
Citation Analysis of PhDs Awarded in Public Administration and Political Science by Punjabi University Patiala

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ABSTRACT

This research paper presents the use of different forms of literature by the PhD researchers of the Department of Political Science and the Department of Public Administration, Punjabi University, Patiala. It is assessed by analyzing the resources cited in the PhD theses awarded by Punjabi University, Patiala during 2015-2019. The different bibliographic forms of the references have been analyzed in order to find out the year-wise submission, average citations per thesis, authorship pattern, chronology, use of electronic resources, and format of citations in both the subjects under study. It has been found in this study that average citations per thesis in Political Science is more (200.53) than Public Administration (160.6). Books are most preferred form in both the subjects. Majority of the citations in both the subjects are from the period 2000-2009. Ranked list of journals for both the subjects have been prepared to identify core journals. The core journals in both the subjects are 9. Bradford Multipliers have been calculated and application of Bradford Law of Scattering has also been tested for both the subjects. It is expected that the present study will help librarians in selecting, retaining and cancelling the existing journals in Political Science and Public Administration.

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1. Introduction

Citation analysis is quite old branch of bibliometrics. It has been used to rank journals in the early part of the nineteenth century but the systematic ongoing measurement of these counts for scientific journals was initiated by Eugene Garfield (1972) at the Institute for Scientific Information. It is a tool used to identify the core references in a subject by counting the citations given at the end of a scientific article. It provides information about various sources of references, such as journals, books, and online sources along with geographical affiliations of contributors, half-life of journals and books, ranking of journals, etc.

The primary task of a librarian is to nourish the users' mind by providing information along with observing the resources required, requested and used. Citation analysis perhaps is the only study capturing in an unobtrusive manner, the resources used for teaching and research in universities. It is further observed that references which researchers refer to are considered to have made some contribution to their thinking process in course of writing a document. It is indeed an honour truly deserved for an author to be cited by a competent colleague. Citation studies point to what documents should be acquired in libraries and provide an insight into the way scholars seek information.

This study has been carried out to find the use of different documents by researchers of the Department of Public Administration and the Department of Political Science, Punjabi University, Patiala, with the help of citation analysis. The two subjects chosen for the study are Political Science and Public Administration as both are closely related in terms of theory and practice.

1.1. Objectives of the study

The main objective of this study is to identify different characteristics of the citations used in the PhD theses belonging to Public Administration and Political Science. Other objectives are:

- To find out the quantitative growth of theses and citations in these subjects
- To find out the average citations per thesis
- To analyse format of literature cited in these theses
- To know the authorship pattern of citations
- To determine print and electronic citations
- To find out the chronology of cited documents
- To prepare ranked lists from journals cited in the theses of both the subjects under study.
- To find out core journals in both the subjects with help of Bradford's Law of Scattering

1.2. Limitations of the study

This study is limited to PhD theses in Public Administration and Political Science awarded by Punjabi University Patiala during 2015-2019. The year 2020 could not be covered because of the COVID-19 pandemic.

1.3. Profile of Department of Public Administration

The Department of Public Administration was established with Postgraduate classes in Public Administration in Evening Institute of Postgraduate Studies, situated at M. M. Modi Degree College, Patiala in 1971. The University Grant Commission sanctioned to start three job-oriented post-graduate diploma courses. The university authorities shifted the Department of Public Administration to Punjabi University, Patiala campus in 1978 keeping in view the relevance of the subject. Presently, it is one of the important departments of Social Sciences and it has been contributing significantly to teaching and research of the discipline. The Department has also started UGC sponsored PG Diploma in Human Rights and Duties in 2009. In addition to this, four degree/diploma courses has also been shifted from the Centre for Public Policy and Governance to the Department of Public Administration in January 2020 (Department of Public Administration). The department has produced 49 PhDs till date. Presently there are 4 full time faculty members in the department as well as in Distance Education in Public Administration who are engaged in teaching and research (Prospectus, 2019-20, <http://www.pupdepartments.ac.in/de/Prospectus2019-20.pdf>).

