Chapter 4
Research Methodology
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The development of a country depends largely upon its research outputs. The importance of quality research can not therefore be overlooked. Quality research exposes academic staff to new information and sharing of socio cultural ideas with others. During the process of research, academic staff has the opportunity to travel outside their environment to seek information and collect relevant data. Quality research by academic staff contributes to genuine indigenous and sustainable development. In recent years, the emphasis for research in universities seems to be focused on productivity.

Keeping in view the above, an attempt has been made to analyze the research performance of science in North Indian Central universities. Bibliometric techniques have employed to conduct the research as it is especially useful when studying a research intensive subject as science.

4.1 Purpose

The purpose of the study is to present the university wise research output in science in order to measure the extent of scientific development in India.

4.2 Scope

The topic of the present study is “Scientific Research in Central Universities of Northern India: A Bibliometric Analysis of Research Output during the period 2000-2008”. The main aim of the study is to present the university wise distribution of scientific research in six central universities of Northern India. Also including the aspects like year wise research output, types of publications, inter university collaborative research journals preferred for publications, subject wise distribution of articles.
4.3 Objectives

Major objectives of this study are as follows:

- To determine the growth of publications produced by central universities of Northern India.
- To determine the type of publications used by authors.
- To know the amount of inter university collaborative research.
- To find out the top institutes of collaborative research in each university.
- To find out the highly preferred scientific journals in each university under the study.
- To determine the number of publications produced by universities in various research field.
- To find out the most prolific authors and their publication productivity in each university.
- To find out the most cited authors in each university.
- To know the h-index of prolific authors.

4.5 Hypotheses

I. There is a constant growth in the scientific publications of all the central universities under the study.

II. University of Delhi has more scientific productivity in comparison with other central universities.

III. Article is the most popular form of communication among faculty members of the universities under study.

4.5 Methodology

The data for the present study have been retrieved form SCOPUS database of Elsevier Publishing group. It is one of the very comprehensive databases covering all aspects of science. It has been indexing articles from reviews since 1996. Scopus indexes the titles of
journals that are submitted as soon as they have been labeled by an institution. All papers contributed by the authors from the following six central universities in Northern India have been considered for the present study.

- Aligarh Muslim University (AMU), Aligarh, UP
- Allahabad University (AU), Allahabad, UP
- Banaras Hindu University (BHU), Varanasi, UP
- University of Delhi (DU), Delhi
- Jamia Millia Islamia (JMI), Delhi
- Jawaharlal Nehru University (JNU), New Delhi

All the universities offer a wide range of academic programs and research in various subjects. Excluded two central universities of Northern India namely: Indraparastha University and Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, because both of them are newly established.

The bibliographic details of the published scientific literature were collected using the Basic search, Author search and Affiliation search options of the Scopus. The search strategy in basic search used for collecting data for Aligarh Muslim University was as follows:

- Affiliation = Aligarh Muslim University
- Time span = 2000 to 2008
- Document type = Article
- Subject = Life Sciences, Physical Sciences and Health Sciences

The same strategy was used to collect data for five other universities only by changing name of the university. MS Excel Spreadsheet and MS Word were used to analyze the final data collected in order to generate tables, charts, groups, etc. The citations received of the
authors were retrieved on 26 August 2009 to identify the rightly cited authors in the field.

The performance of these six universities were judged and compared on the basis of various quantitative indicators: a) size of research output measured by volume of production in various types of publications during the period of study, b) collaboration of scientific activity measured by 'interuniversity collaborative research and national collaboration and c) Impact of scientific activity measured by the numbers of citations received during the period of study and d) the apparent scientific impact of the scientists measured by h-index.

Basic information about these six universities was collected from their official web sites.

4.6 Limitations

Though there are 20 central universities in India, the present study is confined to six universities of Northern India. The literature analyzed was published during a period of nine years from 2000 to 2008. Data collection was limited to one empirical database namely SCOPUS which is one of the very comprehensive databases covering all aspects of science brought out by Elsevier publishers.