DESIDOC Journal of Library & Information Technology, Vol. 29, No. 6, November 2009, pp. 39-44

Analysis of Contributions to *Defence Science Journal*

Neerja Verma* and Rajnish Tamrakar**

*DLIS, MLB Govt College of Excellence, Gwalior-474 009
E-mail: neerja_verma@rediffmail.com

**National Institute of Fashion Technology
NIFT Block, MP Bhoj Open University Campus, Bhopal-462 016
E-mail: rajtam2003@yahoo.com

ABSTRACT

Defence Science Journal has a prominent place in the dissemination of Defence Research & Development information all over the world. Bibliometric analysis of papers published in the *Defence Science Journal* during the years 1997 to 2006 has been presented in this paper. Attempt has been made to study the 10 volumes of this journal on the basis of different parameters, viz., year-wise distribution of the papers, authorship pattern, average number of references per paper in the journal, average length of the papers, institute-wise distribution of papers, major contributors, subject-wise distribution of the papers, and country-wise distribution of papers.

Keywords: *Defence Science Journal*, bibliometric analysis, study, defence, Defence Research and Development Organisation

1. INTRODUCTION

Defence Science Journal (*DSJ*), a quarterly (now bimonthly) publication of the Defence Research and Development Organisation (DRDO), Ministry of Defence, Government of India, is published by the Defence Scientific Information and Documentation Centre (DESIDOC), Delhi since 1949. It is published in the months of January, March, May, July, September and November. *DSJ* publishes the research papers in various disciplines of science and technology, which by and large lead to tangible results for direct defence applications. It covers the research, review papers, short communications, and scientific correspondence. The major subject fields covered in *DSJ* include: applied physics, chemical technology, material science, biomedical sciences, computer sciences, engineering, electronics, and aeronautics, etc.

2. AIMS AND OBJECTIVES

The present study is undertaken to have an in depth study of the DSJ during the period 1997-2006. The study has been carried out with the following objectives:

- To study year-wise distribution of papers.
- To study authorship pattern of the papers.
- To study average number of references per paper in the journal.
- To study average length of the papers.
- To study institute-wise distribution of papers.
- Major contributors to the journal.
- To study subject-wise distribution of the papers.
- To study country-wise distribution of papers.

3. EARLIER STUDIES

Several studies have been done earlier by different authors regarding the bibliometric study/analysis, citation analysis, etc. of papers of different journals of various fields. Das [1]; Dhiman [2]; Hazarika, Goswami and Das [3]; Sivasubramanian [4,5]; Tiew [6]; Dutta and Sen [7, 8]; Thaty and Mishra [9]; Kannappanavar, Swamy and Kumar [10]; Bandyopadhyay [11]; Kumar and Kumar [12]; Joshi and Maheswarappa [13]; and Gupta [14] have studied the contributions of different journals related to Physics, Botany, Agriculture, Mathematics, etc. As far as journals of library science are concerned, few studies

Received on 4 January 2009; Revised on 23 June 2009

related to analysis of contributions to *ILA Bulletin* [15]; *Library Herald* [16]; *IASLIC Bulletin* [17] and *Annals of Library and Information Studies* [18] have been done by Neerja Verma. Vij and Bedi [19] have studied ten years bibliometric study of *DSJ* previously. The present study is the next link to that study.

4. MATERIALS AND METHODS

For the purpose of this study, *DSJ* has been selected as the source journal. Recently it has completed 59 volumes. In the present paper, the 42 issues along with two additional issues of the 10 volumes, i.e., Vol. 47-56 (1997-2006) of this journal have been selected for the study. All the papers from 10 volumes have been scanned to analyse their subjects, authors, geographical distribution, numbers of references, and number of pages.

5. RESULTS AND DISCUSSION

The total number of papers in the 10 years (1997-2006) is 524, which comprises of research and review papers as well as short communications. Letters to the editor have been excluded from this study.

5.1 Year-wise Distribution

Table 1 shows the details of the number of papers from 1997-2006. Table shows that maximum number of papers were published in the year 2006, i.e., 84 (16.03 per cent) out of the total number of papers, i.e., 524. The minimum numbers of papers (41; 7.82 per cent) were published in the year 2003.

