

INFORMATION DEVELOPMENT: A SCIENTOMETRIC STUDY

Gajanand B. Wankhede * Prof. Vaishali S. Khaparde **

***Research Scholar**

****Professor & Head**

Department of Library and
Information Science,
Dr. Babasaheb Ambedkar
Marathwada University,
Aurangabad, Maharashtra,
India.

QR Code



Abstract: - The paper mainly deals with the scientometric analysis of Information Development. The present study is based on 10 volumes 40 issues of Information Development during 2003-2012. In all 3605 citations appended to 204 articles were further analyzed. The paper deals with the Scientrometrics analysis of different E-journals as per the parameters such as Average number of references per articles, Relative Growth Rates, Distribution of references, Authorship pattern, Year - Wise Degree of Collaboration, Organizational Contributions of Articles, Country wise distribution of references, Ranked List of Most Cited Journals, Chronological Distribution of Citation and Length of Articles.

Introduction

Scientometric analysis is a branch of bibliometrics. It is an important research tools for understanding of the subject it aims at measuring the utility of documents and relationship between documents and fields. The Information Development is published Four times in a year. It is an online journal published. The present study is based on 10 volumes 40 issues of Information Development during 2003-2012. The present chapter deals with the Scientrometrics analysis of different E-journals as per the following parameters.

- Average number of references per articles

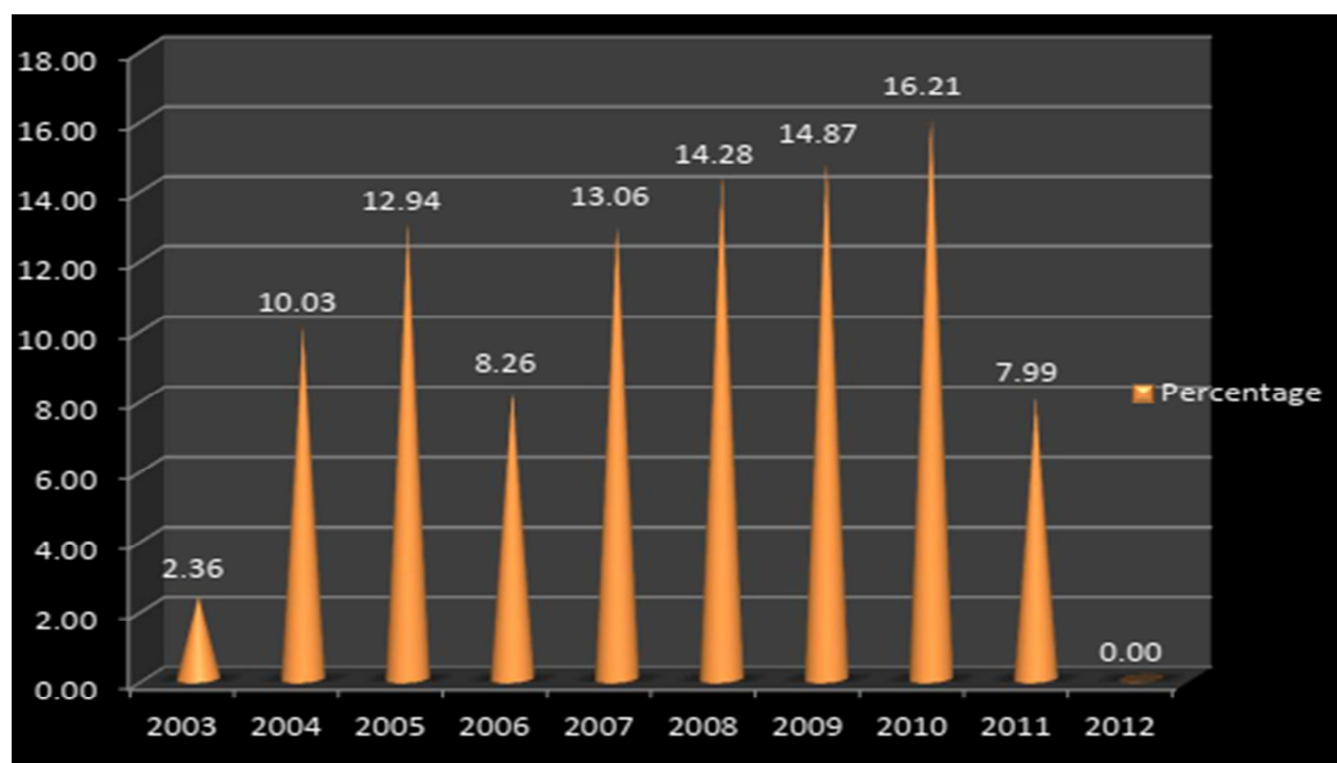
- Relative Growth Rates [R(c)] and doubling time [Dt(c)] for publication
- Relative Growth Rates [R(c)] and doubling time [Dt(c)] for citation.
- Form wise Distribution of references
- Authorship pattern
- Year – Wise Degree of Collaboration
- Organizational Contributions of Articles
- Country wise distribution of references
- Ranked List of Most Cited Journals
- Chronological Distribution of Citation
- Length of Articles.

