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DOMINANCE FACTORS OF PROLIFIC AUTHORS IN OPEN ACCESS JOURNALS IN LIBRARY AND INFORMATION SCIENCE: A BIBLIOMETRIC STUDY

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ABSTRACT

The paper defines the term Dominance in genetics, economics, and research. Review some articles related to the topic. Gives a formula for the dominance factor developed by Prof. Sudhir Kumar. Applies chai square test for the test of hypothesis. The paper first gives selected lists of open-access journals in library and information science published in India, and the USA and calculates the average values of the degree of collaboration and collaboration index of these journals. Analysis of 2118 articles contributed by 3923 authors from India and calculated DF values of some prolific authors. For the USA, the paper analysis articles for 3402 authors contributed and prepared a list of prolific authors and their DF values. In the end, apply the Chai square test to the data collected for each journal by calculating the DF values of authors with 4 or more articles and categorizing them as shown in 3 different tables of the paper. The result shows acceptance of the hypothesis for India and rejection of the hypothesis in the USA and UK. Concluded that prolific authors in LISC are generally dominant and their values of DF are high.

1. INTRODUCTION

Dominance is the word defined variously in different subjects. The evolution of dominance concerns the evolution of genetic dominance.[1] In genetics, dominance describes the effect of the different versions of a particular gene on the phenotype of an organism. Dominance was discovered by G.J. Mendal, who introduced the use of uppercase letters to denote dominant alleles and lowercase to denote recessive alleles. In economics, it is a measure of the strength

of a brand, product, service, or firm, relative to competitive offerings. Kwoka's dominance index is defined as the sum of the squared differences between each firm's share and the next largest share in a market.[2] Dominance profile is a key factor in shaping the way a person thinks and acts. Carla Hannaford[3] shows why and reveals how knowing a person's profile will help him, to learn in the way that suits him best and perform at his highest level. In research dominance means authors who manifest themselves as first author while collaborating with authors.

The dominance factor formula in bibliometrics has been developed by Sudhir Kumar (2008). Dominance factor is the proportion of no. of multi-authored papers of an author as first author (Nmf) to the total no. of multi-authored papers of the author (Nmt).

$$DF = Nmf/Nmt$$

A high DF value shows more dominance of the author as the first author while a low DF value shows low dominance of the author as the first author.

2. Literature review

For the study literature reviews on collaboration and dominance Factors have been made: Thanuskodi (2010)[4] analyses 249 articles during 2005-2009 in JLPP**.** The authorship pattern shows 68.7% of papers of joint authorship while single authorship is only 31.32%. Hussain, Fatima, and Kumar (2011)[5] analyses 578 articles during 2000-2010 in ELJ. Found 46.54% of single-authored papers while 32.87% of papers are by two authors. The paper also analyses the degree of collaboration and found 0.256. Warraich and Ahmad (2011)[6] made an exhaustive bibliometric study of PJLIS and found author productivity and authorship collaboration. Verma Sonkar and Gupta (2015)[7] analyses 1177 articles from 2005- 2014 in LPP**.** Finds an average of 117 articles per year. The authorship pattern shows 568 articles contributed by a single author. Year-wise degree of collaboration found 0.21 to 0.5. Khaparde (2011)[8] studies 1147 articles in 180 issues of 5 important e-journals in LIS such as Library Resources, Library High Tech, etc. from 2005-2009. The authorship pattern shows 55% of single-author and 45% of joint-author articles. Finds Hans Jon Nielson as the most productive author with 110 articles. Maity and Teli (2015)[9] analyses 13 selected LIS journals in the DOAJ database in only the English language during 2004-2014. There were 2115 articles out of which 1047 are of single authorship. Provides year-wise productivity of articles. The Ph.D. thesis of Surendra Kumar has applied the formula for the first time. His work is on Productometric study oilseed crops research institutes of Indian Council Agricultural

Research (ICAR)[10] The Ph.D. thesis of Shilpa Dhoble[11] and Kirti Bala Jain[12] has also applied the formula for Dominance factor on Groundnut and mustered and Soyabeen research.

3. METHODOLOGY

The paper studies selected 10 journals from India, 7 journals from the USA, and 5 journals from the UK for the years 2005-2014. The data have been collected from the Directory of Open Access Journal. For data collection, each paper has been opened online and downloaded as printed, if needed. Their authorship patterns have been analysed and ascertained. The data have been loaded on an MS Excel worksheet for further analysis.

