

Citation Analysis Of Doctoral Studies in Marine Geology

G Siva Prasad

G A Prasda Rao

K Venkata Rao

Abstract

Reports a study of 52 doctoral theses in Marine Geology submitted to Andhra University during the period 1954-2009. A total of 9,453 citations were analysed for identifying their bibliographic form, authorship pattern, ranking of cited journals and subject wise distributions of citations. The finding reveals that nearly 71.27% citations were from journals and 13.51% from books. The subject-wise distribution of theses reveals that sedimentology, Geology, Marine Geology, Oceanography, Geochemistry and General Science and forms 73.16% more than half of the total theses submitted during the period. USA, India and UK are contributes 7875 (83.77%) citations. The authorship patter study reveals that the highest number of journal citations from multi authors nearly 73.7%.

Keywords: Citation Analysis, Doctoral Theses, Marine Geology

1. Introduction

We are living in the 'Information Age' and as a consequence, an "Information Rich" society is emerging, where information is the basic ingredient for all kinds of activities. The provision and accessibility to information are important factors as information is necessary for all decision making and developmental activities. Therefore, to cope with the ever increasing wealth of information, well organized information systems are required at the international, national and subject levels to make information available pinpointedly, expeditiously and comprehensively. Since World War II, there has been an explosive growth of literature in all branches of Science and technology. The earth sciences are no exception. Geo Ref, a computerised database of world wide earth science literature, had about 600,000 items in 1980 with an annual growth rate of 50,000. An American Geological Institute Survey estimates the number of scientific serials currently published throughout the world to be between 35,000 to 5,00,000 per annum and most of the papers in the earth science are to be found in some 4,000 of these scientific serials. The estimates of the annual number of earth science papers vary from 35,000 to 1,00,000 per annum

Citation analysis is an activity of analyzing the citations or references. It is one of the part of bibliometrics, which deals with relationship between the Reference given by an author. Citation method is used in the present study to understand the information needs, use pattern and use of behaviour of research scholars in the field of Marine Geology.

2. Objectives

The objectives of the present study are:

- ◆ to know the distribution of citations in different bibliographic forms

- ◆ to examine the subject wise break up of citations
- ◆ to know the Country-wise scattering of citations
- ◆ to examine the authorship pattern
- ◆ to identify the core journals

3. Methodology

Fifty two theses available at Andhra University during 1954-2009 were studied for citation analysis. A total of 9,453 citations were recorded averaging 182 citations per thesis. Citations belonging to journals, books, conferences, dissertations, reports, reference books, monographs, standards, patents, newspapers, unpublished and unidentified categories of citations were recorded and studied by bibliometric analysis. Further, Ulrich's International Periodical Directory was referred to for knowing the country and the subject of the cited journals. The data was entered into the computer using the dBase III Plus software package.

4. Results and Discussion

4.1 Bibliographic form-wise distribution of citations:

Table 4.1 shows the distribution of cited literature in different bibliographic forms.

Table 4.1: Bibliographic form-wise Distribution of Citations

S. No	Bibliographic form	Number of citations	Percentage	Cumulative Number	Cumulative Percentage
1	Journals	6737	71.27	6737	71.27
2	Books	1277	13.51	8014	84.78
3	Conferences	574	6.07	8588	90.85
4	Dissertations	522	5.52	9110	96.37
5	Reports	184	1.95	9294	98.32
6	Reference books	86	0.91	9380	99.23
7	Monographs	19	0.20	9399	99.43
8	Standards	3	0.03	9402	99.46
9	Unpublished	3	0.03	9405	99.49
10	Unidentified	48	0.51	9453	100.00

Journals are most used bibliographic form account 6737 citations (71.27%) of the total citations (9453). The total number of citations from books were 1277 citations (13.51%), conferences with 574 citations (6.07%), Dissertations with 522 citations (5.52%), reports with 184 citations (1.95%),

reference books with 86 citations (0.91%), monographs with 19 citations (0.20%), standards with 3 citations (0.03%), unpublished with 3 citations (0.03%) and unidentified categories with 48 citations (0.51%).

It can be concluded from the table that research scholars in geology use journals mostly for their research work.

4.2 Subject-wise Distribution of Citations:

Analysis of citations according to their subject classification shows a wide scatter of geological literature ranging from Agriculture to Zoology, and is evidence of the multidisciplinary approach of present day geological research.

