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SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

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CHAPTER - 5
SUMMERY OF FINDINGS, SUGGESPITION AND CONCLUSION

5.0 Introduction

Library resources are necessary for planning of the library services at all levels, this is in terms of facilities. The new technology has given the profession a number of tools and techniques to improve the library and information centers and ability to study and respond to the user’s needs. The technology development is the one answer to solve the several problems connected with collection of data on use. A Librarian’s knowledge of the literature in terms of the use to which it is put is not that adequate. The reason is attributed to the user’s approach which is constantly changing, and unable to predict its definite direction. Thus the user study is being the focal point in library and information science education programme.

Citation Analysis studies help library mangers in effective collection development, organization and dissemination of information to library users. These studies also help scholars in understanding and using information resources optimally. Librarians should be in a better position to rectify their journal subscription policy with their limited financial resources. This is possible for subscribing to a handful of core journals which cover maximum segment of contemporary literature. Further it is possible to provide correct and pin-pointed services.

Doctoral theses which are the products of research activity have been examined through Citation Analysis with a view to find out their effectiveness on the collection development of library and specific subjects collection developments. As regards the study of information sources used by researchers of University of Mysore, Karnataka University and Bangalore University in the area of Physics, Chemistry and Zoology covering the submitted during 2006 to 2010. Citation study means relationship between the cited document and citing document. The study covers 181 Ph.D theses submitted to three Universities of Karnataka for award of Doctoral Degree. The period covered for the study is from 2006 to 2010. The study encompasses three science subjects: Physics, Chemistry and Zoology.
5.1 Summary of Major Findings

The following are some of the major findings that are drawn from this study.

1. The study identified lack of uniformity among theses with regard to format of citation. It is to be emphasized further that there is no consistency even within the citations of the theses.

2. The average number of Citations per thesis is 125.70%.

3. The subject wise average citation of Physics (157.71%), Chemistry (101.43%) and Zoology (132.86%).

4. The average number of citation of Karnataka University (147.72%), Bangalore University (128.27%) and University of Mysore (109.36%).

5. The journals are highly cited with citations count of 17848 (78.45%) among other citations forms of resources.

6. 2322 (10.21%) Citations of books are cited in Physics, Chemistry and Zoology theses.

7. 20170 (88.65%) number of Citations are from books and journals. These are the highest cited forms of resources compared to other Citations forms.

8. Print sources are highly cited compared to electronic resources.

9. The researchers highly depend on current literature.

10. The researchers from the discipline of Physics, Chemistry and Zoology the current published resources.

11. The researchers of Physics, Chemistry and Zoology highly cite the specific resources belonging to their subject.

12. The researchers of Physics, Chemistry and Zoology highly cite sources that are in English Language 22671 (99.64%).

13. The researchers highly cite the resources of multiple authorship (16193).

14. The degree of collaborations of journal article is 0.779.

15. The researchers from the discipline of Physics, Chemistry and Zoology are citing the resources published by the developed countries like USA, UK, and Germany.

16. The researchers also referring resources published by developing countries like India, South Africa, and Australia etc.
17. There is high concentration with large number of Citations in few periodicals in all the subjects, with a large number of periodicals contributing relatively fewer citations.

18. The researchers cited majority of the books published by Taylor and Francis 317 (13.65%) followed by Elsevier 273 (11.76%) and Springer 248 (10.68%).

19. The researchers cited majority of the journals published by Elsevier 2319 (12.99%) followed by Taylor and Francis 1942 (10.88%) and American Institute of Physics 1834 (10.28%).

20. The citation relating to journal literature in Physics, Chemistry and Zoology subject confirm to Bradford’s Law of scattering.

21. The Obsolescence and Half life of journals in Physics, Chemistry and Zoology, is 14 years.

22. The Obsolescence and Half life of books in Physics, Chemistry and Zoology, is 23 years.

5.1.1. Physics

The major findings in Physics subject are:

1. The averages of 158 Citations are cited Physics theses.

2. The distribution of citation of University of Mysore is 2774 (35.89%), followed by Bangalore University 2485 (32.16%) and Karnataka University 2469 (31.95%).

3. Periodicals are highly cited 5978 (77.35%) compared to other forms of resources.

4. The books are considered as second major source of information cited which amounts 854 (11.05%).

5. 6832 (88.41%) of Citations are from periodicals and books sources.