5.2 Authorship Pattern of Papers

Table 2 shows the authorship pattern of the papers published. Two-authored papers comprised the highest percentage, i.e., 149 (28.43 per cent). The number of three-authored papers is 131 (25 per cent), and single-authored papers are 113 (21.56 per cent). The maximum number of authors i.e., eight is found in only one paper (0.19 per cent). Table also shows year-wise authorship pattern of contributions.

5.3 Study of References

Table 3 gives details of the number of references appeared at the end of papers. Out of the total 524 papers published, 18 (3.43 per cent) papers have no references. The highest number of papers, i.e., 265 (50.57 per cent) have 1-10 references per paper. Next to it comes 142 (27.09 per cent) papers having 11-20 references per paper. Five papers (0.95 per cent) have references more than 101. Only two papers (0.38 per cent) have 81-90 references per paper, and two (0.38 per cent) 91-100 references per paper. Table 3 also shows number of references per paper year-wise.

5.4 Length of Papers

Table 4 reveals the length of the papers. Out of 524 papers, 330 papers (62.97 per cent) covered 6-10 pages while 106 papers (20.22 per cent) covered 11-15 pages. There is only one (0.19 per cent) paper that has 41-45 pages. Table 4 also shows length of papers year-wise.

5.5 Institution-wise Distribution

Table 5 indicates the papers contributed by various institutes/laboratories. The maximum papers, i.e., 47 (8.96 per cent) are from High Energy Materials Research Laboratory (HEMRL), Pune. Next contribution is from Defence Research and Development Establishment,

Table 1. Year-wise distribution from 1997-2006

Year	Volume no.	No. of issues	No. of papers	%
1997	47	1-4	54	10.30
1998	47	1-4	54	10.30
1999	47	1-4	49	9.73
2000	50	1-5	48	9.16
2001	51	1-4	45	8.58
2002	52	1-4	50	9.54
2003	53	1-4	41	7.82
2004	54	1-4	58	11.06
2005	55	1-4	44	8.39
2006	56	1-5	84	16.03

Table 2. Authorship pattern of papers published during 1997-2006

No. of authors	Year										Total	%
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
One	10	12	13	16	15	07	06	13	08	13	113	21.56
Two	19	09	13	11	12	18	15	15	08	29	149	28.43
Three	17	12	12	13	11	09	15	12	12	18	131	25
Four	05	09	06	03	04	07	03	08	11	10	66	12.59
Five	01	07	02	01	01	06	—	06	01	08	33	6.29
Six	02	02	02	—	02	03	02	04	03	05	25	4.77
Seven	—	—	01	03	—	—	—	—	01	01	06	1.14
Eight	—	—	—	01	—	—	—	—	—	—	01	0.19
Total	**54**	**51**	**49**	**48**	**45**	**50**	**41**	**58**	**44**	**84**	**524**	**100**

Table 3. Study of references of papers published during 1997-2006

No. of Ref.	Year										Total	%
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
Nil	.04	01	02	02	03	02	—	—	02	02	18	3.43
1-10	30	26	27	24	20	33	23	25	18	39	265	50.57
11-20	10	17	12	12	09	11	09	26	13	23	142	27.09
21-30	06	03	05	—	08	03	07	05	05	05	53	10.11
31-40	01	02	01	06	—	—	—	02	—	07	15	2.86
41-50	02	01	—	02	02	—	01	—	02	02	10	1.90
51-60	—	01	—	—	01	—	—	—	—	01	03	0.57
61-70	—	—	01	—	01	01	—			02	06	1.14
71-80	—	—	—	01	01	—	—	—	01	01	03	0.57
81-90	—	—	—	—	—	—	—	—	—	01	02	0.38
91-100	—	—	—	01	—	—	—	—	01	—	02	0.38
> 100	01	—	01	—	—	—	01	—	02	01	05	0.95
Total	**54**	**51**	**49**	**48**	**45**	**50**	**41**	**58**	**44**	**84**	**524**	**100**