Table No.1: Average No. of References per Article

Average No. of References per Article				
Year	Volume No.	No. of Article	No. of References	Percentage
2003	19	13	60	2.36
2004	20	21	255	10.03
2005	21	22	329	12.94
2006	22	10	210	8.26
2007	23	18	332	13.06
2008	24	20	363	14.28
2009	25	17	378	14.87
2010	26	21	412	16.21
2011	27	12	203	7.99
2012	28	35	0	0.00
		189	2542	100.00

Table 1 depicts the detail regarding the number of articles published during 2003-2012 was 189 and the total number of citations was 2542. Year wise analysis of citation shows that average number of citation per article is maximum i.e. 412 (16.21) in the year 2010 and minimum i.e. 60 (2.36) in the year 2003.

Fig No.1: Average Number of References per Article



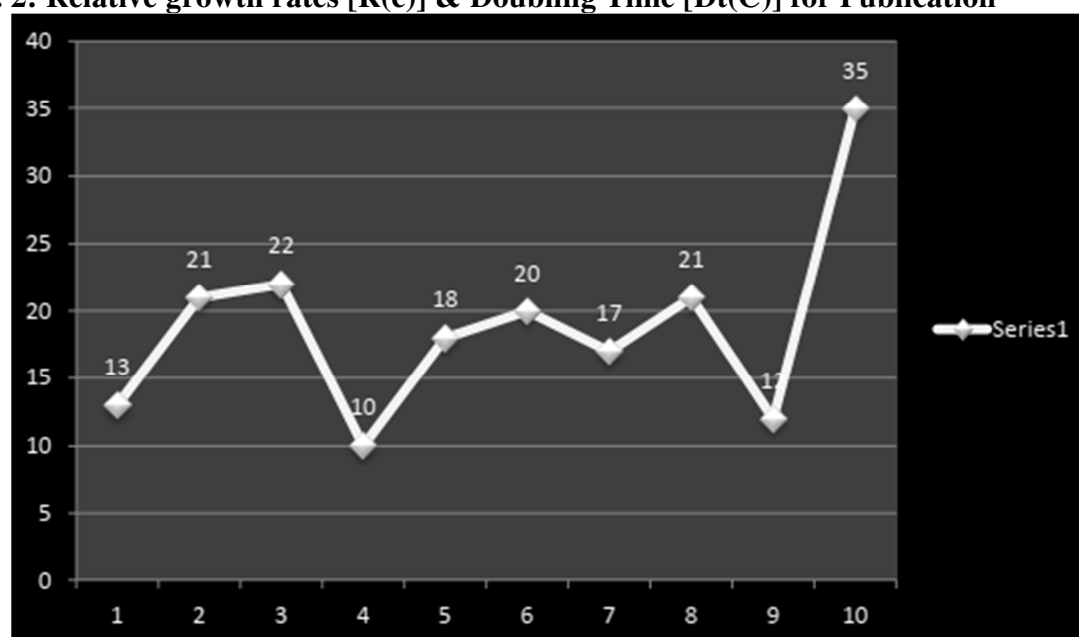
Relative Growth Rates [R(c)] and Doubling Time [Dt (C)] for Publication

The Relative Growth Rate (RGR) is a measure to study the increase in number of articles / pages per unit of articles / pages per unit time (Mahapatra, 1985) and Doubling time is directly related to Relative Growth (RGR). It is the time required for articles / citations to become double of the existing amount.

Table 2: Relative Growth Rates and Doubling Time for Publications

Relative Growth rates and doubling time for publications								
Year	No. of Article	Cumulative No. of Article	LOG 1P	LOG 2P	[R(P)]	Mean [R(P)]	[Dt(P)]	Mean [Dt(P)]
2003	13	13		2.56		0.47		0.94
2004	21	34	2.56	3.53	0.96		1.39	
2005	22	56	3.53	4.03	0.50		1.39	
2006	10	66	4.03	4.19	0.16		0.72	
2007	18	84	4.19	4.43	0.24		0.24	
2008	20	104	4.43	4.64	0.21	0.16	0.35	0.24
2009	17	121	4.64	4.80	0.15		0.31	
2010	21	142	4.80	4.96	0.16		0.22	
2011	12	154	4.96	5.04	0.08		0.23	
2012	35	189	5.04	5.24	0.20		0.12	
	189							

It can be noticed that the Relative Growth of publication [R(P)] decreased from the rate of 0.96 in 2003 to 0.20 in 2012. The mean relative growth for the first five years (i.e. 2003 to 2012) showed a growth rate of 0.47, whereas the mean relative growth for the last five years (i.e. 2008 to 2012) reduced to 0.16. The corresponding Doubling Time for different years [Dt(P)] gradually increased from 1 in 2003 to 0.31 in 2009, and it also shows that there is a decrease in Doubling Time reduced to 0.22. Thus, as the rate of growth of publication was decreased, the corresponding Doubling Time was increased. The Doubling Time for the first five years (i.e. 2003 to 2012) was only 0.94, which was increased to 0.24 during the last five years (i.e. 2008 to 2012). Thus, as the rate of growth of publication was decreased, the corresponding Doubling Time was increased.

