
Indian Literature Output on Textile Research: A Scientometric Study

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Abstract

Literature output on any field normally measured using the bibliometric study. Similar approach has been adopted by the author in order to find the Indian literature output on textile research. Textile research data has been downloaded from 'Scopus' data base. For this study, publications commencing from 1983-2012 (30 years) has been downloaded from the database. A total of 5006 data has been identified. The collected data has been classified by using Excel and the same was loaded in to SPSS

Keywords

Bibliometric Study, Textile Research, RGR and DT

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INTRODUCTION

The textile business is one of the leading segments of the Indian economy and the largest source of foreign exchange earnings for India. The textile and apparel industry employs about 38 million people, making it the largest source of industrial employment in India. India is the world's second largest producer of textiles and garments after China. It is the world's third largest producer of cotton—after China and the USA—and the second largest cotton consumer after China. Currently, Indian Textiles sector contributes about 14% to industrial production, 4% to the GDP, and 17% to the country's export earnings. It provides direct employment to over 35 million people. The Textiles sector is the second largest provider of employment after agriculture. However, the Indian textiles industry has only a small fraction of revenue derived from innovative, technology intensive or emerging products.

BIBLIOMETRIC STUDY

Bibliometric analysis is employed by researchers to study the growth of literature in given field. Pritchard (1969) defined the term Bibliometric as the application of statistical and mathematical methods to books and other communication. The bibliometrics has emerged as a thrust area of research, incorporating different branches of human knowledge. There are famous Laws of Bibliometric i.e. Lotka's law (1926) of scientific productivity, Bradford's law (1934) of scattering and Zips law (1949) on frequency of words. But the Bibliometric studies started in late sixties. A common research tool is a scientometric method which has already been widely applied in scientific production and research-trend studies in many disciplines of science and engineering (Almind & Ingwersen, 1997; Cronin, 2001; Moed, Debruin, & Vanleeuwen, 1995). The popularity in the adaptation of bibliometric techniques in various disciplines stimulated stupendous growth of literature on bibliometrics and its related areas

LITERATURE REVIEW

Conventional Scientometric methods generally evaluate the research trend by investigating the publication outputs of different countries (Rahman, Haque, & Fukui, 2005), research institutes (Rajendram, Lewison, & Preedy, 2006), journals (Dannenberg, 1985), subjects (Rajendran, Ramesh Babu, & Gopalakrishnan, 2005) and research

fields(Davis & Gonzalez, 2003 , Krishnamoorthy, Ramakrishnan, & Devi, 2009).

TEXTILE RESEARCH

Our strength has very much been in commodity products susceptible to intense competition and few entry barriers. It is essential to strengthen the textile industry, which necessitates implementation of current technology to improve the production. Therefore it is essential to identify the Indian contributions on textile research and the institutions that has shown keen interest in the textile research. The Indian publications on textile will enable to identify the strength in this area.

OBJECTIVE

Main objectives of the study are

1. To examine the Indian research production in textile research.
2. To examine the collaborating country in research production in textile research.
3. To identify the organizations conducting the research in textile research.
4. To study the citation analysis on literature produced in textile research.
5. To compare and measure the growth rate of literature published.
6. To identify and analyses of the research contribution in the subject field of textile research.
7. To identify the top source titles those carry the research productions in textile research.

HYPOTHESIS

The following hypotheses will be formulated for this study based on objectives.

- There exists substantial Indian literature on textile research.
- Growth of publications in textile research is comparatively higher in developed countries.
- There exists domination of collaborative research in Indian textile research.
- The research productivity in textile research is dominated by English language.
- Journals are major source of publications for Indian textile research.
- There exists steady growth in publication production in Indian textile research.

COLLECTION OF DATA

For this study, the literature on textile research data has been downloaded from 'Scopus', multidisciplinary online database, which is an international indexing and abstracting database, using the search term "textile". For this study, publications commencing from 1983-2012 (30 years) has been downloaded from the database. A total of 96360 data has been identified. Out of which 5006 articles were published from India. The 5006 collected data has been classified by using Excel and the same was loaded in to SPSS (statistical package for social sciences) for the purpose of analysis. Statistical tools such as frequency distribution and percentage analysis and Scientometric techniques such as Authorship pattern, Relative Growth Rate (RGR), Doubling time (dt) citation analysis etc will be used for the study

LIMITATIONS

The following are the limitations to the study:

1. This study is confined to the Scopus database alone.
2. Publications data published from 1983 to 2012 only taken up for the study.