Table 4. Length of papers published during 1997-2006

Paper length (No. of pages)	Year										Total	%
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
1-5	07	11	05	09	07	06	02	04	01	05	57	10.87
6-10	33	32	33	30	26	37	30	35	20	54	330	62.97
11-15	12	06	07	07	07	06	07	17	17	20	106	20.22
16-20	01	01	04	02	04	—	—	02	04	05	23	4.38
21-25	01	01	—	—	—	01	01	—	02	—	06	1.14
26-30	—	—	—	—	01	—	—	—	—	—	01	0.19
31-35	—	—	—	—	—	—	—	—	—	—	—	—
36-40	—	—	—	—	—	—	—	—	—	—	—	—
41-45	—	—	—	—	—	—	01	—	—	—	01	0.19
Total	**54**	**51**	**49**	**48**	**45**	**50**	**41**	**58**	**44**	**84**	**524**	**100**

Table 5. Institution-wise distribution of papers published during 1997-2006

S. No.	Rank	Name of the laboratory/establishment	No. of papers	%
1	1	High Energy Materials Research Laboratory	47	8.96
2	2	Defence Research & Development Establishment	28	5.34
3	3	Defence Research & Development Laboratory	19	3.62
4	3	Indian Institute of Technology, Delhi	19	3.62
5	4	Institute of Armament Technology (now Defence Institute of Armament Technology)	17	3.24
6	5	Snow & Avalanche Study Establishment	15	2.86
7	5	Vikram Sarabhai Space Centre	15	2.86
8	6	Defence Metallurgical Research Laboratory	14	2.67
9	6	Research Centre Imarat	14	2.67
10	7	Armament Research & Development Establishment	12	2.29
11	8	Centre for Fire Explosive and Environment Safety	11	2.09
12	9	Indian Institute of Technology, Roorkee	10	1.90
13	9	Institute for Systems Studies & Analyses	10	1.90
14	9	Defence Institute of Psychology & Allied Sciences	10	1.90
15	10	Aeronautical Development Establishment	9	1.71
16	10	National Aerospace Laboratories	9	1.71
17	11	Aeronautical Development Agency	8	1.52
18	11	Indian Institute of Technology, Madras	8	1.52
19	11	Solid State Physics Laboratory	8	1.52
20	12	Combat Vehicles Research & Dev. Establishment	7	1.33
21	13	Indian Institute of Science	6	1.14
22	13	Institute of Nuclear Medicine & Allied Sciences	6	1.14
23	13	PSG College of Technology	6	1.14
24	13	US Army Research Laboratory	6	1.14
25	14	Aligarh Muslim University	5	0.95
26	14	Defence Materials & Stores Research & Development Establishment	5	0.95
27	15	Indian Institute of Technology, Kanpur	4	0.76
28	15	Defence Laboratory	4	0.76
29	15	Defence Electronics Research Laboratory	4	0.76
30	15	Defence Food Research Laboratory	4	0.76
31	15	Instruments Research & Development Establishment	4	0.76

32	15	Naval Materials Research Laboratory	4	0.76
33	16	Indian Institute of Technology, Mumbai	3	0.76
34	16	Beijing Institute of Technology	3	0.57
35	16	Centre for Military Airworthiness & Certification	3	0.57
36	16	Defence Electronics Application Laboratory	3	0.57
37	16	Electronics & Radar Development Establishment	3	0.57
38	16	Laser Science and Technology Centre	3	0.57
39	16	Naval Science & Technological Laboratory	3	0.57
40	16	Scientific Analysis Group	3	0.57
41	17	24 Papers of 2 institutions	48	9.16
42	18	104 Papers of 1 institute	104	19.84
			524	**100**

Gwalior with 28 (5.34 per cent) papers. After this Defence Research & Development Laboratory (DRDL), Hyderabad and Indian Institute of Technology (IIT), Delhi, contributed 19 papers (3.62 per cent) each. There are 48 papers (9.16 per cent), which are contributed by two institutes each and 104 (19.84 per cent) papers are from individual institutes.

5.6 Major Contributors to *DSJ*

Table 6 gives details of the major contributors to the *DSJ*. S N Dixit contributed the highest number of papers, i.e., eight (1.52 per cent), then comes Mark L. Bundy who contributed five papers (0.95 per cent). A K Singh, Om Kumar and R S Damse, each contributed four papers (0.76 per cent). Eleven authors have contributed three papers each (0.57 per cent), 49 papers are of two authors each, i.e., (98, 18.7 per cent) and 368 papers (70.2 per cent) are of single author.