1.4. Profile of Department of Political Science

The Department of Political Science came into existence in the year 1972 to start master's classes in the subject of Political Science. Later on some diploma courses were introduced and M. Phil regular was also started which continued till 1993. It was re-introduced in 2000-2001. The Department has been engaged in teaching as well as research activities (Department of Political Science). Presently, there are 10 faculty members in the Department as well as in distance education (Prospectus, 2019-20) in Political Science and has awarded 110 PhDs in this subject.

2. Literature Review

The first paper on citation analysis exploring it as an objective measure to value a journal was written by Gross and Gross in 1927. Samuel C. Bradford (1934) carried out study on science journals indicating that if scientific journals are arranged by the number of articles they produce into three groups, each with about 1/3rd of all articles, then the number of articles in each group will be in proportion of 1: n: n². This journal distribution is as per Bradford Law of Scattering. Select studies carried during last 5-6 years are given below:

Veerabasavaiah and Padmavathi (2014) in their study 'Citation analysis of doctoral theses in Education submitted at the Bangalore University Bangalore, during 2003-2012 analysed 6688 citations from 42 doctoral theses. The highest theses submission (12 theses, 28.57%) was in the year 2009. It was revealed that journals were most preferred sources of information in Education, accounting for 39.43%. There was dominance of single authorship (54.04%) over multiple authors. The most cited journals were from USA and Journal of Applied Psychology was most preferred journal with 5.2% citations among the education researchers.

Amritpal and Rattan (2015) jointly analysed 2641 citations of 17 doctoral theses of Library and Information Science submitted to the Punjabi University Patiala during 1994-2013. It was found that journal citation was first preference with 48.43% citations. There is dominance of single authorship (59.41%) over multiple authorship. Journal citations were more current as compared to book citations. College and Research Libraries was the most cited journal (5.004%) among the researchers of Library and Information Science. The Leimkuhler Model had been utilised for verification of Bradford Law of Scattering and was applicable to this data set.

Rosenberg (2015) assessed the use of library resources by Sociology and Anthropology graduate students of University of Jerusalem through examination of 4904 bibliographic references. The sample of 32 theses and dissertation was randomly taken from the period 2010-2013. English was the predominant language in all theses. Books received majority of citations and also the majority of book citations were in print form. The median age of material was 15 years. The age of books cited was older than journals. 82% of books cited and 95% of journals cited were available in the library. The findings presented the ability of the University library to answer the needs of the concerned graduate students.

Ahmadih, Nalbandian and Noubani (2016) compared the parameters of cited literature in master's theses of the disciplines of Biology, Mechanical Engineering and Political Science at American University of Beirut, Lebanon. The findings showed that Engineering and Biology students used a significantly greater number of journals i.e. 61.03% and 95.14% respectively than Political Science (17.44%). All the disciplines relied on recent publications. The most cited journal in Biology was Journal of Biological Chemistry cited 619 times and in Mechanical Engineering was Energy and Buildings cited 100 times whereas Journal of Palestine Studies cited 58 times in Political Science.

Mahajan and Kumar (2016) analysed 7490 citations in the 60 Ph.D. of Public Administration submitted to Panjab University, Chandigarh during 2002-2012. It was found that books were highly cited with 42.68% citations followed by journals with 27.36%. Single authorship dominated in books and journals with 87.02% and 87.06% citations respectively. Half-life period of journals was 23 years whereas it was 19 years for books. Maximum journal citations (27.48%) and book citations (31.06%) were from the period 1996-2005. The core journals identified were 7 and Economic and Political weekly was the most cited journal with 4.25% journal citations. The journal distribution in the Public Administration satisfied the formulation of Bradford Law of Scattering.

Gunasekera (2016) analysed the sources cited in 32 post graduate (Master and Ph. D) theses in Sociology and Economics at University of Peradeniya submitted between 1996 and 2014. Out of the total theses, 14 theses were of Sociology and 18 were on Economics. The average citations per thesis in Sociology was 115 whereas 110 in Economics. A total of 3578 citations were produced from these 32 theses. 1603 citation were of Sociology and 1975 citations were of Economics. Monographs were first preference in both (Sociology (57.8%) and Economics (48.7%)) the subjects. The print version of citations was used most in Sociology (94%) and Economics (97%). Single authorship was dominant in both subjects i.e. Sociology with 81.9% citations and Economics with 63.6% citations. It was found that the journal distribution in both subjects was not as per Bradford Law of Scattering.

