

## Chapter Three

### Methodology

#### 3.1 Introduction

This chapter describes the method used to analyse the research activities and the information sources used by the postgraduate students in the sciences. The theses analysed in this study span over twenty- five years from 1971 to 1995. As the purpose of this study is to examine the trends in research activities and the sources of information used, it was felt that a study based on descriptive statistics would be most appropriate to describe, analyse, and make comparisons of the data collected. Descriptive statistics are used to indicate quantities and trends of research in the sciences as a whole and by discipline.

The sample for the present study is based on the Ph.D. theses in the sciences accepted by the University of Malaya between 1971 and 1995. Since the submission of a thesis is a requirement for the postgraduate programme at the University, acquiring a complete list of the theses submitted is necessary for an accurate study. The list of the theses submitted to the University of Malaya was obtained from two sources: *Theses and Dissertations in the University of Malaya Library* compiled by Mercy P. Selvaratnam and Mukhtiar Kaur, a 1985 publication of the University of Malaya Library, and *Kekal Abadi*, a quarterly periodical also produced by the University of Malaya Library. The title page for

each thesis includes the title of the thesis, name of the author, year of submission and the call number.

*Theses and Dissertations in the University of Malaya Library* contains not only lists of doctoral theses but also dissertations submitted by students in the Masters programme. It covers theses and dissertations in all areas of study including those from other countries, but mainly those submitted to the University of Malaya. As the titles of theses and dissertations are compiled together under their respective disciplines, extra care had to be exercised so that only the theses submitted by the University of Malaya postgraduate science students between 1971 and 1983 were considered.

The second source, *Kekal Abadi*, lists only theses and dissertations submitted to the University of Malaya. The lists are contained only in the December issues of *Kekal Abadi*. Hence, only the December issues from 1984 to 1996 were studied. As the June 1997 issue contained titles of theses in the sciences that were submitted in 1995, and as these titles were not printed in the earlier issues, this issue was also studied. The titles of theses and dissertations are listed separately under the theses section and dissertation section respectively. This facilitates research.

Photocopies of the list of theses were made from both sources to ensure greater accuracy and easy reference. Each thesis is accompanied by its call number, and thus, the author did not have to search OPAC (On-line Public Access

Catalogue) of the University of Malaya to get this information. The search in OPAC was only made when the theses could not be located on the library shelves.

The list of doctoral theses recorded in *Theses and Dissertations in the University of Malaya Library* between 1971 and 1983 and *Kekal Abadi* between 1984 and 1997 are assumed to be the sum total of the theses in the sciences submitted to the University of Malaya from 1971 to 1995. A total of 101 titles of theses in nine disciplines in the sciences were identified from the two sources.

### **3.2 Sample**

The sample materials used for this study are the Ph.D. theses in the sciences submitted to the University of Malaya between 1971 and 1995. The theses in the sciences, comprising nine disciplines were from the Faculty of Science and the Institute of Advanced Studies. These theses are shelved at the Za'ba Memorial Library of the University of Malaya.

The sciences comprise various disciplines. The theses kept at the Za'ba Memorial Library are catalogued according to the Library of Congress Classification scheme (LCC). The LCC is basically a classification by discipline and was established to accommodate all subject areas. The scheme consists of twenty-one classes which are in turn divided into sub-classes; a progression from the general to the specific (Chan, 1994). The sciences are classified under the letter 'Q'. The classification for the various science disciplines is as follows:

Q	-Science (general)
QA	- Mathematics
QB	- Astronomy
QC	- Physics
QD	- Chemistry
QE	- Geology
QH	- Biology (general), Natural history (general)
QK	- Botany
QL	- Zoology
QM	- Human anatomy
QP	- Physiology
QR	- Microbiology

This study will concentrate on QA (Mathematics), QC (Physics), QD (Chemistry), QE (Geology), QH (Biology), QK (Botany), QL (Zoology), QP (Physiology), and QR (Microbiology). Only theses in the disciplines mentioned, submitted between 1971 and 1995 and shelved at the Za'ba Memorial Library, will be compiled as sample materials for this study.