5.7 Subject-wise Distribution of Papers

Table 7 reveals the distribution of papers in various fields of the subject, during the survey period. It indicates that out of 524 papers, the highest number, i.e., 124 (23.66 per cent) related to Material Science and Metallurgy, Textile, Military Clothing and the lowest number, i.e., 08 (01.52 per cent) related to Combat vehicle and Engineering.

Table 6. Major contributors to *DSJ* during 1997-2006

S. No.	Name	Total authorship	%
1.	Dikshit, S.N.	8	1.52
2.	Bundy, Mark L.	5	0.95
3.	Singh, A.K.	4	0.76
4.	Kumar, Om	4	0.76
5.	Damse, R.S.	4	0.76
6.	Singh, Beer	3	0.57
7.	Gupta, D.C.	3	0.57
8.	Shekhar, Himanshu	3	0.57
9.	Bhat, K.P.M.	3	0.57
10.	Ganapathi, M.	3	0.57
11.	Kishore, M. Sankar	3	0.57
12.	Vizhakat, Mohan	3	0.57
13.	Upadhyay, S.N.	3	0.57
14.	Purkayastha, S.S.	3	0.57
15.	Balamurugan, V.	3	0.57
16.	Kemao, Zang	3	0.57
17.	49 papers with 2 authors	98	18.70
18.	368 papers with single author	368	70.22
		524	**100**

5.8 Country-wise Distribution of Foreign Papers

Table 8 shows international contribution to the journal. Sixteen countries contributed 52 papers. The highest number (13, 25 per cent) of papers were from China, and one (1.92 per cent) paper each was contributed by the authors from Australia, Belgium, France, Norway, Poland, Taiwan, and Turkey.

Table 7. Subject-wise distribution of papers published in *DSJ* during 1997-2006

S. No.	Subject category	No. of papers	%
1.	Aeronautics and Flight Mechanics	73	13.93
2.	Applied Physics and Fluid Dynamics	58	11.06
3.	Armaments and Explosives	68	12.97
4.	Chemical Technology and Propellants	46	8.77
5.	Computer and System Studies	28	5.34
6.	Electronics and Instrumentation	59	11.2
7.	Quality and Reliability	60	11.4
8.	Materials Sci./Metallurgy, Textile and Military Clothings	124	23.6
9.	Combat Vehicles and Engineering	08	01.5
Total		**524**	**100**

Table 8. Country-wise distribution of foreign papers published in *DSJ* during 1997-2006

S. No.	Name of the country	No. of papers	%
1.	China	13	25
2.	US	12	23.07
3.	Russia	05	9.61
4.	U.K.	04	7.69
5.	Czech	03	5.76
6.	Germany	02	3.84
7.	Israel	02	3.84
8.	Italy	02	3.84
9.	Switzerland	02	3.84
10.	Australia	01	1.92
11.	Belgium	01	1.92
12.	France	01	1.92
13.	Norway	01	1.92
14.	Poland	01	1.92
15.	Taiwan	01	1.92
16.	Turkey	01	1.92
Total		**52**	**100**

6. CONCLUSIONS

The following conclusions are drawn from the present study:

- The maximum numbers of papers (84) were published in 2006, and minimum 41 in 2003.
- Authorship pattern shows that most of the contributors prefer to contribute their work with one companion.
- Most of the papers (265) have 1-10 references. This is a healthy trend. Eighteen papers were without references.
- The average length of papers ranged between 6-10 pages, which constitute 330 papers of the total. This is the ideal length for research papers.
- High Energy Materials Research Laboratory contributed maximum (47) papers followed by the Defence Research and Development Establishment with 28 papers.
- S.N. Dixit contributed maximum papers in DSJ during the period under study.
- Authors from 16 foreign countries contributed in this Indian journal as found in the study of 10 volumes. It reflects that the journal needs the popularity in other countries also.

ACKNOWLEDGEMENTS

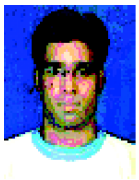
The authors thank Dr D.C. Gupta, Head TIRC and Joint Director Defence Research and Development Establishment (DRDE), Gwalior, for giving permission to publish this study and his valuable suggestions during the study.