Mahajan and Kumar (2017) jointly carried citation analysis of the Ph. D theses in the History

subject. It was found that 36 theses containing 8488 citations were submitted during the period 2002-2012. The results obtained revealed that most frequently used (54.16%) documents were books. Single authorship was dominant in books and journals citations i.e. 87.14% and 67.59% respectively. Journal citations, 25.28% (period 1996-2005) were more current than and book citations (period 1966-1975). The place of publication of majority of books (58.69%) and journals (64.47%) citations was India. Economic and Political Weekly was the most cited journal (7.12%) among the ranked list of journals. The journal distribution in the field of history is according to the Bradford's law of scattering.

Tyagi and Kumar (2017) investigated the use pattern of literature through citation analysis in doctoral theses submitted to the Department of Political Science Chaudhary Charan Singh University Meerut, Uttar Pradesh, India during 2010-2015. 22 Ph. D theses had been chosen containing 2192 citations. Highest numbers of citations (61.1%) were recorded from books, followed by journal articles, newspapers etc. Country-wise scattering of citations revealed that Indian literature received highest (51.6%) citations followed by USA and UK with 325 (14.8%) and 172 (7.8%) citations respectively. Authorship pattern revealed that 79.6% of citations were the papers written by single authors indicated that Political Science was less collaborative as compared to Science and Technology. Most cited authors in the theses were Indian (64.8%) and citations to foreign authors were about 35.2%.

Mondal and Roy (2018) presented analysis of 7711 citations collected from 56 theses of five sub-facets of Political Science under the University of Burdwan for the period 1986-2015. The maximum contribution (31) was in Public Administration. It was found that books was most cited materials (51.51%) followed by journal citations with 28.14%. Majority of the citations were single authored.

Abba, Boda, and Aliyu (2019) analysed citations of doctoral theses in Library and Information science submitted to the School of Postgraduate Studies (SPGS), University of Maiduguri during 2014-2018. It was revealed that 14 theses generated 1828 citations with highest journal citations while textbooks and monographs together 35.4% citations. Majority of the works cited (986,53.9%) was from 2000 – 2009, followed by 2010 – 2018 with 411 (22.5%) citations which indicated that the cited documents were not current. The ranked list of journals disclosed that the journals citations were from 91 journal titles and the most frequently cited journal was Library Philosophy and Practice (e-journal) with 92 citations.

Unnikrishnan (2019) attempted to analyse the quality of Ph. D theses awarded by Mahatama Gandhi University, South India in social sciences. The 25 theses were selected from 69 theses awarded during 2017-18. American Psychological Association (APA) referencing style was used, but none follow it strictly. No criteria was framed for using reference sources. The researchers have not mentioned the use of internet resources although they have used these resources. Bibliography was further divided into subheads books, journals etc. 7 theses have no chapter references making it difficult for the evaluators to find out the details of in-text citations. Suggestions to improve along with possible solutions have also been discussed.

Gupta and Sharma (2020) aimed to study the grey literature cited in Ph.D. theses in Social Sciences submitted to state universities of Haryana (India) during 2011-2018. The data was collected from

Shodhganga : Indian National Repository of ETD. A total of 14547 citations of 43 formats have been cited. Book chapters were the most preferred form of citations with 33.12% followed by journal citations (31.77%)

All the above studies are indirectly related with the present study except three studies. Out of these three studies, two studies (each) are on Public Administration (Mahajan and Kumar, 2016) and Political Science (Tyagi and Kumar, 2017). The third study (Mondal and Roy, 2018) covered both the subjects Political Science and Public Administration.

Present study is comparative study of reference pattern of PhD theses of The Department of Public Administration and The Department of Political Science awarded by Punjabi University Patiala during the period 2015-2019 as no such study has been carried out previously.