Table 3.1 shows the total number of theses and the citations collected from 1971-1995. This duration is divided into five, five-year periods namely 1971-75, 1976-80, 1981-85, 1986-90 and 1991-95. From a total of 101 theses compiled, a total of 22218 citations were collected. The most number of citations collected

was during the 1976-80 period with a total of 6669 citations. The least number of theses submitted was 10 during the 1971-1975 period but the least number of citations was recorded during the 1981-85 period with 2948 citations. The breakdown of figures can be clearly seen in Table 3.1

**Table 3.1: Chronological distribution of total citations**

Year	Theses n=101	Citations n=22218
1971-75	10	3196
1976-80	31	6669
1981-85	15	2948
1986-90	18	3539
1991-95	27	5866

The data compiled is divided into two parts. The first part (Part 1) of this study will use data from the 'Acknowledgement' section to examine the trends in research activities amongst the postgraduate science students during the period of study. The second part (Part 2) of this study will examine the 'Bibliography' section. Only 50% of the sample material will be used for the second part of the study to examine the sources of information used.

About fifty percent (or close to it) of the theses are taken from each of the nine disciplines, resulting in varying numbers of theses from each discipline.

These theses were randomly selected through the proportionate stratified sampling method. A total of 51 theses were randomly selected. The breakdown of the theses from each discipline is as follows:

QA: 6

QC: 6

QD: 8

QE: 2

QH: 2

QK: 13

QL: 9

QP: 2

QR: 3

The 51 theses contain a total of 10386 citations. It was felt that this number of citations would have the balanced allocation within disciplines and would therefore be representative of the total.

### **3.3 Data Collection**

Each thesis was studied manually. The data for the present study were collected by physically examining each of these theses located in the Za'ba Memorial Library. Only two sections of each thesis were looked into, namely the 'Acknowledgement' section and the 'Bibliography' section. Information from the

former was used, to obtain data on scholarships received, tutorship tenures, gender and race of the researchers, year of theses submission by discipline and informal communication. The latter section provides information on types of sources of information (types of documents, example journals, books) used, language, currency of the sources of information and informal communication.

The data from the 'Acknowledgement' section and the 'Bibliography' section were noted on plain paper under separate columns with appropriate headings. The first sheet contains the following information from the 'Acknowledgement' section as follows:

- Name of researcher
- Race of researcher - M (Malay), C (Chinese), I (Indian), O (others)
- Gender- M(male), F(female)
- Year of submission of thesis - as noted in the title page
- Scholarship/grant
- Tutorship tenure - Tt ( Tt from the University of Malaya)
- Language: E (English), M (Bahasa Melayu), F (foreign)

The second sheet of paper records information on type and number of information sources used. The following type of information is determined from the 'Bibliography' section.

- Journals
- Books

Theses/dissertations

Conference papers

Informal communication - cited in the Bibliography only

Others - includes all those not mentioned above

The third sheet gives an indication of the currency of journals and books.

Currency of journals - journals less than 10 years / journals more than 10 years

Currency of books - books less than 10 years / books more than 10 years

The currency - age (of journals/books used) is counted from the year of submission of thesis.

The purpose of this compilation by citations is to get the number of citations used by the science postgraduate students, the language used in journals, and the currency preference of books and journals. It must be noted here, for the purpose of clarity, that the citations in each of the thesis were recorded on each occasion upon which the citation was made (footnotes are not included in this study). It must also be noted here that the informal sources ('Acknowledgement' section) are considered to be sources that involve any form of informal assistance received by the researcher (advice, help in analysing data etc.). Another point to be clarified is that a journal is classified as a foreign language journal only by its foreign language title. It should be noted that these foreign language journals do carry abstracts and translations in the English Language. Russian journals have

cover-to-cover translations in English (Holmstrom, 1962; Marshakova-Shaikevich, 1993). To determine whether the postgraduate student referred to the foreign language content or merely to the abstracts in the English Language, or translations, would require a detailed study, and hence, is beyond the scope of the present study.

About a month was taken to compile the data. The final data was then compiled as tables and graphs on Excel.