DATA ANALYSIS

In textile research there are 96360 research publications. These publications were grouped under countrywise and the same is shown table. The percentage of contribution of each country and the ratio of each country contribution in relation to USA has also been calculated and the same is shown in Table -1.

Table -1: Countrywise Distribution

Sl. No.	Country	TP	%	Ratio of contribution with USA
1	United States	8610	8.94	1.00
2	China	5296	5.50	0.62
3	Germany	5186	5.38	0.60
4	India	5006	5.20	0.58
5	United Kingdom	3534	3.67	0.41
6	Japan	1844	1.91	0.21
7	France	1653	1.72	0.19

8	Italy	1357	1.41	0.16
9	Turkey	1283	1.33	0.15
10	Spain	999	1.03	0.12
11	Others	61592	63.91	
		96360	100	

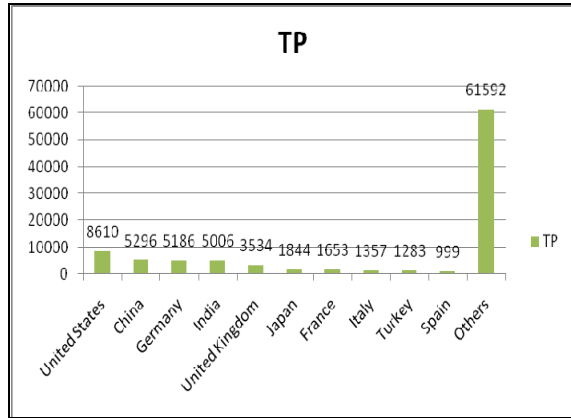


Fig 1 Countrywise distribution

Out of the top ten countries in textile research, India positions itself in the fourth place with 5006 contribution. Nearly 5.38% of total production has been made from India. While comparing with USA, India's ratio is 1:0.41. These 5006 publications are further grouped yearwise and the same is shown in Table 2. Further Compound Annual Growth Rate, the year-over-year growth rate of articles published over a specified period of time, has been calculated and the same is shown in Table 2. The mathematical formula of CAGR is

$$\text{CAGR} = \frac{\text{Ending Value}}{\text{Beginning Value}}$$

The compound annual growth rate is calculated by taking the nth root of the total percentage growth rate, where n is the number of years in the period being considered.

This can be written as follows:

$$\text{CAGR} = \left(\frac{\text{Ending Value}}{\text{Beginning Value}} \right)^{\left(\frac{1}{\# \text{ of years}} \right)} - 1$$

Table 2: Year wise Distribution

Sl.No.	YEAR	TP	Cumulative	%	Cum. %
1	1983	3	3	0.06	0.06
2	1984	11	14	0.22	0.28
3	1985	13	27	0.26	0.54
4	1986	10	37	0.20	0.74
5	1987	9	46	0.18	0.92
6	1988	24	70	0.48	1.40
7	1989	42	112	0.84	2.24
8	1990	28	140	0.56	2.80
9	1991	27	167	0.54	3.34
10	1992	21	188	0.42	3.76
11	1993	23	211	0.46	4.21
12	1994	25	236	0.50	4.71
13	1995	14	250	0.28	4.99
14	1996	66	316	1.32	6.31
15	1997	58	374	1.16	7.47
16	1998	69	443	1.38	8.85
17	1999	146	589	2.92	11.77
18	2000	190	779	3.80	15.56
19	2001	220	999	4.39	19.96
20	2002	228	1227	4.55	24.51
21	2003	278	1505	5.55	30.06
22	2004	314	1819	6.27	36.34
23	2005	360	2179	7.19	43.53
24	2006	368	2547	7.35	50.88
25	2007	329	2876	6.57	57.45
26	2008	346	3222	6.91	64.36
27	2009	415	3637	8.29	72.65
28	2010	433	4070	8.65	81.30
29	2011	430	4500	8.59	89.89
30	2012	506	5006	10.11	100.00
		5006		100	
	CAGR	0.1864			

It can be seen from the table that the Indian publication on textile research seems to be in linear trend. During the last ten years there is a substantial increase in the publications. This indicates that the awareness and importance of textile has been in

increasing trend. The CAGR indicates 18.64% of growth in textile research. To identify the growth trend, the 30 years period has been divided in to five block years. Each block year comprises of six years. The blockyearwise distribution is shown in table 3.