Fig No. 2: Relative growth rates [R(c)] & Doubling Time [Dt(C)] for Publication

Relative growth rates [R(c)] and Doubling Time [Dt(C)] for Citations

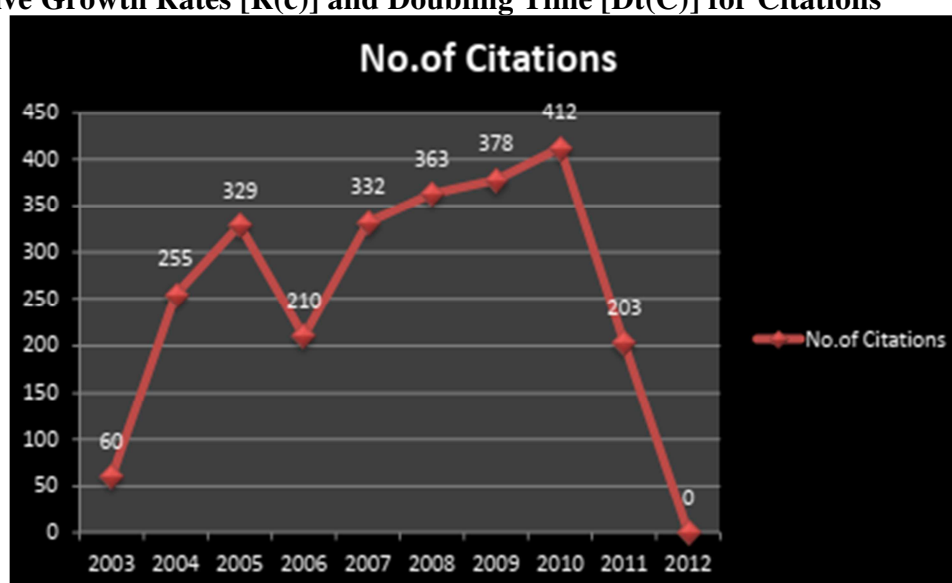
The relative growth [R(C)] and Doubling time [Dt (C)] of citations were determined and provided in the Table.

Table No.3: Relative Growth Rates and Doubling Time for Citations

Relative Growth rates and doubling time for Citations								
Year	No. of Citation	Cumulative No. of Citation	LO G1C	LO G2C	[R(C)]	MEAN [R(C)]	[Dt (C)]	MEAN [Dt(C)]
2003	60	60		4.09		0.74		1.08
2004	255	315	4.09	5.75	1.66		2.39	
2005	329	644	5.75	6.47	0.72		1.03	
2006	210	854	6.47	6.75	0.28		0.41	
2007	332	1186	6.75	7.08	0.33		0.47	
2008	363	1549	7.08	7.35	0.27	0.15	0.39	0.22
2009	378	1927	7.35	7.56	0.22		0.32	
2010	412	2339	7.56	7.76	0.19		0.28	
2011	203	2542	7.76	7.84	0.08		0.12	
2012	0	2542	7.84	7.84	0.00		0.00	
	2542							

It is observed from Table 3 in case of citations it was observed that the relative growth rate of citations was gradually decreased from 0.72 in 2003 to 0.00 in 2012. The mean Relative Growth [R(C)] of Citations during first five years (i.e. 2003 to 2012) was higher (0.74) than the last five years i.e. during 2008 to 2012 (0.15). The corresponding Doubling Time also indicate trend of 0.90 in 2003 to 2.39 in 2012. The mean Doubling Time [Dt(C)] during the half period (i.e. 2003 to 2012) was 1.08 which was increased to 0.22 during 2008 to 2012. Thus the rate of growth of citations has been gradually reduced and corresponding Doubling Time has been increased.

Fig No. 3: Relative Growth Rates [R(c)] and Doubling Time [Dt(C)] for Citations



Form wise Distribution of References

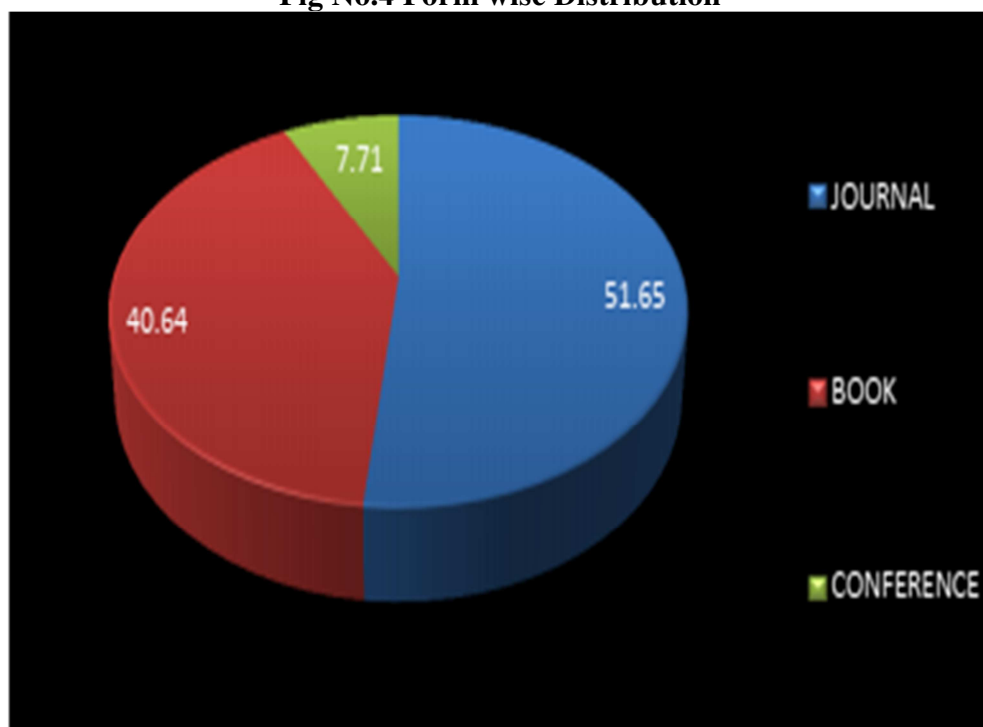
Journals, Book, Conference are cited in journal are shown in table no.4. The study regarding the Form Wise distributions of citations has been done in order to know the most dominant forms in which the information is cited.