The subject-wise distribution of citations in Geology is shown in Table 4.2.

Table 4.2: Subject-wise Distribution of Citations

S. No	Subject	Number of citations	Percentage	Cumulative Number	Cumulative Percentage
1	Sedimentology	1863	19.81	1863	19.81
2	General Geology	1511	16.07	3374	35.88
3	Marine Geology	1099	11.69	4473	47.57
4	Oceanography	1086	11.55	5559	59.12
5	Geochemistry	785	8.35	6344	67.47
6	General Science	535	5.69	6879	73.16
7	Petroleum & Gas	438	4.66	7317	77.82
8	Mineralogy	385	4.09	7702	81.91
9	Earth Science	354	3.76	8056	85.67
10	Clay Mineralogy	201	2.14	8257	87.81
11	Geophysics	119	1.26	8376	89.07
12	Paleontology	114	1.21	8490	90.28
13	Geomorphology	101	1.07	8591	91.35
14	Petrology	84	0.89	8675	92.24
15	Others(40 subjects)	730	7.76	9405	100.00

From the table it is observed that geological literature is scattered over 54 subject areas. sedimentology account for 1863 citations (19.81%), General Geology with 1511 citations (16.07%), Marine Geology with 1099 citations (11.69%), Oceanography with 1086 citations (11.55%), Geochemistry with 785 citations (8.35%), General Science with 535 citations (5.69%), Petroleum and Gas with 438 citations (4.66%), Mineralogy with 385 citations (4.09%), Earth Science with 354 citations (3.76%), Clay Mineralogy with 201 citations (2.14%), Geophysics with 119 citations (1.26%), Paleontology with 114 citations with (1.21%), Geomorphology with 101 citations (1.07%), Petrology with 84 citations (0.89%) and 40 other subjects with 730 citations (7.76%).

4.3 Country-wise Distribution of Citations

It is evident from Table 4.3 that USA with 4086 citations (43.46%), India with 2477 citations (26.35%), UK with 1312 citations (13.96%), The Netherlands with 803 citations (8.54%), Germany with 235 citations (2.50%), France with citations 86 (0.91%), Japan with 81 citations (0.86%), Canada with 68 citations (0.72%), Russia with 54 citations (0.57%) and other 30 countries with 200 citations (2.13%).

Table 4.3: Country-wise distribution of citations

S. No	Country of origin	Number of citations	Percentage	Cumulative Number	Cumulative Percentage
1	USA	4086	43.46	4086	43.46
2	India	2477	26.35	6563	69.81
3	UK	1312	13.96	7875	83.77
4	The Netherlands	803	8.54	8678	92.31
5	Germany	235	2.50	8913	94.81
6	France	86	0.91	8999	95.72
7	Japan	81	0.86	9080	96.58
8	Canada	68	0.72	9148	97.30
9	Russia	54	0.57	9202	97.87
10	Others (30 Countries)	200	2.13	9402	100.00

4.4 Language-wise Distribution of Citations

The language-wise distribution of citations in Marine Geology is presented in Table 4.4. The citations in Marine Geology are scattered over 7 languages. English occupies the first place with 85.73 percent of the total citations, followed by German (1.27%), French (0.84%), Russian (0.56%), and Japanese (0.53%). The bi-lingual and multi-lingual categories account for 0.70 percent and 10.35 percent respectively

Table 4.4: Language-wise distribution of citations

S. No	Language	Number of citations	Percentage	Cumulative Number	Cumulative Percentage
1	English	8060	85.73	8060	85.73
2	German	119	1.27	8179	87.00
3	French	79	0.84	8258	87.84
4	Russian	53	0.56	8311	88.40
5	Japanese	50	0.53	8361	88.93
6	Bi-lingual	66	0.70	8427	89.63
7	Multi-lingual	973	10.35	9400	99.98
8	Others (2 languages)	2	0.02	9402	100.00

4.5 Authorship pattern in Journal citations:

It can be seen from Table 4.5 that most of the journal citations (54.65%) have two authors. Theremaining citations are contributed by single (26.30%), three (13.61%), four (3.67%) and more than five (1.77%) authors. It can be inferred from data that multi-authored papers are maximum in number accounting for 73.7 percent of total journal citations.