Table 3: Block Year wise Distribution

S.No	Block Year	No. of publications	%	Ratio of growth
1	1983-1988	70	1.40	1.00
2	1989-1994	166	3.32	2.37
3	1995-2000	543	10.85	3.27
4	2001-2006	1768	35.32	3.26
5	2007-2012	2459	49.12	1.39
		5006	100.00	

During the block year of 2007 to 2012, the growth has attained 49.12%. Even during the block year of 2001 to 2006 the growth rate is 35.32%. Nearly 84.44% of output on the growth of Textile research has been witnessed during the period of 2001 to 2012. This indicates the awareness on textile research has gaining momentum only after 2000. The Relative growth rate (RGR) and doubling time has been calculated and the same is shown in table 4.

Table 4: RGR and Dt

Sl. No.	YEAR	TP	w1	w2	RGR	Dt
1	1983	3		1.10	1.10	0.63
2	1984	11	1.10	2.40	1.30	0.53
3	1985	13	2.40	2.56	0.17	4.15
4	1986	10	2.56	2.30	-0.26	-2.64
5	1987	9	2.30	2.20	-0.11	-6.58
6	1988	24	2.20	3.18	0.98	0.71
7	1989	42	3.18	3.74	0.56	1.24
8	1990	28	3.74	3.33	-0.41	-1.71
9	1991	27	3.33	3.30	-0.04	-19.06
10	1992	21	3.30	3.04	-0.25	-2.76
11	1993	23	3.04	3.14	0.09	7.62
12	1994	25	3.14	3.22	0.08	8.31
13	1995	14	3.22	2.64	-0.58	-1.20

14	1996	66	2.64	4.19	1.55	0.45
15	1997	58	4.19	4.06	-0.13	-5.36
16	1998	69	4.06	4.23	0.17	3.99
17	1999	146	4.23	4.98	0.75	0.92
18	2000	190	4.98	5.25	0.26	2.63
19	2001	220	5.25	5.39	0.15	4.73
20	2002	228	5.39	5.43	0.04	19.40
21	2003	278	5.43	5.63	0.20	3.50
22	2004	314	5.63	5.75	0.12	5.69
23	2005	360	5.75	5.89	0.14	5.07
24	2006	368	5.89	5.91	0.02	31.53
25	2007	329	5.91	5.80	-0.11	-6.19
26	2008	346	5.80	5.85	0.05	13.76
27	2009	415	5.85	6.03	0.18	3.81
28	2010	433	6.03	6.07	0.04	16.32
29	2011	430	6.07	6.06	-0.01	-99.68
30	2012	506	6.06	6.23	0.16	4.26
		5006				

The graph shows the relative growth rate is linear in nature. Their exists negative growth in certain period both in RGR and DT. Similarly the doubling time also shows linear trend and few exceptions. The collaborative nature of Indian textile research is predominantly has been analysed. The country in which the Indian author has collaborated were shown in table 5.

Table 5: Collaborated Countries

Sl.No.	Collaborated Countries	TP	%
1	United States	64	1.28
2	South Korea	39	0.78
3	United Kingdom	38	0.76
4	Portugal	16	0.32
5	Germany	15	0.30
6	Australia	14	0.28
7	Taiwan	12	0.24
8	Canada	10	0.20
9	Czech Republic	10	0.20
10	Japan	10	0.20
11	Brazil	9	0.18
12	Singapore	9	0.18