Table No.4: Form wise Distribution of References

Form	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total No. of References	Cumulative No of Citation	%	Cumulative %
Journal	40	112	167	134	142	191	1203	191	133	0	1313	1313	51.7	51.7
Book	8	122	121	66	177	143	142	191	63	0	1033	2346	40.6	92.3
Conference	12	21	41	10	13	29	33	30	7	0	196	2542	7.71	100
Total	60	255	329	210	332	363	378	412	203	0	2542		100	

Table 4 gives form wise distribution of citation analysis and shows that of the total 2542 citation 1313 Citations are journal citation. It forms about 51.65% of the total. This is followed by other forms such as Conference 40.64%, Books (7.73%) etc.

Fig No.4 Form wise Distribution



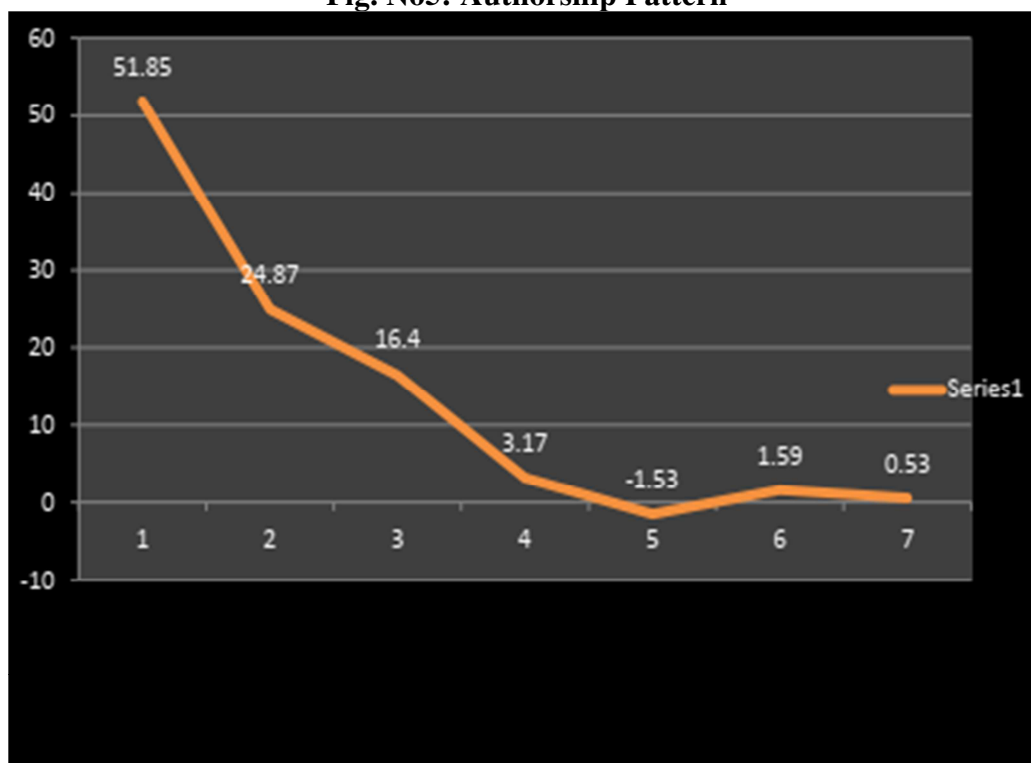
Authorship pattern: The authorship pattern is analyzed to determine the percentage of single and multiple authors.

Table 5: Authorship Pattern of the Articles

Authorship	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Single Author	9	14	15	7	6	11	12	7	7	10	98
%	69.2	66.7	68.2	70	33.3	55	70.6	33.3	58.3	28.6	51.9
Two Author	1	3	5	1	4	6	5	11	3	8	47
%	7.69	14.3	22.7	10	22.2	30	29.4	52.4	25	22.9	24.9
Three Author	3	4	2	2	3	3	0	2	2	10	31
%	23.1	19.1	9.09	20	16.7	15	0	9.52	16.7	28.6	16.4
Four Author	0	0	0	0	3	0	0	0	0	3	6
%	0	0	0	0	16.7	0	0	0	0	8.57	3.17
Five Author	0	0	0	0	1	0	0	0	0	2	3
%	0	0	0	0	-5.6	0	0	0	0	5.71	1.59
Six Author	0	0	0	0	0	0	0	1	0	2	3
%	0	0	0	0	0	0	0	4.76	0	5.71	1.59
Seven Author	0	0	0	0	1	0	0	0	0	0	1
%	0	0	0	0	5.56	0	0	0	0	0	0.53
Total	13	21	22	10	18	20	17	21	12	35	189
%	6.9	11.1	11.6	5.3	9.52	11	9	11.1	6.4	18.5	100

Table 5 indicates that the details about the authorship pattern 98 articles (51.85%) out of 189 articles have been contributed by single author. 47 articles (24.87 %) by two authors and 31 articles (16.40%) by three authors. 6 (3.17%) articles by 5 authors, 5 (1.59%) articles by 6 and the lowest is 1 (0.53%) articles by 4 authors.