Table 4.5: Authorship pattern in Journal citations

S. No	No. of authors	Number of citations	Percentage	Cumulative Number	Cumulative Percentage
1	Single	1771	26.30	1771	26.30
2	Two	3681	54.65	5452	80.95
3	Three	917	13.61	6369	94.56
4	Four	247	3.67	6616	98.23
5	Five & Above	119	1.77	6735	100.00

4.6 Ranked list of cited Journals:

The ranked list of journals in the field of Marine Geology is presented in Table 4.6. It is observed that researchers in Marine Geology have cited a total of 392 journals. The Journal of Sedimentary Research occupies the first rank with 19.52 percent of the total cited journal citations, followed by *Geochimica et Cosmochim Acta* (6.80%), *Marine Geology* (5.83%), *Indian Journal of Marine Sciences* (4.26%), *Geological Society of America Bulletin* (3.79%), *Journal of Geology* (3.77%), *American Association of Petroleum Geologists Bulletin* (3.73%), and *Journal of the Geological Society of India* (3.49%). The first two journals cover 26 percent of the total cited journals. The first 8 journals in the ranked list contribute 51 percent of the total journal citations. Among them, three journals are devoted to General Geology, two journals are devoted to Marine Geology, and one journal each, is devoted to Petrology, Geochemistry, Petroleum and Gas. The first 29 journals contributed nearly 75 percent of the total cited journal citations and the remaining 25 percent of citations are distributed among 363 other journals.

Table 4.6: Ranked list of Cited Journals

S.No	Rank	Title of journal	Country	No. of Citations	%	Cum. No.	Cum. %
1	01	J. Sed. Res	USA	1315	19.52	1315	19.52
2	02	Geochim. et Cosmo. Acta	UK	458	6.80	1773	26.32
3	03	Marine Geology	The Netherlands	393	5.83	2166	32.15
4	04	Indiqn J. Mar. Sci.	India	287	4.26	2453	36.41
5	05	Geol. Soc. Amer. Bull.	USA	255	3.79	2708	40.20
6	06	J. Geology	USA	254	3.77	2962	43.97
7	07	Amer. Asso. Petro. Geol. Bull.	USA	251	3.73	3213	47.70
8	08	J. Geol.Soc.India	India	235	3.49	3448	51.19
9	09	Sedimentlogy	UK	169	2.51	3617	53.70
10	10	Current Science	India	142	2.11	3759	55.81
11	11	Proc. Ind. Acad. Sci. (EPS)	India	122	1.81	3881	57.62
12	12	Andhra Univ. Mem. Oceano.	India	115	1.71	3996	59.33
13	13	Sedimentary Geology	The Netherlands	102	1.51	4098	60.84
14	14	US Geol. Surv. Prof. Pap.	USA	77	1.14	4175	61.98
15	15	Bull. Nat. Inst. Sci. India	India	76	1.13	4251	63.11

G Siva Prasad, G A Prada Rao and K Venkata Rao

16	16	Deep Sea Research	UK	75	1.11	4326	64.22
17	17	American Mineralogist	USA	74	1.10	4400	65.32
18	18	Indian J. Ear. Sci.	India	70	1.04	4470	66.36
19	19	Amer. J. Sci.	USA	65	0.97	4535	67.33
20	19	Chemical Geology	The Netherlands	65	0.97	4600	68.30
21	20	Economic Geology	USA	60	0.89	4660	69.19
22	21	Amer. Asso. Petro. Geol.	USA	58	0.86	4718	70.05
23	21	Mahasagar	India	58	0.86	4776	70.91
24	22	Can. J. Ear. Sci.	Canada	54	0.80	4830	71.71
25	23	Nature	UK	46	0.68	4876	72.39
26	23	Soc. Econ. Pal. Mem.	USA	46	0.68	4922	73.07
27	24	Q.J.Geol. Met. Min. Soc. India	India	43	0.64	4965	73.71
28	24	EOS	USA	43	0.64	5008	74.35
29	25	US Geol. Surv. Bull.	USA	39	0.58	5047	74.93
30	25	Ear. Plan. Sci. Lett.	The Netherlands	39	0.58	5086	75.51
31	26	Geol. Surv. India Spl. Pap.	India	37	0.55	5123	76.06
32	27	Clays & Clay Min.	USA	36	0.53	5159	76.59
33	28	J. Geop. Res.	USA	35	0.52	5194	77.11
34	29	2 Journals with 33 citations each		66	0.98	5260	78.09
35	30	1 Journal with 32 citations		32	0.47	5292	78.56
36	31	1 Journal with 27 citations		27	0.40	5319	78.96
37	32	1 Journal with 26 citations		26	0.39	5345	79.35
38	33	3 Journals with 25 citations each		75	1.11	5420	80.46
39	34	1 Journal with 23 citations		23	0.34	5443	80.80
40	35	1 Journal with 22 citations		22	0.33	5465	81.13
41	36	2 Journals with 21 citations each		42	0.62	5507	81.75