Following bibliometric and statistical formulae have been used in this study.

(a) Degree of Collaboration (DC):- Degree of collaboration is the proportion of jointly authored publications to total publications.[13] The mathematical presentation of the degree of collaboration (D.C.) is

$$D.C. = \frac{Nm}{Nm + Ns}$$ Where, Ns = Single authored publications

Nm = Multiple authored publications

(b) **Collaboration Index:** The collaboration index is the mean number of authors per joint-authored publication.[14] The mathematical presentation of the collaboration index (C.I.) is

$$C.I. = \frac{No. \ of \ authors \ of \ total \ joint \ publications}{Total \ joint \ publications}$$

(c) Dominance Factor

The dominance factor formula in bibliometrics has been developed by Sudhir Kumar (2008). Dominance factor (DF) is the proportion of the number of joint–authored papers of an author as first author (Nmf) to the total number of joint-authored papers of the author (Nmf)[15] Mathematically it is represented as:

$$DF = \frac{Nmf}{Nmt}$$

where, Nmf = number of multi-authored
papers of a author as first author
Nm**t** = number of multiple-authored
papers of a author

The list of prolific authors of up to 10 contributions has been given in this paper.to calculate DF authors with 4 or more publications have been analysed. The hypothesis has been tested with figures up to 4 or more articles so that better results can be obtained.

(D) Chi-square test

A chi-square test has been used which is suitable for such data. It is a non-parametric test not based on any summary value of population. Mostly this test is used for data available in frequencies two are more categories. It can also be used with data reduced to proportions or percentages. Mathematically it is represented as:

$$\chi^2 = \sum (O\text{-}E)^2/E$$

Where O is the observed frequency and

E is the expected frequency of the same event.

Values of Chi-Square at various levels of significance with various degrees of freedom are given in a standard table which is used to compare observed and tabulated value to reach inferences.

Observed values are these which are collected.

An expected value in a contingency table is calculated by the formula.

$$= \frac{1}{N^2}$$

Here 'n' is the number of contributions such as 2 or 3 or 4 and so on.1 is denoted number of authors who contributed only one article each.

4. Hypothesis

1. Most of the prolific authors have high DF values.

5. Data analysis

5.1. Degree of collaboration (D.C.) and collaboration index (C.I.)

In this section values of D.C. and C.I. have been calculated.

5.1.1 India

The study has analysed 2118 articles and 3923 authors published during 2005-2014. Table 1 calculates values of the Degree of collaborations and collaboration indexes**.** The CC ranges between 0.55 to 0.77 with an average of 0.62. The C.I. also ranges between 1.71 to 2.33 with

an average of 1.85. These figures are very low compared to other bibliometric studies, especially in the sciences.

Table 5.1.1: Degree of collaboration and collaboration index-OAJ-LIS-India.

S.N.	Name of journals	D.C.	C.I.
1	Annals of Library and Information Science	0.66	1.92
2	Desidoc Journal of Library and Information Technology	0.62	1.92
3	Trends in Information Management	0.55	1.79
4	International Journal of Digital Library Services	0.6	1.76
5	International Journal of Information Dissemination and Technology	0.63	1.87
6	International Journal of Library and Information Studies	0.68	1.85
7	International Research	0.62	1.87
8	E-Library Science Research Journal	0.57	1.71
9	International Journal of Library and Information Science	0.76	2.17
10	International Journal of Library and Information Science Research Development	0.77	2.33
	Average	**0.62**	**1.85**

Graph 1: Degree of collaboration and collaboration index-OAJ-LIA-India
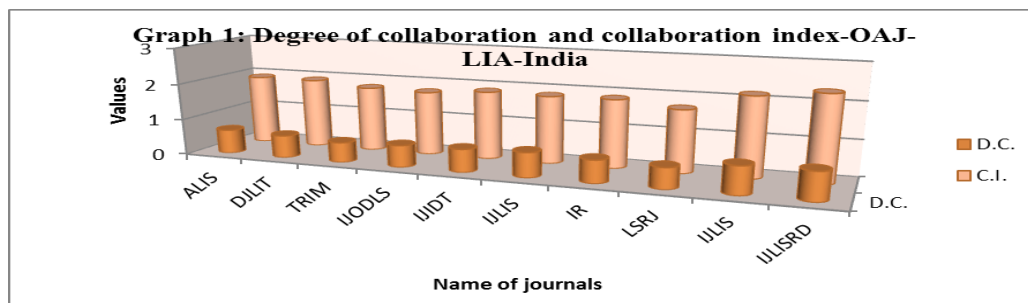
5.1.2 USA