Fig. No5: Authorship Pattern



Degree of Author's Collaboration

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

Formula,

$$C = \frac{Nm}{Nm + Ns}$$

Where,

C = Degree of collaboration in a discipline

Nm = Number of multi authored articles in the discipline

Ns = Number of single authored articles in the discipline,

Here,

$$Nm = 47$$

$$Ns = 98$$

$$C = \frac{47}{189} = 0.24. \text{ Thus the degree of}$$

Collaboration is $C = 0.24$.

So, in the study of collaboration during the overall 10 years (2003 – 2012) is 0.53.

Table 6: Year – Wise Degree of Collaboration

Year- Wise Degree of Contribution's							
Year	Totale No. of Article	Totale No. of Author	No.of Single	Percentage of Article	No. of Multi Authored Articles	Percentages of Articles	Degree of Collaboration
2003	13	20	9	4.76	4	2.12	0.31
2004	21	32	14	7.41	7	3.7	0.33
2005	22	29	15	7.94	7	3.7	0.32
2006	10	9	7	3.7	3	1.59	0.3
2007	18	34	6	3.17	12	6.35	0.67
2008	20	32	11	5.82	9	4.76	0.45
2009	17	22	12	6.35	5	2.65	0.29
2010	21	41	7	3.7	14	7.41	0.67
2011	12	19	7	3.7	5	2.65	0.42
2012	35	88	10	5.29	25	13.23	0.71
Total	189	326	98	51.85	91	48.15	0.45

Table 6 shows that the single author articles are highest than multi author articles. The single author articles are highest in the year 2005 i.e.15 (7.14%) and highest multi author articles are observed in the year 2012 i.e.25 (13.23).

Organizational Contribution of Articles

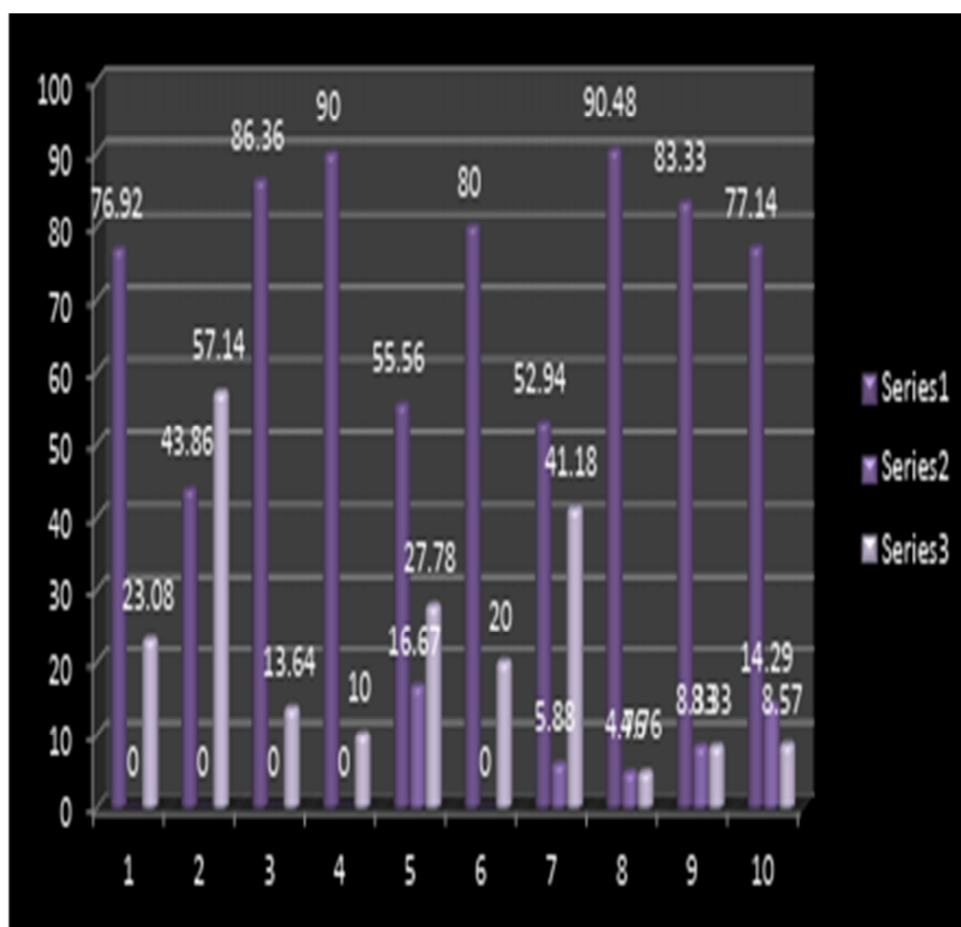
Table shows organization – wise distribution of articles published in Collection Management journal during the period under study.

