Chapter 3

RESEARCH METHODOLOGY

3.1 Introduction

‘Research Methodology’ consists of two words i.e. ‘Research’ and ‘Methodology’. The word ‘research’ is derived from the Latin word meaning ‘to know’. Research as defined as a “scientific understanding, which, by means of logical and systematized techniques, aims to: 1) discover new facts or verify and test old facts; 2) analyze their sequences, interrelationships, and casual explanations which were derived within an appropriate theoretical frame of reference; 3) develop new scientific tools, concepts, and theories which would facilitate reliable and valid study of human behaviour”\(^1\). This definition has given a totality of research concepts but stressed on behavioral research. “It is a systematic and a replicable process which identifies and defines problems, within specified boundaries. It employs well designed method to collect the data and analyses the results. It disseminates the findings to contribute to generalize able knowledge”\(^2\). The present definition itself is a complete due to covers basic steps of research like identification of problem, delimitation, data collection, analysis of data and results and conveyed to the same to the community. ‘Methodology’ means logical and systematic techniques are adopted for accomplishing a task. It is a step wise movement towards the
achievement of the goal. Methodology is "adequate descriptions of procedures will facilitate better understanding of how the study was accomplished". Here, this definition highlights only the methodology part. "Scientific method involves certain stages which invariably leads to systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relations among natural phenomena". On the basis of above definitions, following specific features of research methodology may be drawn: a) identification of problem b) formulation of hypotheses c) delimitation of area d) collection of data e) analysis of data f) findings and draw conclusion g) and finally dissemination of findings.

The following methodology has been adopted to carry out the study:

h) All literature published on building materials have been collected (physically scanned one by one and recorded) from the source journals listed in the scope as well as details are given in the Appendix-I.

i) Computerized database has been created through WINISIS software.

j) The data for the study have been based on the created database.

k) The data has been analyzed and presented in tabular as well as chart (bar/pie) form.

l) To classify the different aspects of building materials, the Universal Decimal Classification (UDC) (Medium English Edition) BS-1000 has been used (Appendix –II).

m) Different laws of bibliometrics / scientometrics study have been tested towards the analysis of data

3.2 Laws of Bibliometrics

There are three main classical laws used in bibliometrics. These are Lotka’s law of scientific productivity, Bradford’s law of scatter, and Zipf’s law of word occurrence.

3.2.1 Lotka’s Law

It was named after Alfred J. Lotka and is one of the classical method used in bibliometrics. It describes the frequency of publication by authors in any given field. It states that the number of authors making n contributions is about 1/n of those making one; and the proportion of all contributors that make a single contribution is in the region of 60 percent. This mean that out of all the authors in a given field, 60
percent will have just one publication; 15 percent will have two publications (1/2 times 60); 7 per cent will have three publications (1/3 times 60), and so on. The general formula says:

\[ Y = C \times x^{-n} \tag{3.1} \]

Where \( x \) is the number of publications of interest (1, 2, etc.); \( n \) is an exponent that is constant for a given set of data; \( y \) is the expected percentage of authors with frequency \( x \) of publications, and \( C \) is a constant. The productivity corresponds not to the number of articles published by an author but to its logarithm; it seems that a multiplicative, rather than simply additive, modest provides a better fit to this measure or counting method.

The exponent \( n \) is often fixed at 2, in which case the law is known as the inverse square law of scientific productivity. However, given that the exponent \( n \) predicts the relative number of authors at each productivity level it would seem useful to calculate it. In the present study, least square method has been used. It can be expressed as:

\[ n = \frac{N \sum XY - \sum X \sum Y}{N \sum X^2 - (\sum X)^2} \tag{3.2} \]

Where \( N \) is the number of data pairs considered \( X \) is the logarithm of \( x \) \((x=\text{number of articles})\) and \( Y \) is the logarithm of \( y \) \((y=\text{number of authors})\).

The constant \( C \) is calculated using the formula:

\[ C = \frac{1}{\sum 1/x^n} \tag{3.3} \]

To this end the maximum difference between the real and estimated accumulated frequencies was calculated, and this value was then compared with the critical value \((c\,v.)\) obtained from the following equation:
\[ \text{c.v.} = \frac{1.63}{\left[ \sum y_x + \left( \frac{\sum y_x}{10} \right)^{\frac{1}{2}} \right]^2} \] (3.4)

### 3.2.2 Bradford’ Law

Bradford’s law is a pattern first described by Samuel C. Bradford in 1934 that estimates the exponentially diminishing returns of extending a search for references in science journals. Bradford’s Law serves as a general guideline to librarians in determining the number of core journals in any given field. It states that journals in a single field can be divided into three parts, each containing the same number of articles: 1) a core of journals on the subject, relatively few in number, that produces approximately one-third of all the articles, 2) a second zone, containing the same number of articles as the first, but a greater number of journals, and 3) a third zone, containing the same number of articles as the second, but a still greater number of journals. The mathematical relationship of the number of journals in the core to the first zone is a constant \( n \) and to the second zone the relationship is \( n^2 \). Bradford expressed this relationship as 1:n:n\( n^2 \) Bradford’s law is also known as Bradford’s law of scattering and Bradford distribution.

### References