3. Methodology

The study examined the total number of 10 PhD theses in Public Administration and 38 PhD theses in Political Science awarded by Punjabi University, Patiala during 2015-2019. The data was retrieved from the LIBSYS software used in the Bhai Kahn Singh Nabha Library, Punjabi University Patiala. The theses having two types of references, namely footnotes and references given at the end of each chapter of the theses have been examined. The complete bibliographical detail of each thesis of both subjects has been noted down separately. These include number of citations of each thesis. Then each citation is further categorised into authorship pattern, format of citation, chronology of citation and name of the journal. Citation analysis technique of bibliometrics has been used involving counting and categorisation of citations in each thesis according to the format of literature (books, book chapters, conference proceedings, debates, dictionaries/ encyclopaedias, government publications, journals, newspapers, reports, theses, web sites). The format of citation which cannot be categorised in these 11 categories is placed under ‘others’ category. This data is transferred to excel spread sheets and presented in tables keeping in view the objectives of the study.

4. Results

4.1. Data Analysis and Discussion

Table 1. Year wise Theses Awarded in Public Administration and Political Science

Theses Awarded in the Year	Public Administration		Political Science	
	No of Theses	%age	No of Theses	%age
2015	0	0	7	18.42
2016	2	20	6	15.79
2017	4	40	7	18.42

2018	0	0	7	18.42
2019	4	40	11	28.95
Total	10	100	38	100

Table 1 reveals the year-wise theses awarded in the subject of Public Administration and Political Science during the period 2015-2019. The number of theses in Public Administration is 10 whereas it is 38 in Political Science which is more than three and half times the public administration. In Public Administration, maximum theses are produced in the year 2017 and 2019 (40% each) whereas in Political Science it is in the year 2019 (28.95%). The growth in theses awarded is steadier in Political Science than Public Administration as there is not even a single thesis produced in years 2015 and 2018 in Public Administration.

Table 2. Year-wise Citations in Public Administration and Political Science

Theses Awarded in the Year	Public Administration		Political Science	
	No. of Citations	%age	No. of Citations	%age
2015	0	0	1163	15.27
2016	301	18.74	1211	15.89
2017	756	47.08	1387	18.2
2018	0	0	1179	15.47
2019	549	34.18	2680	35.17
Total	1606	100	7620	100

The number of references used in the theses of both the Departments is reflected in **Table 2** indicating that percentage of references has increased from 18.74% in the 2016 to 34.18% in the year 2019 in Public Administration. However, there is sudden jump to 47.08% in the year 2017. Similarly, there is increase in the references in Political Science also and 15.27% references were used in the year 2015 by the research scholars which rose to 35.17% in the year 2019. The increase in number of references is more gradual in Political Science than Public Administration.

Table 3. Average Citations per Thesis

Theses Awarded in the Year	Public Administration			Political Science		
	No of Theses	No of Citations	Average Citations per Thesis	No of Theses	No of Citations	Average Citations per Thesis
2015	0	0	0	7	1163	166.14
2016	2	301	150.5	6	1211	201.83
2017	4	756	189	7	1387	198.14
2018	0	0	0	7	1179	168.43

2019	4	549	137.3	11	2680	243.64
Total	10	1606	160.6	38	7620	200.53

The average citations used by a research scholar to write a thesis is given in Table 3. The overall average citations in Public Administration is 160.6 whereas it is 200.53 in Political Science. There is decrease in the average citations per thesis in Public Administration from 150.5 in 2016 to 137.3 in 2019. There is tremendous increase in average citation per thesis in Political Science from 166.14 in 2015 to 243.64 in 2019. The reason for more number of average citations per thesis in Political Science is the scope as well as selection of the topic. The scope of the theses in Political Science is not only broader but the topics selected are also conceptual which quote tremendous citation as compared to Public Administration.