The study has analysed 1901 articles and 3402 authors published during 2005-2014Table 2 calculates **the** Degree of Collaboration and Collaboration index**.** The CC ranges between 0.16 to 0.62 with an average of 0.54. The C.I. also ranges between 1.32 to 2.07 with an average of 1.79. These figures are very low compared to earlier bibliometric studies, especially in the sciences.

Table 5.1.2: Degree of collaboration and collaboration index-OAJ-LIS-USA.

S.N.	Name of journals	D.C.	C.I.
1	Journal of the Rutgers University Libraries (JRUL)	0.16	1.32
2	College and Research Libraries (CRL)	0.62	2.02
3	Education Libraries (EL)	0.3	1.34
4	Library Philosophy and Practice (LPP)	0.53	1.74
5	Communication in Information Literacy (CIL)	0.6	2.07

6	Collaborative Librarianship (CL	0.61	1.97
7	Journal of Library Innovation (JLI)	0.44	1.67
	Average	0.54	1.79

Graph 2:Degree of collaboration and collaboration index-OAJ-LIS-USA
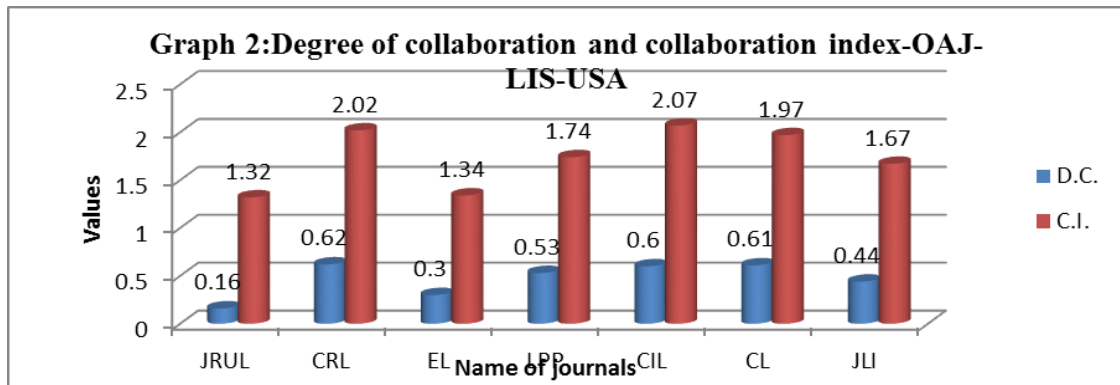
5.2. Prolific authors and their Dominance factors

In this section values for the Dominance Factor of prolific authors have been calculated in various tables.

5.2.1 India

Table 4 shows a list of 19 top authors in all OA journals from India in the study. In India in all 2118 articles have been contributed by 3923 authors in the journals during the period of study. Out of them, 5+ articles have been contributed by 79 authors. Out of them, 30 authors (36%) have high/maximum DF values, and 41 (52%) authors have low/mild DF values. In India B.M. Gupta has contributed the highest 27 articles followed by B.K. Sen and Thanuskodi, S The list includes other 79 authors.

Table 5.2.1: Prolific authors and their Dominance factors-OAJ-LIS-India.

S.N.	Prolific authors	N. of articles	Single author	Joint authors	First author	D.F.	Ranges
1	Gupta, B.M.	27	10	17	11	0.65	D
2	Sen, B K	20	7	13	0	0	A
3	Tamilselvan,N	20	0	20	6	0.3	B
4	Thanuskodi , S.	19	10	9	2	0.22	B
5	Kumar, Ashok	18	0	18	3	0.17	A
6	Sivaraman,P.	18	0	18	3	0.17	A
7	Sevukan, R.	17	1	16	2	0.13	A
8	Sivakumar, N.	17	0	17	9	0.53	C
9	Bansode, Sadanand Y.	16	8	8	5	0.63	D
10	Dhanavandan S.	16	2	14	5	0.36	B
11	Garg, K.C.	15	3	12	9	0.75	D
12	Maharana, Rabindra, K.	15	4	11	8	0.73	D
13	Nikam, Khaiser	15	0	15	5	0.33	B