13	France	6	0.12
14	Malaysia	6	0.12
15	United Arab Emirates	6	0.12
16	South Africa	5	0.10
17	China	5	0.10
18	Belgium	5	0.10
19	Hong Kong	5	0.10
20	Italy	5	0.10
21	Spain	4	0.08
22	Iran	4	0.08
23	Thailand	3	0.06
24	Sri Lanka	3	0.06
25	Turkey	3	0.06
26	Nepal	2	0.04
27	Netherlands	2	0.04
28	New Zealand	2	0.04
29	Nigeria	2	0.04
30	Saudi Arabia	2	0.04
31	Sudan	2	0.04
32	Switzerland	2	0.04
33	Bangladesh	2	0.04
34	Ireland	2	0.04
35	Luxembourg	2	0.04
36	Brunei Darussalam	1	0.02
37	Gabon	1	0.02
38	Ethiopia	1	0.02
39	Denmark	1	0.02
40	Cameroon	1	0.02
41	Oman	1	0.02
42	Sweden	1	0.02
43	Poland	1	0.02
44	Greece	1	0.02
45	Bulgaria	1	0.02
46	Algeria	1	0.02
47	Trinidad and Tobago	1	0.02
48	Mexico	1	0.02
49	Russian Federation	1	0.02
50	Norway	1	0.02
51	Tanzania	1	0.02
	TOTAL	342	6.83

Only 6.83% of the textile research in India has collaborative in nature. The Indian authors collaborated with 51 countries for their contribution. USA, South Korea, UK, Portugal and Germany are the top five countries that were collaborated. The Indian Institutions that are contributing for textile research has been shown in Table 6.

Table 6: Indian Institutions Contribution

Sl.No.	Indian Institution/University/R&D	TP	%
1	Indian Institute of Technology, Delhi	309	6.17
2	PSG College of Technology	217	4.33
3	University of Mumbai	141	2.82
4	Technocrat Society	127	2.54
5	Mumbai University Institute of Chemical Technology	113	2.26
6	South India Textile Research Association	103	2.06
7	Synthetic and Art Silk Mills Research Association India	99	1.98
8	Anna University	99	1.98
9	Kumaraguru College of Technology	92	1.84
10	Shivaji University	76	1.52
11	Pandian Consultants	62	1.24
12	The Maharaja Sayajirao University of Baroda	60	1.20
13	National Institute of Fashion Technology India	54	1.08
14	Bannari Amman Institute of Technology	50	1.00
15	D.K.T.E. Society's Textile and Engineering Institute India	49	0.98
16	Jadavpur University	48	0.96
17	National Environmental Engineering Research Institute India	45	0.90
18	G B Pant University of Agriculture & Technology	44	0.88
19	Indian Institute of Technology, Kanpur	41	0.82
20	Central Research Institute for Jute and Allied Fibres India	40	0.80
21	Others	3137	62.64
	Total	5006	100

Indian Institute of Technology, Delhi has contributed more than 309 (6.17%) publications and seems to be the major contributors. It is followed by PSG College of Technology 217 (4.33%), University of

Mumbai 141 (2.82%) and Technocrat Society 127 (2.54). The journals thus preferred by the Indian authors were also analysed and the top 25 journals were shown in Table 7

Journals

Table 7 Indian Author's contribution in the

Sl. No	Indian Contributions in the Journal	TP	%
1	Colourage	635	12.68
2	Asian Textile Journal	351	7.01
3	Man Made Textiles in India	342	6.83
4	Journal of the Textile Association	184	3.68
5	Textile Magazine	174	3.48
6	Journal of the Textile Institute	124	2.48
7	Indian Journal of Fibre and Textile Research	118	2.36
8	Asian Dyer	117	2.34
9	Indian Silk	117	2.34
10	Textile Trends	107	2.14
11	Indian Journal of Environmental Protection	81	1.62
12	Bioresource Technology	66	1.32
13	International Dyer	64	1.28
14	Journal of Applied Polymer Science	63	1.26
15	Synthetic Fibres	61	1.22
16	Journal of the Institution of Engineers India Part TX Textile Engineering Division	54	1.08
17	Textile Research Journal	53	1.06
18	Pollution Research	50	1.00
19	Journal of Hazardous Materials	49	0.98
20	Textile Asia	46	0.92
21	Journal of Industrial Pollution Control	36	0.72
22	Textile Outlook International	34	0.68
23	American Dyestuff Reporter	32	0.64
24	ATA Journal	30	0.60
25	Journal of Scientific and Industrial Research	29	0.57
	Others	1989	39.71
		5006	100