6. The journals Citations in Physics theses are from University of Mysore amount to 2124 followed by Bangalore University 2005 and Karnataka University 1849 citations.

7. The researchers highly refer the resources 6984 (90.373%) of Science and 721 (9.331%) from Applied and Medical Science.

8. The researchers highly cite the journals is 2511 (42.00%) of Physics, followed by 1043 (17.45%) Nuclear Physics and 438 (07.33%) of Polymer Science.
9. The researchers highly cite the books 583 (68.27%) of Physics, followed by 113 (13.23%) Nuclear Physics and 43 (05.04%) Chemistry.

10. 2199 (36.78%) of journal Citations are from USA compared to other countries 3779 (63.22%).

11. The most cited journal in the area of Physics i.e. 237 (03.96%) “Journal of Chemical Physics”, followed by 182 (03.04%) Journal of Applied Physics and 169 (02.83%) of Nuclear Instrument Methods in Physics Research Section- B.

12. The majority of journal publications Ranking is from U.S.A. followed by the Netherlands and India.

13. The Physics researchers highly depend on journal publications published by developed countries which amount to 5475 (91.56%) compared to Indian journal publications which amount to 503 (08.44%).

14. Productivity of cited journals highlights the first 25% of the Citations are covered by the first 12 journals.

15. The average productivity is 12 journals with 125 Citations per journal.

16. The study confirms that the journal use pattern of Physics researchers fits well with the Bradford’s Law of scattering with the ratio of 19:55:706.

17. The findings of the study bear implication the need based collection developed in the field of Physics.

5.1.2. Chemistry

The major findings in Chemistry subject are:

1) The Average Citations of 101.43 are cited from Chemistry.

2) The distribution of citation in University of Mysore is 2742 (33.79%), followed by Bangalore University is 2736 (33.71%) and Karnatak University is 2637 (32.50%).

3) The periodicals are highly cited 6473 (79.76%) compared to other forms of resources.

4) The books are considered as second major information sources cited which amounts to 717 (8.83%).

5) 7190 (88.59%) Citations are from periodicals and books. Citations from the other form of sources are very negligible.
6) The highest journal citation cited from Chemistry of Bangalore University is 2178 (33.64%) followed by University of Mysore 2168 (33.50%), and Karnataka University 2127 (32.86%).

7) The researcher highly refer the sources in science 4591 (56.57%) and 3504 (43.17%) relating to Applied Science and Medical Science.

8) The researcher highly refer the journal sources with 2486 (38.40%) of Chemistry followed by 484 (7.477%) Polymer science and 418 (6.458%) Pharmaceutical science.

9) The researchers refer the book Citations 293 (40.86%) in Chemistry followed by 89 (12.41%) Medical Chemistry and 71 (9.90%) of Medical science.

10) 2540 (39.23%) of journals Citations are from USA compared to other countries with 3993 (60.77%).

11) 70 % journal publications Citations are from USA, UK and India journal publications.

12) The majority of journal publications Ranking is from U.S.A. followed by India.

13) The highest cited journals are from Chemistry subject 239 (3.69 %) of Analytical Chemistry followed by 135 (2.09%), Journal of Membrane Science, and 128 (1.98%) of Journal of Chemical Physics.

14) The Chemistry researcher highly depend on journal publications of developed countries amount to 5627 (86.94%) compared to Indian journal publications amount to 846 (13.06%).

15) Productivity of cited journals highlights the first 25 % of the Citations are covered by the first 15 journals.

16) The average productivity of 15 journals is 109.8 Citations per journal.

17) The study confirms that the journal use pattern of Chemistry fits well to the Bradford’s Law of scattering with the ratio of 22:50:579

18) The findings of the study bear implication the need based collection developed in the field of chemistry.