14	Jeyshankar R	14	3	11	8	0.73	D
15	Khaparde, Vaishali	14	0	14	0	0	A
16	Mahajan, Preeti	14	2	12	2	0.17	A
17	Dutt, B;	12	0	12	9	0.75	D
18	Jeyapragash	11	0	11	0	0	A
19	Kademani a, B.S.	11	0	11	4	0.36	B
20	Velmurugan, C.	10	4	6	5	0.83	E
21	Padma, P.	9	1	8	6	0.75	D
22	Sridhar.K.	9	2	7	2	0.29	B
23	Kumar, Suresh	8	2	6	0	0	A
24	Rajendiran, P.,	8	0	8	6	0.75	D
25	Ramasamy K	8	0	8	4	0.5	C
26	velmurugan, V. Senthur	8	6	2	2	1	E
27	Baskaran, C.	7	3	4	0	0	A
28	Chikkamanju	7	1	6	2	0.33	B
29	Ganaie, Shabir Ahmad	7	5	2	2	1	E
30	Jeyaprakash, B	7	0	7	0	0	A
31	Kalbande, D. T	7	0	7	6	0.86	E
32	Kumbar, B.D.	7	1	6	2	0.33	B
33	lal, Payare	7	0	7	4	0.57	C
34	Loan, Fayaz Ahmad	7	2	5	2	0.4	B
35	Mudho, Mahesh V.	7	0	7	0	0	A
36	Mukherjee, Bhaskar	7	4	3	2	0.67	D
37	Pandita, Ramesh	7	5	2	2	1	E
38	Pujar, Shamprasad M	7	1	6	4	0.67	D
39	Sarasvathy, P.	7	0	7	3	0.43	C
40	Sivakumaren, K.S.	7	0	7	6	0.86	E
41	Biradar, B. S	6	2	4	3	0.75	D
42	Gul, Sumeer	6	0	6	3	0.5	C
43	Hasan, Nabi	6	1	5	2	0.4	B
44	Madhusudhan, argam	6	0	6	2	0.33	B
45	Maharana, Rabindra K.	6	0	6	6	1	E
46	Paul, Prantosh Kumar	6	3	3	3	1	E
47	Reddy, V. Pulla	6	0	6	1	0.17	A
48	Shafi, S.M.	7	3	4	4	1	E
49	Swain, Dillip K	6	2	4	0	0	A
50	Thavaman, K.	6	3	3	2	0.67	D
51	Alhamdi, Fawaz Abdullah	5	0	5	4	0.8	D
52	Babu, B. Rames	5	0	5	0	0	A
53	Babu, K. Surendra	5	1	4	0	0	A
54	Bhat, Mohammad Hanief;	5	3	2	1	0.5	C
55	Chandrashekara, M	5	0	5	0	0	A
56	Chinnadurai, D.	5	1	4	3	0.75	D
57	Gautam, J N;	5	0	5	0	0	A
58	Gupta, Dinesh K	5	2	3	2	0.67	D
59	Kamble, V.T.	5	1	4	0	0	A
60	Kannapanavar BU	5	1	4	0	0	A
61	Kumar, Rajinder	5	3	2	1	0.5	C

62	Kumbar, Mallinath;	5	0	5	0	0	A
63	Mahapatra,Rabindra K.	5	1	4	3	0.75	D
64	Mallaiah, T Y	5	1	4	0	0	A
65	Manjunath, M.	5	1	4	0	0	A
66	Maurya,Shyam Lal	5	2	3	1	0.33	B
67	Natarajan, M.	5	3	2	0	0	A
68	Nazim, Mohammad	5	0	5	4	0.8	D
69	Ram, Shri	5	3	2	0	0	A
70	Ray, Partha Pratim	5	2	3	3	1	E
71	Satija , M.P	5	2	3	2	0.67	D
72	Selvan, R.Saravana Subbu	5	2	3	1	0.33	B
73	Shah, Tariq Ahmad	5	1	4	0	0	A
74	Somashekara , Y. L.	5	1	4	4	1	E
75	Sujatha, H R	5	1	4	3	0.75	D
76	Tamizhchelvan, M	5	0	5	3	0.6	C
77	Ugwu, Cyprian I	5	0	5	2	0.4	B
78	Vasishta, Seema	5	4	1	0	0	A
79	Vishwakarm,Mohanlal	5	0	5	1	0.2	B
	50 authors	4	-	-	-	-	-
	126 authors	3	-	-	-	-	-
	328 authrors	2	-	-	-	-	-
	2016 authors	1	-	-	-	-	-
	Total authors	3923	-	-	-	-	-