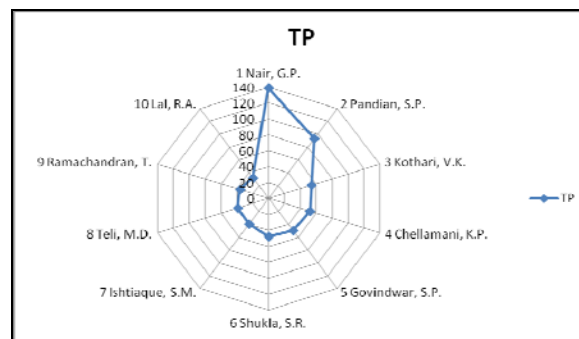
The top 25 journals contribute 60.29% of indian contributions. Majority of the textile research appeared in colourage (635,12.68%) journal. It is

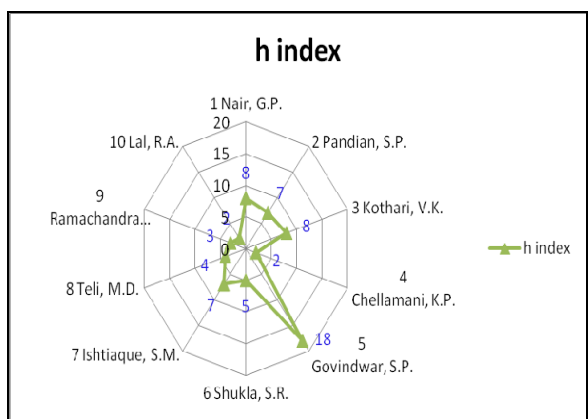
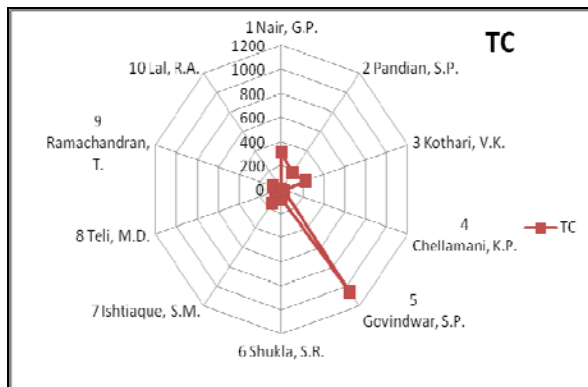
followed by Asian Textile Journal (351, 7.01%), Man Made Textiles in India (342, 6.83%), Journal of the Textile Association (184, 3.68%) and Textile Magazine (174, 3.48%). 33.6% of the Indian contributions were appearing in these five journals. The top five journals contribute 33.68% of articles. Out of the Indian contributors, the top 10 Indian authors were identified. The name, total number of papers, total citation and their h index were shown in Table 8.

Table 8: Top 10 Indian Authors

Sl.No.	TOP 10 INDIAN AUTHORS	TP	TC	h index	Rank
1	Nair, G.P.	139	309	8	2
2	Pandian, S.P.	93	167	7	4
3	Kothari, V.K.	54	227	8	3
4	Chellamani, K.P.	52	25	2	9
5	Govindwar, S.P.	50	1052	18	1
6	Shukla, S.R.	48	81	5	7
7	Ishtiaque, S.M.	40	145	7	5
8	Teli, M.D.	39	59	4	8
9	Ramachandran, T.	36	83	3	6
10	Lal, R.A.	32	7	2	10

Nair G P has contributed more than 139 publications with his h index 8. It is followed by Pandian S P (93), Kothari V K (54) and Chellamani K P (52). Govindwar S P has 50 publication with highest number of citation of 1052 and h index is 18. Based on h index the top 5 textile research authors were Govindwar S P, Nair G P, Kothari, V K, Pandian S P and Ishtiaque S M.





FINDINGS

The major findings of the study are

- Out of the top ten countries in textile research, India positions itself in the fourth place with 5006 contribution. Nearly 5.38% of total production has been made from India. While comparing with USA, Indias' ratio is 1:0.41.
- The Indian publication on textile research seems to be in linear trend. During the last ten years there is a substantial increase in the publications.
- Nearly 84.44% of output on the growth of Textile research has been witnessed during the period of 2001 to 2012.
- The relative growth rate is linear in nature. Their exist negative growth in certain period both in RGR and DT. Similarly the doubling time also shows linear trend and few exceptions.
- The Indian authors collaborated with 51 countries for their contribution. USA, South Korea, UK, Portugal and Germany are the top five countries that were collaborated

- Indian Institute of Technology, Delhi has contributed more than 309 (6.17%) publications and seems to be the major contributors. It is followed by PSG College of Technology 217 (4.33%), University of Mumbai 141 (2.82%) and Technocrat Society 127 (2.54).