Table No.7: Organization Contribution of Articles

Organization Contribution of Articles											
Organization	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
University	10	9	19	9	10	16	9	19	10	27	138
	76.9	42.9	86.4	90	55.6	80	52.9	90.5	83.3	77.1	73.02
Research Institute	0	0	0	0	3	0	1	1	1	5	11
	0	0	0	0	16.7	0	5.88	4.76	8.33	14.3	5.82
Others	3	12	3	1	5	4	7	1	1	3	40
	23.1	57.1	13.6	10	27.8	20	41.2	4.76	8.33	8.57	21.16
TOTAL	13	21	22	10	18	20	17	21	12	35	189

Authors from Universities are the major contributors with 138 (73.02%) contribution from 2003-2012 and followed by college institute with 40(21.16%) contribution.

Fig. No. 7: Organizational Contribution of Articles



Country Wise distribution of Authors: The country distribution is shown in the table 8.

Table No.8: Country Wise distribution

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total	%
Africa	1	2	3		3	3	1	2	2	2	19	10
Albany	1										1	0.5
Augustine											0	0
Bangladesh						1	1	1	1	1	5	2.7
Botswana	1	1	1	2	1	1	1	1	2	2	13	6.9
Brazil									2	1	3	1.6
China		1				1	1		1		4	2.1
Eritrea	1										1	0.5
Gambia								8			8	4.2
Ghana	1	3	3	1	3	1	2	1		1	16	8.5
Gordon				1							1	0.5
Granada		1					1				2	1.1
Guatemala											0	0
Gulfstate			1	1							2	1.1
Ibadan								1		1	2	1.1
India			2		3	3	1			1	10	5.3
Kenya	1	1	2	1		1				2	8	4.2
Lesotho					1		1				2	1.1
London						2				2	4	2.1
Malaysia	1	4	2					1		3	11	5.8
Mauritius		1				1					2	1.1
Namibia				1							1	0.5
Netherlands	1	1		1	1	1	1	2	1	10	19	10
Nigeria	2	3	2			2	2				11	5.8
Pakistan	1		1		1			1		1	5	2.7
Peru					1	1	1				3	1.6
Sierraleone			1						1		2	1.1
Southafrica	1										1	0.5
Swaziland		2	1				1				4	2.1
Taiwan								1			1	0.5
Tanzania						1				1	2	1.1
Thailand					1			1			2	1.1
Trinidad										1	1	0.5
Tunisia				2				1			3	1.6
Turkey							1			1	2	1.1
Uganda										1	1	0.5
Uk			1		1		1		1		4	2.1
Usa	1	1	2		2	1	1		1	4	13	6.9
	13	21	22	10	18	20	17	21	12	35	189	100

The country having a maximum number of 2542 citations appended in 189 articles have been considered. The study regarding the country wise distributions of citations has been done in order to know the most dominant countries in which the information is cited. Table reveals that USA India have 2542(100).

Ranked List of Most cited Journals. The journals Citations were further analyzed to establish a list of journals. Table 9 provide ranked list of the top most frequently cited journal.

Table No. 9: Ranked list of most cited Journals

Ranked List of Journals				
Sr No	Rank No	Name Of Journal	No. Of Citation	%
1	2	Academic Librarian	71	5.41
2	2	Information Development	34	2.59
3	3	Journal of Information Science	29	2.21
4	4	Library Review	24	1.83
5	5	African Journal of Library, Archives and Information Science	22	1.68
6	6	Journal of Documentation	19	1.45
7	7	Library Management	17	1.29
8	7	Journal of the American Society for Information Science	17	1.29
9	7	Journal of the American Society for Information Science and Technology	17	1.29
10	8	Libri	16	1.22
11	9	Library Hi Tech News	14	1.07
12	10	American Archivist	13	0.99
13	10	International Information and Library Review	13	.99
14	10	The Electronic Library	13	0.99
15	11	Bulletin of the Medical Library Association	12	0.91
16	12	New Library World	11	0.84
17	13	British Medical Journal	10	0.76
18	13	Decision Support Systems	10	0.16
19	13	Education for Information	10	0.76
20	13	Journal of Academic Librarianship	10	0.76
21	14	Library Journal	9	0.69
22	14	Nigerian Libraries	9	0.69
23	14	The Guardian	9	0.69
24	15	College and Research Libraries	8	0.61
25	15	Communications of the ACM	8	0.61
26	15	ESARBICA Journal	8	0.61
27	15	Journal of Library and Information Science	8	0.61
28	16	Collection Management	7	0.53
29	16	Information and Management	7	0.53
30	16	Information Technology for Development	7	0.53
31	16	International Journal of Information Management	7	0.53
32	16	International Journal of Mobile Communications	7	0.53
33	16	Journal of Librarianship and Information Science	7	0.53
34	16	Library Trends	7	0.53
35	16	Management Journal	7	0.53
36	16	Online Information Review	7	0.53
37	16	Program	7	0.53
38	16	Scientometrics	7	0.53