5.1.3. Zoology

The major findings in Zoology subject are:

1. The Average Citations of 132.86 are cited in Chemistry theses.
2. The distribution of citation in Bangalore University is 2604 (37.689%) followed by University of Mysore 2468 (35.723%) and Karnatak University 1837 (26.588%).
3. The periodicals are highly cited 5397 (78.54%) compared to other forms of resources.
4. Books are considered as second major source cited which amount to 751(10.86%).
5. 6148 (88.98%) Citations are from periodicals and book sources. Citations from the other forms of sources are negligible.
6. The journal Citations in Zoology theses is 2026 (37.53%) from Bangalore University followed by 2018 (37.40%) and 1353 (25.07%) from Karnatak University.
7. The Zoology researcher highly cite the source 5069 (72.90%) from Science followed by 1840 (25.19%) Applied science and Medical Science.
8. The researcher of Zoology highly cited journals 2149 (39.81%) followed by 1130 (20.938%) Medical Science and 542 (10.04%) from Biology.
9. The researcher of Zoology highly cited book citation subjects are 346 (46.072%) followed by 108 (14.38%) Medical science and 81 (10.78%) from Genetics.
10. 1782 (33.02%) journal citations are from USA compared to other countries 3615 (66.98%)
11. 60% of journals Citations are from USA, UK and India.
12. The highest cited journal of Zoology subject is 147 (2.72%) belonging to topic Evolution, followed by 129 (2.39%) Genetics and 112 (2.08%) Drosophila information service.
13. Productivity of cited journals highlights the first 25 % of the Citations are covered by the first 16 journals.
14. The average journal productivity of 16 journals with 85.18 Citations per journal.
15. The study confirms that the journal use pattern of Zoology fits well to the Bradford’s Law of scattering with the ratio 25:53:521:
16. The findings of the study bear implication the need based collection developed in the field of Zoology.
5.2 Testing of Hypotheses

Regarding the objectives of the study, the following hypotheses have been framed and defined:

1) Hypothesis -1

The researchers of Physics, Chemistry and Zoology highly cited the resources of periodical literature rather than other sources of information.

**Hypothesis-1:** The researchers of Physics, Chemistry and Zoology highly cite the resources of periodical literature rather than other sources of information. The table - 4.3 and figure - 4.2 reveals that periodical literature is highly cited than the other sources of information. The findings of the study support the facts that journals are the main sources for research scholars as they report original research literature and are considered to be primary channels of scientific communications. In the present research, with 78.45% (17848) of total Citations the journals occupy the first place among three subjects. The journal citations in Physics is 5978 (77.53%), Chemistry6473 (79.76%) and Zoology5397 (78.11%). These are the highest in journal citations. This reveals the importance of journals as primary source of information for researchers in three science disciplines. Hence the **Hypothesis - 1 is accepted.**

2) Hypothesis -2

The researchers are highly depending on Current literature.

**Hypotheses-2:** The researchers highly depend on current literature. The table - 4.9 and table - 4.10 depicts that the researchers citing current literature. The table furnish that the three Universities the three subjects of Physics, Chemistry and Zoology theses are highly cited references during are 1991 to 2000 (28.73%) and 2001 to 2010 (27.12%). This clearly indicates that the research scholars refer and cite very recent and current information for their research work. In total of 50 % of the Citations are current literatures. Hence the **Hypothesis - 2 is accepted.**

3) Hypothesis – 3

The Majority of researchers are cited the resources published by the developed countries.
Hypothesis-3: The researchers of three Universities of Karnataka, Covering the subjects Physics, Chemistry and Zoology highly cite the resources published by the developed countries. The table 4.11, 4.14 and figure – 4.6 displayed that 69% of resources have been published by USA, UK, and Germany. The three subjects cited references are published by developed countries viz. USA (9774) 42.96%, followed by UK (5018) 22.06% and Germany (1029) 4.52%. Hence the Hypothesis - 3 is accepted.

4) Hypothesis – 4

The researchers of Physics, Chemistry and Zoology highly cited the English language resources.

Hypothesis-4: The researchers of Physics, Chemistry and Zoology highly cite the English language resources. The table 4.15 presents that 22671 (99.64%) of resources are in English language. It depicts that English language is the main communication media for researchers. The table – 4.15 depicts that 22671 (99.64%) of total Citations from English language reflects the clear domination of English as medium for scientific communication which is attributed to the fact that is a universal language. English is universal language which can bring scientists, research scholars, and educationists from different counties, backgrounds, cultures, language on to a common platform to share their experiences. The table – 4.9 presented that, the highest English language journal Citations are 17798 (99.715). Therefore, maximum sources are available in English language. The entire research finding is being published in English. This language plays vital role to know the latest developments in a disciplines. It helps the researcher to take up challenges and to update their knowledge. Hence the Hypothesis-4 is accepted.

