based on the Country

Country	The number of articles					sum
	1 Author	2 authors	3 authors	4 authors	More than 4 authors	
Spain	6	44	42	44	59	195
China	7	40	52	14	11	124
USA	34	44	24	9	13	124
Belgium	23	27	39	12	10	111
UK	14	21	16	23	6	80
Germany	15	10	17	9	23	74
Netherlands	15	22	14	13	3	67
India	5	24	8	16	13	66
France	1	11	11	27	3	53
Taiwan	4	8	13	16	9	50
Hungary	5	13	9	18	0	45
Canada	4	10	11	4	5	34
South Korea	7	14	8	4	0	33
Brazil	2	2	18	4	6	32
Japan	2	12	6	1	10	31
Australia	2	5	13	2	8	30

Spain, China and U.S.A. are the first three countries which had the most number of articles and Spain has the most collaboration with 59 articles written by more than 4 authors.

To determine the authors who have the most collaboration, data are analyzed and classified in a long table. Here are the authors who had 5 or more than 5 articles in this journal during the mentioned year.

Table 4

Frequency Distribution of the Authors Who Have the Most Collaboration

Authors' name	The number of articles					sum
	1 author	2 authors	3 authors	4 authors	More than 4 authors	
Glänzel, Wolfgang	6	9	7	2	0	24
Rousseau, Ronald	3	6	3	1	1	14
Egghe, Leo	10	2	1	0	0	13
Leydesdorff, Loet	3	7	2	0	0	12
Meyer, Martin	3	5	2	1	0	11
Schubert, András	1	4	3	2	0	10
Thijs, Bart	0	4	4	1	1	10
Ho, Yuh-Shan	0	3	4	2	0	9
Braun, Tibor	0	4	1	3	0	9
Debackere, Koenraad	0	2	3	1	2	8
Thelwall, Mike	0	6	1	1	0	8
Vaughan, Liwen	1	5	2	0	0	8
Yu, Guang	0	3	5	0	0	8
Guan, Jiancheng	0	7	0	0	0	7
Lewison, Grant	2	3	0	1	1	7
Bornmann, Lutz	0	4	2	0	0	6
Burrell, Quentin L.	6	0	0	0	0	6
Daniel, Hans-Dieter	0	3	3	0	0	6
Moya-Anegón, Félix	0	2	1	0	3	6
Kretschmer, Hildrun	1	1	3	0	0	5
Li,Yi-Jun	0	1	3	1	0	5
Markpin, Teerasak	0	0	1	2	2	5
Sombatsompop, Narongrit	0	0	1	2	2	5
Tijssen, Robert J. W.	1	2	1	0	1	5
van Raan, Anthony F. J.	5	0	0	0	0	5
Yu, Daren	0	1	4	0	0	5

To determine collaboration rate in articles data of Table 5 and Table 6 answer our question.

Table 5

Frequency Distribution of the Articles from the Collaboration Rate Point of View

Year	Number of the articles					sum
	1 author	2 authors	3 authors	4 authors	More than 4	
2004	35	34	14	10	3	96
2005	39	33	17	11	7	107
2006	50	38	44	14	8	154
2007	31	38	32	20	8	129
2008	41	50	22	7	9	129
sum	196	193	129	62	35	615
percentage	31/87	31/38	20/98	10/08	5/69	100

Table 6

Collaboration Coefficient during 2004 – 2008

Year	Authors' collaboration rate
2004	0.62
2005	610.
2006	570.
2007	0.59
2008	590.
mean	.600

Collaboration Coefficient is a number between 0 and 1. The more it is bigger than 0.5., the better is the collaboration rate among authors. When it is near 0, it means that authors have a weak collaboration. As it is shown in Table 6, the mean is 0.60 which shows the average rate among authors.

Conclusion

Research findings showed that 1435 authors had participated in writing 615 articles so that the mean number for each article was 2.33 persons. Comparing with previous papers, Farajpahloo (2004) in Library and Information Science and Osareh (2005) in Astronomy field had shown that the mean number was 6.6 authors. Osareh & Marefat (2005) in Medical Sciences showed 3.4 authors. Danesh & et. al. (2007) in Medical Sciences showed 4.47 researchers. The result of his paper showed a low participation of authors.

The results of this research showed that the status of collaboration is in a low level so that 196 articles (31.87%) were by single authors, though it seems that the number of multi-

author articles increases in tables. So, evolution reveals tendency toward group articles. Coefficient collaboration on average was 0.60. Compared with previous findings it is relatively low.

Suggestions

1. Coefficient collaboration in this study was in a low level. So, it is recommended that some privilege policy be established in universities and research centers for team works and multi-author articles to encourage researchers to write their articles together.

2. Researchers study on a subject like this in future and compare the results regarding development of electronic relationships in global village.

3. Some similar researches can be done with different communities for example students of Library and Information Science, collaborating in other journals, etc.

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