SN.	Symbol	Range	Category	Number	%
1	A	0.00-0.20	Negligible	26	32.91%
2	B	0.21-0.40	Mild	15	18.99%
3	C	0.41-0.60	Moderate	8	10.13%
4	D	0.61-0.80	High	19	24.05%
5	E	0.81-1.00	Maximum	11	13.92%
	Total	-	-	79	100.00%

5.2.2 USA

In the list, authors have been listed with five or more articles in OA journals from the USA. The list contains 33 names out of a total of 3402 authors in all. In the USA there are 32 authors with 5+ articles. Bhati is on top with 27 articles. Followed by Mahmood (19) and Ugah (13). The DF values are given against each author in the table. Over 15 authors (out of 32) have H/M DF values and 13 have L/M values.

Table 5.2.2: Prolific authors and their Dominance factors –OAJ-LIS-USA.

S.N.	Prolific authors	N. of articles	Single author	Joint authors	First author	D.F.	Ranges
1	Bhatti, Rubina	27	5	22	13	0.59	C
2	Mahmood, Khalid	19	2	17	1	0.06	A
3	Ugah, Akobundu Dike	13	8	5	5	1	E

4	Shafique, Farzana	11	2	9	3	0.33	B
5	Thanuskodi, S	10	7	3	2	0.67	D
6	Cargill,Mary	9	0	9	0	0	A
7	Popoola,Sunday Olanrewaju	8	1	7	0	0	A
8	Witte,Sarah	8	0	8	8	1	E
9	Gupta,B. M.	7	1	6	6	1	E
10	Okello-Obura, C.	7	1	6	2	0.33	B
11	Okoye, Michael nuchukwu	7	6	1	1	1	E
12	Ameen, Kanwal	6	2	4	0	0	A
13	Esmail, S. Mohamed	6	0	6	0	0	A
14	Horton, Valerie	6	1	5	2	0.4	B
15	Lee, Janet	6	1	5	0	0	A
16	Mahajan, Preeti	6	4	2	1	0.5	C
17	Maharana,Rabindra K.	6	1	5	4	0.8	D
18	Saleh, Adam Gambo	6	4	2	2	1	E
19	Sethi,Bipin Bihari	6	0	6	4	0.67	D
20	Smale, Maura A	6	4	2	1	0.5	C
21	Uzuebgu,Chimezie Patrick	6	1	5	4	0.8	D
22	Adekunjo,Olalekan A.	5	0	5	2	0.4	B
23	Anyira, Isaac Echezonam	5	4	1	1	1	E
24	CannCasciato, Daniel	5	4	1	1	1	E
25	Dhanavandan, S.	5	0	5	4	0.8	D
26	Eke , Helen N.	5	0	5	5	1	E
27	Flatley ,Robert	5	0	5	3	0.6	C
28	Gaetz, Ivan	5	1	4	1	0.25	B
29	Gavgani, Vahideh Zarea	5	0	5	4	0.8	D
30	Nweze, Chinwe M.T.	5	4	1	1	1	E
31	Ogbomo, Esoswo F.	5	0	5	2	0.4	B
32	Tucker, Cory	5	0	5	0	0	A
	four articles	36					
	three articles	102					
	two articles	396					
	single article	1919					
	Total authors	3402					

SN.	Symbol	Range	Category	Number	%
1	A	0.00-0.20	Negligible	7	21.88%
2	B	0.21-0.40	Mild	6	18.75%
3	C	0.41-0.60	Moderate	4	12.50%
4	D	0.61-0.80	High	6	18.75%
5	E	0.81-1.00	Maximum	9	28.13%
	Total	-	-	32	100.00%

6. Hypothesis 1: *Most of the prolific authors have high DF values.*

Mathematically

H_0: $X_c < X_t$

H_1 : $X_c \geq X_t$

For analysis purposes number of prolific authors categorised in 5 categories in each journal has been taken into consideration as shown in the tables 5.3. Authors with 4 publications or more have been considered for calculations of DF values.