- The top 25 journals contribute 60.29% of indian contributions. The top five journals contribute 33.68% of articles. The top indian journals are Colourage journal, Asian Textile Journal, Man Made Textiles in India, Journal of the Textile Association and Textile Magazine.

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CONCLUSION

- The textile is primarily depends on the society and culture. There fore anticipated research as like that of other decipline can not be expected. The study has shown the dimensional changes in the textile research which indicates the socialial and cultural development in the Indian environment. However the research work should be applied in nature and relevant to the needs of the society. This may primarily because of establishment of exclusive textile educational institutions for fashion and apperal. Further the government inisitives in developing the policy making bodies in improving the reseach outcome in textile.

REFERENCES

1. Bradford, S.C (1934). Sources of information on specific subjects. *Engineering: An Illustrated Weekly*, 3550, 85-86.
2. Lotka, A. J. (1926). The frequency distribution of scientific productivity, *Journal of the Washington Academy of Science*, 16, 317-323.
3. Pritchard, A (1969). Statistical bibliography or bibliometrics? *Journal of Documentation*, 24, 1348-349.

4. Gupta, B.M. Sureshkumar, Sangam., S.L. and Karisiddappa, C.R. (2002) Modeling the growth of world social science literature. *Scientometrics*. 53(H):161—164.
5. Jeevan, V.K and Gupta, B.M .(2002) A Scientometrics analysis of research output from Indian Institute of Technology, Koharagpur. *Scientometricc*.53 (1),165-168.
6. Bose Sugata and Ayesha Jalal, *Modern South Asia. History, Culture, Political Economy*, New York and London: Routledge, 2nd edition 2004.
7. Bruland Kristine, 'Industrialisation and technological change' in Roderick Floud and Paul Johnson (eds), *The Cambridge Economic History of Modern Britain. Volume I: Industrialisation, 1700-1860*, Cambridge: CUP, 2004.
8. http://en.wikipedia.org/wiki/Compound_annual_growth_rate (04.02.2014)
9. Almind, T.C. & Ingwersen, P. (1997). Informatic analysis in the World Wide Web, Methodological approaches to "Webometrics". *Journal of Documentation*, 53(4), 404-426.
10. Cronin, B. (2001). Bibliometrics and beyond: some thoughts on web-based citation analysis, *Journal of Information Science*, 27(1), 1-7
11. Moed,H.F., Debruin, R.E.& Vanleeuwen, T.N. (1995). New bibliometric tools for the assessment of national research performance— Database description, overview of indicators and first applications. *Scientometrics*, 33(3), 381-422.
12. Hood, W.W., & Wilson C.S.(2001). The literature of bibliometrics, scientometrics and informatics, *Scientometrics*, 52(2), 291-314.
13. Rahman, M., Haque, T.L., & Fukui, T. (2005). Research articles published in clinical radiology journals: *Trend of contribution from different countries*, *Academic Radiology*, 12(7), 825-829.
14. Rahman, M., Haque, T.L., & Fukui, T. (2005). Research articles published in clinical radiology journals: *Trend of contribution from different countries*, *Academic Radiology*, 12(7), 825-829.
15. Rajendram, R., Lewison, G., & Preedy, V. (2006). Worldwide alcohol-related research and the disease burden. *Alcohol and Alcoholism*, 41(1), 99-106.
16. Rajendran, P., Ramesh Babu, B , & Gopalakrishnan, S. (2005).Bibliometric analysis of "Fiber Optics" literature. *Annals of Library and Information Studies*, 52(3), 82-85
17. Davis, J.C., & Gonzalez, J.G.(2003). Scholarly journal articles about the Asian Tiger Economies: Authors, journals and research fields,1986-2001. *Asian-Pasific Economic Literature*, 17(2), 51-61
18. Krishnamoorthy G., Ramakrishnan, J., & Devi.(2009). Bibliometric analysis of literature on diabetes (1995-2004), *Annals of Library and Information Studies*, 56, 150-155