39	16	Library Collections, Acquisitions, and Technical Services	7	0.53
40	17	Interlending and Document Supply	6	0.46
41	17	Library Quarterly	6	0.46
42	17	MIS Quarterly	6	0.46
43	17	Telematics and Informatics	6	0.46
44	18	African Journal of Library and Information Science	5	0.38
45	18	IFLA Journal	5	0.38
46	18	Information Research	5	0.38
47	18	Information Systems	5	0.38
48	18	Journal of Education for Library and Information Science	5	0.38
49	18	Management Quarterly	5	0.38
50	18	Reference Services Review	5	0.38
51	18	Vanguard	5	0.38
52	18	World Development	5	0.38
53	19	Agricultural Economics	4	0.3
54	19	College and Research Libraries News	4	0.3
55	19	Electronic Networking Applications and Policy	4	0.3
56	19	Information Systems Journal	4	0.3
57	19	Information Technology and Libraries	4	0.3
58	19	Journal of the Medical Library Association	4	0.3
59	19	Pak-LIS News	4	0.3
60	19	Research Evaluation	4	0.3
61	19	The International Journal for Communication Studies	4	0.3
62	20	Al-Anbaa	3	0.23
63	20	American Journal of Public Health	3	0.23
64	20	American Libraries	3	0.23
65	20	Aslib Proceedings	3	0.23
66	20	BOTA BOTA News	3	0.23
67	20	D-Lib Magazine	3	0.23
68	20	Education Libraries Journal	3	0.23
69	20	Educom Review	3	0.23
70	20	Electronic Library and Information Systems	3	0.23
71	20	First Monday	3	0.23
72	20	Health Libraries Review	3	0.23
73	20	Information Quarterly	3	0.23
74	20	International and Comparative Librarianship	3	0.23
75	20	Journal of AGSI	3	0.23
76	20	Journal of Research on Computing in Education	3	0.23
77	20	Journal of Small Business Management	3	0.23
78	20	Management Bulletin	3	0.23
79	20	MEDICC Review	3	0.23
80	20	Nigerian Library and Information Science Review	3	0.23
81	20	Online	3	0.23
82	20	Society	3	0.23
83	20	Third World Quarterly	3	0.23
84	21	Two Time	142	10.8
85	22	One Time	475	36.2
			1313	100

It was observed that the Academic Librarian ranked 1st in position than other journal with maximum of citations i.e.71 (5.41%).19 journals with 2 citations & 34 journals with 1 citation respectively.

Chronological Distribution of Citations

Table 10: Chronological Distribution of Citations

Chronological Distribution of Citations				
Period	No. of Citation	Cumulative Citations	% of Citations	Cumulative % of Citations
1900 & before	1	1	0.04	0.04
1901-1910	1	2	0.08	0.12
1911-1920	1	3	0.12	0.24
1921-1930	1	4	0.16	0.39
1931-1940	1	5	0.20	0.59
1941-1950	3	8	0.31	0.91
1951-1960	11	19	0.75	1.65
1961-1970	18	37	1.46	3.11
1971-1980	54	91	3.58	6.69
1981-1990	218	309	12.16	18.84
1991-2000	920	1229	48.35	67.19
2001-2010	1300	2529	99.49	166.68
Not Define	13	2542	100.00	
Total	2542			

The study regarding the ranking of year wise citations has been done in order to know the most dominant year; the ten year span of period was undertaken for the study. Table 10 gives Ranking of the year of distribution of citation which shows that 2529 the highest number of citations out of a total of 2542 citations is in the year 2003-2012 and lowest number of citation in year 1911-1920.

Length of the Articles: Indicates the details about the page length of the contributions.

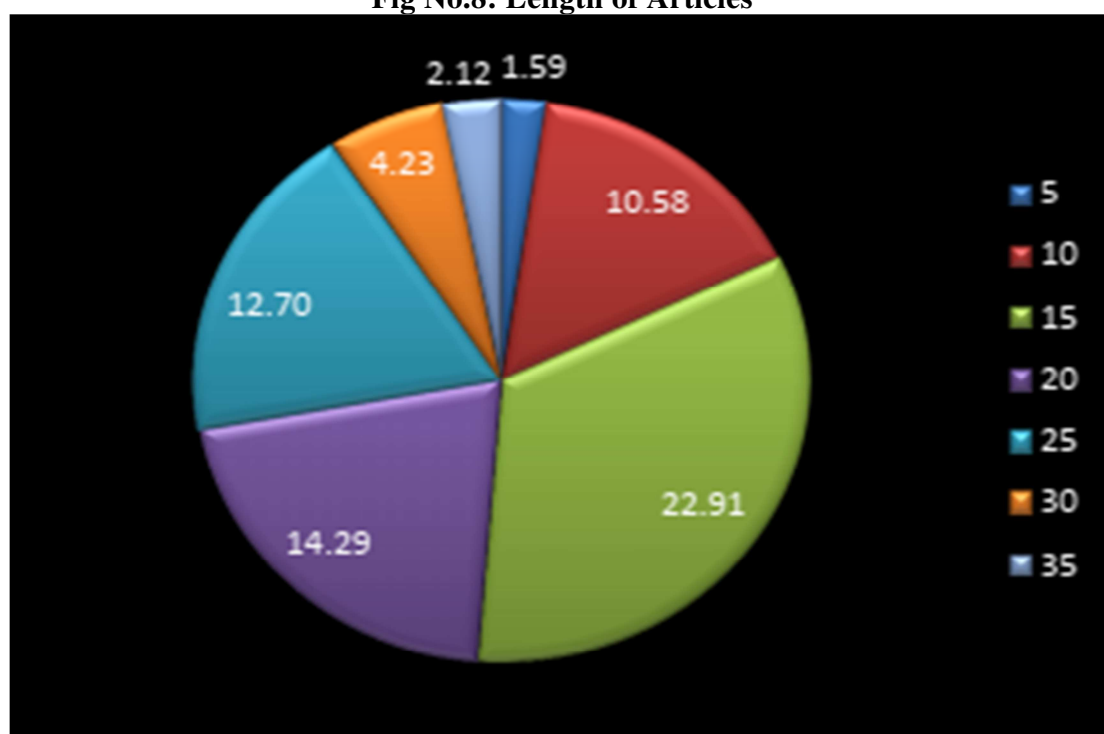
Table No. 11: Length of Articles:

No of Pages	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	%	%
1-5	1			1			1				3	1.59
6-10	2	2	2	1	3	1	1	1	4	3	20	10.58
11-15	6	13	18	4	10	13	6	9	5	16	100	52.91
16-20	2	2	1	3	1	5	3	1	1	8	27	14.29
21-25	2	1		1	2		3	8	1	6	24	12.70
26-30		2			1		2	1	1	1	8	4.23
31-35			1			1				1	3	1.59
36-40		1			1		1	1			4	2.12
	13	21	22	10	18	20	17	21	12	35		100.00

Table 11 above aptly reflects the distribution of length of the articles during the period of study. Out of 189 articles 100 (52.91%) had 11-15 pages followed by 27 (14.29%) had 16- 20 pages. The lowest range being 4

(2.12%) articles in the range of 36-40. Only 3 (1.49%) articles had length of 31-35 pages. Table shows year wise length of the articles

Fig No.8: Length of Articles



Findings

The findings are based on the 10 volumes 40 issues of Information Development during 2003-2012. In all 3605 citations appended to 204 articles were further analyzed.

Average Number of References per Articles

The number of articles published during 2003-2012 was 189 and the total number of citations was 2542 Year wise analysis of citation shows that average number of citation per article is maximum i.e.412 (16.21) in the year 2010 and minimum i.e.60 (2.36) in the year 2003.

Relative Growth Rates [R(c)] and Doubling Time [Dt(c)] for Publication

It can be noticed that the Relative Growth of publication [R(P)] decreased from the rate of 0.96

in 2003 to 0.20 in 2012 The mean relative growth for the first five years (i.e.2003 to 2012) showed a growth rate of 0.47 whereas the mean relative growth for the last five years (i.e. 2008 to 2012) reduced to 0.16 The corresponding Doubling Time for different years [Dt(P)] gradually increased from 1 in 2003 to 0.31 in 2009 and it also shows that there is decrease in Doubling Time reduced to .0.22 Thus as the rate of growth of publication was decreased, the corresponding Doubling Time was increased. The Doubling Time for the first five years (i.e.2003 to 2012) was only 0.94 which was increased to 0.24 during last five years (i.e. 2008 to 2012).Thus as the rate of growth of publication was decreased; the corresponding Doubling Time was increased.

Relative Growth Rates

it was observed that the relative growth rate of citations was gradually decreased from 0.72 in 2003 to 0.00 in 2012. The mean Relative Growth [R(C)] of Citations during first five years (i.e. 2003 to 2012) was higher (0.74) than the last five years i.e. during 2008 to 2012 (0.15). The corresponding Doubling Time also indicate trend of 0.90 in 2003 to 2.39 in 2012. The mean Doubling Time [Dt(C)] during the half period (i.e. 2003 to 2012) was 1.08 which was increased to 0.22 during 2008 to 2012. Thus the rate of growth of citations has been gradually reduced and corresponding Doubling Time has been increased.

Form wise Distribution of References

The total 2542 citation 1313 Citations are journal citation. It forms about 51.65% of the total. This is followed by other forms such as Conference 40.64%, Books (7.73%) etc.

Authorship Pattern

the details about the authorship pattern 98 articles (51.85%) out of 189 articles have been contributed by single author. 47 articles (24.87 %) by two authors and 31 articles (16.40%) by three authors. 6 (3.17%) articles by 5 authors, 5 (1.59%) articles by 6 and the lowest is 1 (0.53%) articles by 4 authors.

Year – Wise Degree of Collaboration

The single author articles are highest than multi author articles. The single author articles are highest in the year 2005 i.e. 15 (7.14%) and highest multi author articles are observed in the year 2012 i.e. 25 (13.23%).

Organizational Contributions of Articles

Authors from Universities are the major contributors with 138 (73.02%) contribution from 2003-2012 and followed by college institute with 40 (21.16%) contribution.

Country wise Distribution of References

The country having a maximum number of 2542 citations appended in 189 articles have been considered. The study regarding the country wise distributions of citations has been done in order to know the most dominant countries in which the information is cited. Table reveals that USA India have 2542 (100).

Ranked List of Most Cited Journals

It was observed that the Academic Librarian ranked 1st in position than other journal with maximum of citations i.e. 71 (5.41%). 19 journals with 2 citations & 34 journals with 1 citation respectively.

Chronological Distribution of Citation

Ranking of the year of distribution of citation which shows that 2529 the highest number of citations out of a total of 2542 citations is in the year 2003-2012 and lowest number of citation in year 1911-1920.

Length of Articles

Out of 189 articles 100 (52.91%) had 11-15 pages followed by 27 (14.29%) had 16- 20 pages. The lowest range being 4 (2.12%) articles in the range of 36-40. Only 3 (1.49%) articles had length of 31-35 pages. Table shows year wise length of the articles

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