Table 4. Format of References

Format of Citations	Public Administrations	%age	Political Science	%age
Books	541	33.69	3738	49.06
Book chapter	49	3.05	309	4.06
Conference Proceedings	30	1.87	43	0.56
Debates	4	0.25	21	0.28
Dictionaries/Encyclopaedias	10	0.62	84	1.10
Govt. Publications	53	3.30	158	2.07
Journals	464	28.89	1359	17.83
Newspapers	34	2.12	940	12.34
Reports	64	3.99	112	1.47
Theses	45	2.80	24	0.31
Web sites	288	17.93	768	10.08
Others	24	1.49	64	0.84
Total	1606	100	7620	100

The use of various format of documents in theses writing by researchers of both the subjects is clear in Table 4. More than 11 different formats of documents are used in both the subjects. The format of documents which cannot be placed in these 11 categories are placed under the category ‘others’. The table shows that books are first preference in both the subjects i.e. 33.69% in Public Administration and 49.06% in Political Science and journals are the second preference in Public Administration and Political Science with 28.89% and 17.83% respectively. Websites (17.93%) are the third preference in Public Administration whereas it is Newspapers in Political Science with 12.34% citations. Debates are the least used form of documents in both the subjects.

Table 5. Authorship Pattern

No. of Authors	Public Administration		Political Science	
	No. of Citations	%age	No. of Citations	%age
1 Author	929	57.85	5344	70.13
2 Authors	261	16.25	706	9.27
3 Authors	69	4.29	49	0.64
More than 3 Authors	30	1.87	200	2.62
NA	317	19.74	1321	17.34
Total	1606	100	7620	100

The authorship pattern of references is shown in table 5 indicating the preference of researchers for single author over multiple authors in both the subjects. In Public Administration the use of single author documents is 57.85% as compared to 70.13% in Political Science. The use of documents written by more than 3 authors is minimum (1.87%) in Public Administration whereas documents by 3 authors is minimum (0.64%) in Political Science.

Table 6. Electronic Resources

Year Awarded	Public Administration			Political Science		
	Electronic Resources	Print Resources	%age of Electronic Resources	Electronic Resources	Print Resources	%age of Electronic Resources
2015	0	0	0	124	1039	11.94
2016	42	259	13.95	83	1128	7.36
2017	189	567	25	72	1315	5.48
2018	0	0	0	288	891	32.32
2019	100	449	18.22	572	2108	27.14
Total	331	1275	25.96	1139	6481	17.57

Table 6 provides information about the use of electronic resources by researchers. The use of electronic resources is 13.95% in the year 2016 in Public Administration. It increased to 25% in the year 2017 and then decreased to 18.22% in the year 2019. In Political science, the use of electronic resources with 11.94% in the year 2015 and keep on decreasing to 5.48% till 2017. After this, immediately it augmented to 32.32% in 2018, then fell to 27.14% in 2019. In both the subjects (Public Administration and Political Science), the overall use of electronic resources is 25.96% and 17.57% respectively.

Table 7. Chronological Distribution of References

Year	No of Citations (Pub Administration)	%age	No of Citations (Political Science)	%age
2010-2019	414	25.78	1566	20.55
2000-2009	484	30.14	2425	31.82
1990-1999	169	10.52	1141	14.97
1980-1989	94	5.85	707	9.28
1970-1979	63	3.92	505	6.63
1960-1969	50	3.11	408	5.35
1950-1959	19	1.18	168	2.21
1940-1949	4	0.25	52	0.68
1930-1939	7	0.44	27	0.35
1920—1929	8	0.5	19	0.25
Before 1920	5	0.31	21	0.28
NA	289	18	581	7.63
Total	1606	100	7620	100

The chronology of citations is represented by table 7. The publication year of citations is divided into groups of 10 years period starting from 2019 to date back to documents published before 1920. In both the subjects maximum documents are used from the period 2000-2009 with 30.14% in Public Administration and 31.82% in Political Science. Again in both the subjects, the second preference is for the documents which are published during 2010-2019. In Public Administration going back from the period 2000-2009 to before 1920, the use of references kept on decreasing from 30.14% to 0.31%. In Political Science going back from the period 2000-2009 to 1920-1929, the use of references kept on decreasing from 31.82% to 0.25%. The date of origin of 18% documents in Public Administration and 7.63% in Political Science is not available.