42	37	2 Journals with 19 citations each	38	0.56	5545	82.31
43	38	6 Journals with 18 citations each	108	1.60	5653	83.91
44	39	3 Journals with 17 citations each	51	0.76	5704	84.67
45	40	1 Journal with 16 citations	16	0.24	5720	84.91
46	41	5 Journals with 15 citations each	75	1.11	5795	86.02
47	42	5 Journals with 13 citations each	65	0.97	5860	86.99
48	43	3 Journals with 12 citations each	36	0.53	5896	87.52
49	44	3 Journals with 11 citations each	33	0.49	5929	88.01
50	45	4 Journals with 10 citations each	40	0.59	5969	88.60
51	46	6 Journals with 9 citations each	54	0.80	6023	89.40
52	47	8 Journals with 8 citations each	64	0.95	6087	90.35
53	48	10 Journals with 7 citations each	70	1.04	6157	91.39
54	49	13 Journals with 6 citations each	78	1.16	6235	92.55
55	50	15 Journals with 5 citations each	75	1.11	6310	93.66
56	51	20 Journals with 4 citations each	80	1.19	6390	94.85
57	52	22 Journals with 3 citations each	66	0.98	6456	95.83
58	53	60 Journals with 2 citations each	120	1.78	6576	97.61
59	54	161 Journals with 1 citation each	161	2.39	6737	100.00

The ranked list of journals can be used by librarians and research scholars to select the journals of greater importance and productivity in a particular subject area.

5. Conclusion

Out of 9453 citations from 52 theses were analysed by using citation analysis techniques and following conclusions are drawn:

1. Citations cited in the theses are not in the standard format. Researchers have not adopted the uniform pattern and sequence while cited document
2. Highest number of citations recorded are from journal articles i.e.6737 (71.27%) citations. Books source is the next favoured category of the researchers i.e. 1277 (13.51%).
3. The subject-wise distribution of theses reveals that Sedimentology, General Geology, Marine Geology, Oceanography, Geochemistry and General Science forms 73.16% of the total theses submitted during the period.
4. USA, India and UK are contributes 7875 (83.77%) of total citations It is concluded from the authorship pattern study that works of multi authors citations have been frequently.
5. The journal articles are scattered in 392 different journals. However, most of citations (51.19%) are found in 8 journals. The Journal of Sedimentary Research gets first rank for being cited more number of times by the researchers in Marine Geology.

References

1. CRAIG (GR). Communication in Geology. (1969). *Scottish Journal of Geology*. 5; 305-321.
2. CHAKRABORTY (AR). Citation characteristics of Marine Geology. (1970). *Annals of Library Science and Documentation*. 18; 88-91.
3. NIJAGUNAPPA (R) and NIJAGUNAPPA (P). Core journals used by Indian geoscientists (1978-82). (1985). *Journal of the Geological Society of India*.26; 10-15.
4. VIMALA (V). Bibliometric study of citations in Ph.D. theses in Biological sciences. (1997). Sri Venkateswara University, *Ph.D. (Unpublished)*.
5. ARUNA PRASAD REDDY (C). Bibliometric study of citations in Ph.D. theses in Chemistry accepted by Sri Venkateswara University, Tirupati: 1964-1997. (1999). Andhra University, *Ph.D. (Unpublished)*.
6. DORASWAMY (M) and PULLA REDDY (V). Citation analysis of Ph.D. theses in Geography. (2001). *University News*. 39(48); 3-6.
7. HIRAWADE (MA) and DANKHADE (SS). Citation analysis of doctoral research in economics. (2002). *ILA Bulletin*. 38; 36-45.

About Authors

Dr. Siva Prasad G, Lecturer, Library Science, MVGRR Degree College, Bhattiprolu.

Dr. Prasada Rao G A, Lecturer, Library Science, Andhra Loyola College, Vijayawada.

Prof. Venkata Rao K, Librarian, Acharya Nagarjuna University, Nagarajuna Nagar.