6.1 India

The table shows the number of prolific authors in each category in 10 journals published in India

Categorization of DF values of prolific authors-**India**

S.N.	Category	1	2	3	4	5	6	7	8	9	10	Total
1	**A**-negligible	5	7	3	2	3	2	-	9	-	2	33
2	**B**-Mild	4	4	1	-	1	1	-	5	3	2	21
3	**C**-Moderate	-	2	1	-	1	-	-	5	1	1	11
4	**D**-High	4	3	-	-	1	-	-	5	1	-	14
5	**E**-Maximum	6	1	-	-	2	-	-	5	-	-	14
	Total	19	17	5	2	8	3	-	22	5	5	93

1=ALIS, 2=DJLIT, 3=TRIM, 4=IJODLS, 5=IJIDT, 6=IJLIS, 7=IR, 8=ELSRJ, 9=IJLIS, 10=IJLISRD

The study revealed that as per table 6.2.8 only 28 authors out of 93 authors are highly dominating with category D&E. Other 65 authors are least dominating (category A+B).

To test this hypothesis chi-square test has been applied.

Table 6.1: Chi-square test.

S.N.	Category	Observed	Expected	o-e	$(o-e)^2$	$(o-e)^2/e$
1	A	33	18.6	14.4	207.36	11.15
2	B	21	18.6	2.4	5.76	0.31
3	C	11	18.6	-7.6	57.76	3.11
4	D	14	18.6	-4.6	21.16	1.14
5	E	14	18.6	-4.6	21.16	1.14
	Total	93	18.6	74.4	5535.36	16.84

Here

χ^2 (calculated value) $= 16.84$

χ^2 (tabulated value) $= 9.48$

The calculated Chi-square value (16.84) is more than the table Chi-square value (9.48) at a degree of freedom of 4, level of significance, a=0.05) (table 6.2.9) the difference in values is highly significant so the hypothesis is not applicable to the data for India.

So, $18.78 > 9.48$

$\chi^2{}_{cal} > \chi^2{}_{tab}$

So, the null hypothesis is not accepted for India.

6.2 USA

The table shows the number of prolific authors in each category in 7 OA journals from the USA

Categorisation of DF values of prolific authors-USA

S.N.	Category	JRUL	CRL	EL	LPP	CIL	CL	JLI	Total
1	A	2	1	2	14	-	3	-	22
2	B	-	0	-	8	-	1	-	9
3	C	-	1	-	10	-	-	-	11
4	D	-	2	-	14	-	-	-	16
5	E	-	1	-	12	-	-	-	13
	Total	2	5	2	58		4	-	71

The study revealed that 29 authors are highly dominating out of 71 authors with category D&E.42 authors are least dominating.

To test this hypothesis chi-square test has applied.

Table 6.2: Chi-square test.

S.N.	Category	Observed	Expected	o-e	$(o-e)^2$	$(o-e)^2/e$
1	A	22	14.2	7.8	60.84	4.28
2	B	9	14.2	-5.2	27.04	1.9
3	C	11	14.2	-3.2	10.24	0.72
4	D	16	14.2	1.8	3.24	0.23
5	E	13	14.2	-1.2	1.44	0.1
	Total	71				7.23

Here

$\chi^2{}_{\text{(calculated value)}} = 7.23$

$\chi^2{}_{\text{(tabulated value)}} = 9.48$

The calculated Chi-square value (7.23) is less than the table Chi-square value (9.48) at a degree of freedom of 4, level of significance, a=0.05) the difference in values is highly significant so the hypothesis is applicable to the data for the USA.

So, $7.23 < 9.48$

$\chi^2{}_{cal} < \chi^2{}_{tab}$

So, the null hypothesis is accepted for the USA.

Overall the null hypothesis is partially rejected.

6. CONCLUSION

The study shows the low value of the Degree of Collaboration (DC) and Collaboration Index. For India values are 0.62 and 1.85, for the USA the values are 0.54 and 1.79 It means approx 56% of papers are collaborated papers with only 1.7 authors per paper. The values for the Dominance Factor are equally distributed In OA journals from India 30 % of authors have high and maximum DF values 54% have low negligible or mild DF values. In OA journals from the USA, 40% have high and maximum DF values. On the test of the hypothesis, "Most of the prolific authors have high DF values" the null hypothesis has been rejected for India but has been accepted for USA library and information science prolific authors are more dominant and their levels of dominance factors are high.

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