Table 8. Ranked List of Journals in Public Administration and Political Science

Public Administration			Political Science			
Number of Journals	Name of Journal	Number of Citations (%age)	Rank of Journals	Name of Journal	Number of Citations (%age)	Rank
1	Indian Journal of Public Administration	40 (8.62)	1	Economic Political Weekly	170(12.51)	1
2	Economic and Political Weekly	36 (7.76)	2	Frontline	50 (3.68)	2
3	Nagarlok	18 (3.88)	3	Mainstream	45 (3.31)	3
4	Public Administration Review	17 (3.66)	4	Global Environmental Politics	42 (3.09)	4
5	Indian Journal of Political	13 (2.8)	5	Asian Survey	37 (2.72)	5

	Science						
6	Mainstream	11 (2.37)	6	6	India Today	35 (2.58)	6
7	Yojna	10 (2.15)	7	7	The Indian Journal of Political Science	33 (2.43)	7
8	International Review of Administrative Sciences	8 (1.73)	8	8	The Sikh Review	26 (1.91)	8
9	International Journal of Public Administration	7 (1.51)	9	9	Outlook	22 (1.62)	9
10	Journal of E-Governance	7 (1.51)	9	10	Strategic Analysis	17(1.25)	10
11	Journal of Theoretical and Applied Information Technology	7 (1.51)	9	11	Journal of Constitutional and Parliamentary Studies	16 (1.18)	11
12	Management in Government	7 (1.51)	9	12	Third Concept	16 (1.18)	11
13-14	Two journals with 6 citations each	12 (2.59)	10	13	International Organisations	13 (0.96)	12
15-16	Two journals with 5 citations each	10 (2.15)	11	14	Social Change	13 (0.96)	12
17-22	Six journals with 4 citations each	24 (5.17)	12	15	India Quarterly	12 (0.88)	13
23-31	Nine journals with 3 citations each	27 (5.82)	13	16-18	Three journals with 11 citations each	33 (2.43)	14
32-62	Thirty one journals with 2 citations each	62 (13.36)	14	19-20	Two journals with 10 citations each	20 (1.47)	15
63-210	One hundred forty eight journals with 1 citation each	148 (31.9)	15	21-24	Four journals with 9 citations each	36 (2.65)	16
				25-26	Two journals with 8 citations each	16 (1.18)	17
				27-29	Three journals with 7 citations each	21 (1.55)	18
				30-32	Three journals with 6 citations each	18 (1.32)	19
				33-45	Thirteen journals with 5 citations each	65 (4.78)	20
				46-60	Fifteen journals with 4 citations each	60 (4.41)	21
				61-91	Thirty one journals with 3 citation each	93 (6.84)	22
				92-157	Sixty Journals with 2 citations each	132 (9.71)	23
				158-475	Three hundred eighteen journals with one citation each	318 (23.4)	24
Total		464 (100)				1359 (100)	

Table 8 reveals the ranked list of journals in both the subjects. The list provides 210 journals with 464 articles/journal citations in Public Administration and 475 journals containing 1359 journal citations in Political Science. For Public Administration, Indian Journal of Public Administration is highly cited with 40 (8.62%) citations, followed by Economic and Political Weekly with 36 (7.76%) citations, Nagarlok with 18 (3.88%) citations and so on as is evident from the table.

Economic and Political Weekly is most preferred journal among Political Science researchers with 170(12.51%) citations. Frontline and Mainstream are ranked second and third among the list of journals with 50(3.68%) and 45(3.31%) citations respectively. Global Environmental Politics is ranked four with 42(3.09%) citations. Asian Survey and India Today are ranked five and six with 37(2.72%) and 35 (2.58%) citations respectively. With the help of Leimkuhler model, nine journals have been identified as core journals in both the subjects which form 34.48% of the journal citations in Public Administration and 33.85% in Political Science.

4.2. Application of Bradford law of scattering to journal distribution

For the application Bradford’s Law, the journal citations (Public Administration) are divided in three zones (p = 3, here p denotes the number of zones) and k (Bradford Multiplier, BM) is ascertained by using mathematical formula,

The Bradford distribution can be written as 9.402: 9.402 (4.415): 9.402 (4.415)². The findings of this calculation are depicted in **Table 9**.

$$k = (e^y \gamma_m) 1/p \quad (\text{where } \gamma_m \text{ is the number of items in the most productive source})$$

$$k = (1.781 \times 40)^{1/3}$$

$$k = 4.145$$

$$r_0 = \frac{T(k-1)}{(k^p - 1)} \quad (\text{where } r_0 \text{ is the number of journals in nucleus } \& T \text{ is the total number of journals})$$

$$= 9.402$$

$$r_1 = 38.97$$

$$r_2 = 161.54$$

Table 9. Scattering of Journals and Citations over Bradford Zone in Public Administration