5) Hypothesis – 5

Majority of researchers are cited the multiple authorship pattern Citations.

Hypothesis-5: The researchers of Physics, Chemistry and Zoology highly cited the multiple authorship pattern Citations. Table - 4.19 reveals that 71.17% are multiple authorship patterns. Journal authorship pattern is highest is Multi authorship with13882 (61.62%), followed by Conference proceedings 892 (3.95%) and Reports
128 (0.32%). The degree of collaborations of journal article is 0.779. Hence the **Hypothesis - 5 is accepted.**

6) **Hypothesis – 6**

The researchers cited the specific resources are highest from their subjects.

**Hypothesis-6:** The researchers of Physics, Chemistry and Zoology highly cited the specific resources belonging to their subject Citations. The table - 4.25 to table - 4.37 presented the highly cited subject citations. The table - 4.31 reveals that in Physics journal citations 42% (2511) of Physics subject, in Chemistry also 38.40% (2846) of citations belong to Chemistry and Zoology 39.81% (2149) are related to Zoology subject journal citations. The result is the same in book citations with highest on their subject viz. Physics (68.27%), Chemistry (40.86%) and Zoology (46.07%). Hence the **Hypothesis - 6 is accepted.**

7) **Hypothesis – 7**

Majority of Cited Journal citations are published by the developed countries

**Hypothesis-7:** The researchers of Physics, Chemistry and Zoology subjects Journal citations are published of the developed countries. That table - 4.38 deals the highest journal Citations published by Elsevier (2319), Taylor Francis (1942) and American Institute of Physics (1468). Above three publishers produce 34.15%. The remaining 66% of journal citations are from other publishers. Above three journals publisher is International reputed publisher and they are from the developed country publishers. It is identified that researcher highly depend on developed country publications when compared to other country publications. Hence the **Hypothesis - 7 is accepted.**

8) **Hypothesis – 8**

Majority of Cited Book citations are published by the developed countries.

**Hypothesis-8:** The researchers of Physics, Chemistry and Zoology Book citations are published by of the developed countries. That table - 4.39 deals the highest Book Citations published by Taylor & Francis 13.65% (317) followed by Elsevier 11.76 (273) and Springer 10.68% (248). Above three publishers produce 36.09%. The remaining 64% of Book citations are from other publishers. Above
three Books publisher are International reputed publisher and they are the publishers from developed countries. It is identified that researcher highly depend on developed country publications when compared to other country publications. Hence the **Hypothesis - 8** is accepted.

9) **Hypothesis -9**

The Citations of Journal literature does conform to Bradford’s Law of scattering.

**Hypothesis – 9** The citation relating to journal literature of Physics, Chemistry and Zoology subjects confirm to Bradford’s Law of scattering. The table - 4.45 table-4.52 and table- 4.59 reveals the Bradford’s Law of scattering.

Result relating to 4.46, figure 4.28 and table -4.45 have discussed about the Bradford’s zones. Hence, we have identified only three zones and the first zone. i.e. nucleus zone, is having 19 journals representing 2.44 percent of total number of journals cited. In the second zone there are 55 journals representing 7.05 percent of total journals and in the third zone we have identified 706 journals with 90.51 percent of total number of journals cited.

When we observe the data in the table 4.46 it depicts the cumulative percentage of 19 journals is 2.44 only for 55 journals it is 7.05 and 706 journals it is 90.51 percent. Again it is observed from figure 4.46 that for the first 19 journals log of cumulative journals workout to be 1.28 (column 2 of the table 4.46) and for 74 journals log of cumulative journals work out to be 1.87. The figure 4.28 also clearly shows that the first zone is ended, with 1.29, second zone ended with 1.87 and third zone ended with 2.89. Thus table – 4.45 tables 4.46 and figure 4.28 reveal that the citation data pertaining to the Physics fits well with Bradford’s law of scattering. The other subject analysis also fits well with Bradford’s law of scattering.