REFERENCES

1. Das, Arundhaty. Bibliometric analysis of publications in plasma physics contributed by the scientists at the institute for plasma research. *IASLIC Bulletin*, 2000, **45**(4), 145-60.
2. Dhiman, A.K. Ethnobotany journal: A ten year bibliometric study. *IASLIC Bulletin,* 2000, **45**(4), 177-82.
3. Hazarika, Tilak; Goswami, Kusuma & Das, Pritimoni. Bibliometric analysis of Indian forester: 1991-2000. *IASLIC Bulletin,* 2003, **48**(4), 213-23.
4. Sivasubramanian, V. *J. Indian Coffee*: A bibliometric study. *Annals Lib. Sci. Doc.*, 2000, **47**(2), 75-79.
5. Sivasubramanium, V. *J. Planters Chronicle*: A bibliometric study. *IASLIC Bulletin,* 2003, **48**(2), 119-23.
6. Tiew, Wia Sin S. *J. Natural Rubber Research* 1998-1996: A ten year bibliometric study. *IASLIC Bulletin*, 1998, **43**(2), 49-57.
7. Dutta, Bidyarthi & Sen, B.K. *Indian J Pure and Applied Physics*: An analysis of citation pattern. *ILA Bulletin,* 2000, **36**(3), 65-68.
8. Duttta, Bidyarthi & Sen, B.K. *Indian J Pure and Applied Mathematics*: An analysis of citation pattern. *IASLIC Bulletin,* 2001, **46**(4), 221-26.
9. Thate Rajendra, Kumar & Mishra, Sanjay. Periodicals cited most frequently by Indian agricultural economists. *ILA Bulletin*, 1990, **26**(1), 45-50.
10. Kannappanavar, B.U.; Swamy, Chindananda & Kumar, M. Vijay. Publishing trends of Indian chemical scientists: A bibliometric study. *Annals Lib. Inf. Study*, 2004, **51**(1), 39-41.
11. Bandyopadhyay, Amit Kumar. Authorship pattern in different disciplines. *Annals Lib. Inf. Study,* 2001, **48**(4), 139-47.
12. Kumar, Surendra & Kumar S. Productometric study of scientists of ICAR's National research centre for soybean (NRCS). *Annals Lib. Inf. Study,* 2004, **51**(1), 11-21.
13. Joshi, N. Anupam & Maheswarappa, B.S. Multiple authorship trends in different subjects of science and technology: A review of literature. *ILA Bulletin*, 1994, **30**(1-2), 31-37.
14. Gupta, S. Structure of African psychological literature. *Int. Inf. Lib. Rev*., 1995, **27**(3), 203-23.
15. Verma, Neerja. Analysis of contributions of ILA Bulletin. *ILA Bulletin,* 1994-95, **30**(3-4), 78-83.
16. Verma, Neerja. Analysis of contributions of Library Herald. *Library Herald*, 2001, **39**(1-2), 32-49.
17. Verma, Neerja. Analysis of contributions of IASLIC Bulletin. *IASLIC Bulletin*, 2004, **49**(2), 93-103.
18. Verma, Neerja; Tamrakar, Rajnish & Sharma, Priyanka. Analysis of contributions of Annals of Library & Information Studies. *Annals Lib. Inf. Studies*, 2007, **53**(2), 106-11.
19. Vij, Rajeev & Bedi, D.S. *Defence Science Journal*: A ten year bibliometric study. *ILA Bulletin,* 1998-99, **34**(3-4), 39-44.
20. Mete, Mahendra V & Deshmukh, P.P. Citation analysis of *Annals of Library Science and Documentation. Annals Lib. Sci. Doc.,* 1996, **43**(1), 11-25.

About the Authors

Dr Neerja Verma obtained her Master's degrees in Chemistry from the Jiwaji University, Gwalior; MLibISc from the University of Rajasthan, Jaipur; and PhD (Library Science) from Jiwaji University, Gwalior. At present, she is working as Professor and Head in the Department of LIS, MLB Govt College of Excellence, Gwalior.



Shri Rajnish Tamrakar obtained his MLibISc from Jiwaji University, Gwalior. He is working as Research Assistant in the National Institute of Fashion Technology, Bhopal. His areas of interest include digital library, library networking, etc.