Zones	Number of Journals	Percentage of Journals	Number of Citations	%age of citations	Bradford Multiplier
1	9	4.29	160	34.48	-----
2	39	18.57	128	27.59	4.333
3	162	77.14	176	37.93	4.154
Total	210	100	464	100	-----

Table 9 indicates that the number of journals in core zone (Public Administration) or zone 1 is 9 with 160 citations. Zone 2 contains 39 journals with 128 article citations and zone 3 with 176 journal citations. The Bradford multiplier for each group has been calculated by dividing the number of journals in the given group by its preceding group. The value of k for 2nd and 3rd group is 4.333 and 4.154 respectively which is very close to 4.415, BM is calculated from formula given by Egghe (1986 and 1990).

Similarly, the value of k and journals in three zones in Political Science has been calculated and given below:

$$k = 6.715$$

$$r_0 = 8.995$$

$$r_1 = 60.401$$

$$r_2 = 405.593$$

The Bradford distribution (Political Science) can be written as 8.995: 8.995(6.715): 8.995(6.715)² and findings of this calculation are given in **Table 10**.

Table 10. Scattering of Journals and Citations over Bradford Zone in Political Science

Zones	Number of Journals	Percentage of Journals	Number of Citations	%age of citations	Bradford Multiplier
1	09	1.90	460	33.85	-----
2	60	12.63	383	28.18	6.667
3	406	85.47	516	37.97	6.767
Total	475	100	1359	100	-----

Table 10 reveals that the number of journals contributing to citations to each zone increases by multiplier 6.715 and first zone containing 09 journals contributes 460 citations, the second zone having 60 journals produces 383 references and the third zone with 406 journals contribute 516 citations. The value of k for 2nd and 3rd group is 6.667 and 6.767 which very close to BM i.e. 6.715.

The core journals identified in both subjects are 9. These journals are the most cited journals by the researchers of both subjects. The three zones in both the subjects do not carry exactly the 1/3rd of the citations. The Third zone in both the subjects carry more the 1/3rd of citations whereas the second zone having less than 1/3rd of citations. The first zone contains almost 1/3rd of citations in both the subjects.

5. Findings and Conclusion

The Department of Public administration and The Political science were started in the year 1971 and 1972 respectively at Punjabi University, Patiala. Twelve faculty members have guided 38 Ph. D. research scholars in Political Science during the period under study. Dr Dilbir Kaur Bajwa has guided maximum number (7, 21.21%) of theses in Political Science. Similarly, four faculty members have guided 10 Ph. D. research scholars in Public Administration and Dr. Rajbans Singh Gill has guided maximum number (5, 50%) of theses in Public Administration. The award of theses in Political Science is more than three and half times of Public Administration but the faculty is two and half time in Political Science than Public Administration. The findings of the study are as follows:

- Average citations per thesis in both the subjects (Public Administration and Political Science) are 160.6 and 200.53 respectively.
- There is dominance of single authorship over multiple authors in both the subjects as 57.85% of the citation in Public Administration and 70.13% in Political Science are single authored.
- Books are first preference (about 1/3rd) in Public Administration and Political Science (49.06%) whereas journals are the second preference in both the subject.
- The use of e-resources in Public administration and Political science is 25.96% and 17.57% respectively.
- Majority of citations used in Public Administration (30.14%) and Political science (31.82%) are from period 2000-2009.
- The highly cited journal in Public Administration is Indian Journal of Public Administration (40 times, 8.62%) and Economic and Political Weekly (170 times, 12.51%) in Political Science.
- The core journals identified in both subjects are 9.
- Bradford Law of Scattering is applicable to both the subjects. The Bradford Multiplier is 4.145 in Public Administration whereas it is 6.715 in Political Science.

It can be safely concluded that this study will definitely help libraries in selecting relevant documents. The ranking of journals will help in selecting, continuing and cancelling the existing journals for the concerned library especially in the subjects under study.

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