The Bradford’s Zone ratio of Physics journal citation is 19:55:706, Chemistry journal citation is 22:50:579, and Zoology journal Citations is 25:53:521. This ratio fits the Bradford’s law of scattering. The verbal form was the result of the theoretical speculation while the graphical form was obtained from empirical data derived from
the bibliographies. The graphical formulation has been found to be more accurate when compared with the data and also more convenient to use. With the above application, it states that the journal citation of Physics, Chemistry and Zoology subjects conform with the Bradford’s Law of Scattering. Hence the **Hypothesis - 9 is accepted.**

5.3 **Recommendations and Suggestions**

In the light of the findings of the study the following suggestions are made.

- This present study is based on the Citations rendered in Ph.D theses of Physics, Chemistry and Zoology subjects submitted to University of Mysore, Karnataka University and Bangalore University in Karnataka. Similar type of investigations may be carried out covering the theses in other science subjects and social science subjects. This is to generalize the findings of the study and gain an in-depth knowledge of the literature used by the researchers.

- The Citations from other forms of documentation concerned are conference proceedings, reports, theses, technical reports, are very less used because of the inadequacy of information about these documents. In this regard it is suggested that concerned authorities should make an attempt to overcome these restrictions by providing proper cataloguing, abstracting and indexing services.

- The online information resources are less cited in theses; therefore library authorities should create awareness and guide the researchers for proper utilization of available online resources.

- The Library should conduct orientation programmes on the use of electronic resources at regular intervals of time to keep phase with latest technologies.

- The acquisition policy of the University libraries should be examined in the light of growing demands of the research scholars.

- UGC and INFLIBNET Center should also extend helping hand to the University libraries in getting access of more and more of e-journals through Consortia.

- The important features of research environment in the Universities of developed countries that there was to be special staff for thesis work. They
designated as “Theses editor”, “Dissertation Secretary”, “Theses Coordinator”, etc. It is their responsibility to set and maintain theses standard. The University theses co-coordinator checks the format of bibliography, Citations, Quotations, avoiding plagiarism, Chapters, Guide consultancy, and referencing styles of each thesis as well as corrects the statistical method of data analysis and quality of the contents are cross checked by thesis editor of concern University. In India all most Universities maintain separate wing for research works. For example University of Mysore follows all most UGC guideline and there is separate wing for this activity. The science researchers should cite authentic referred resources in their theses.

- Subscription to important and leading publishers, and leading information services and their products such as Web of Science database, Scopus, and other online and print sources would provide better opportunity for the research workers to know the relevant source materials for their specific requirements.

- The University libraries in the state of Karnataka should build a consortium to share their print and electronic resources available.

### 5.4 Suggestion for Further Research

Based on the present study, the following areas are identified for further research.

1. The study is limited to Science Discipline of Universities in Karnataka, future studies can concentrate on other disciplines of Universities in and outside of Karnataka.
2. A comparative study of citation patterns among various disciplines available in Universities.
3. The same study can be done with different advance statistical bibliographical tools and techniques.
4. The studies can be conducted on Citation Analysis at regular intervals to enable better standards, collection development.
5. Bibliometrics and Scientometrics studies can be conducted covering theses of various disciplines submitted to the of Universities of Karnataka.
6. To study the bibliographic coupling of doctoral theses.
7. A longitudinal research is desirable so that the emerging patterns and trend could be further explored.
8. To study the reference accuracy of cited references of science theses
9. To study the academic honesty of bibliographical references of doctoral theses.

5.5 Conclusion

Citation studies provide some guidelines for the librarians and Information scientists for the decision making process relating to the acquisition policy. The exponential growth of literature and the escalating cost of reading materials, coupled with the rising cost of organizing the collection on the one hand and the shrinking budget allocation on the other, are factors that necessitate the librarians of modern times to think more in terms of adopting statistical techniques for rational decision making. The prospective librarians have to act as intermediaries between recorded knowledge and the patrons in an effort to provide improved quality in the service.

The Citation Analysis is a practical tool to evaluate the needs of users and use of information sources by them while conduction any study. Research activities are increasing every year. With Citation Analysis, libraries can evaluate suitability of collection which fulfils the need of users. The citation studies help in monitoring budget allocation, collection development, especially useful for journal selection, reserving and weeding out process.

However, the findings of the study provide guidelines to librarians for decision making process, collection development, acquisition, subscription, compact shelving and weeding out of documents.