Chapter - IV

RESEARCH DESIGN AND METHODOLOGY

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For all knowledge and wonder (which is the seed of knowledge)
is an impression of pleasure in itself.

- Francis Bacon (1605)
4.1. Introduction

It is necessary for a researcher to design a methodology for the chosen research problem. It is important for the researcher to know not only the research methods but also methodology required for the research. Research methodology refers to the ways or methods that are used by a researcher to conduct or organize his/her research to accomplish the set objectives. The research methodology is quite important as it helps the researcher to identify the relevant strategies and methods that can help researcher to solve the underlying research problem or issue. All the methods used by a researcher during a research study is termed as research methods, which includes theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc. Research methods help researcher in selecting the samples, collecting data and find solution to the research problem. These contents of research methodology influence the outcomes and the process of conducting a research positively/negatively that shows the importance of understanding research methodology. In other words, to develop in-depth understanding towards the methods that can be used to accomplish the objectives of the research, that includes various parts such as research strategy, approach, philosophy, data collection methods, etc. research methodology is responsible that helps in determining the importance of research.

4.2. Research Design

Academic library research had frequently adopted surveys to collect data because these instruments assess effectiveness and efficiency in assisting their decisions, prioritizing services, resolve problems, and evaluate user interaction and their satisfaction. This quantitative study is designed to use the empirical and descriptive methods employing a survey research to examine the level of usage of electronic information resources among students and the faculty members of management studies. Generally, the quantitative method has been widely used in social science research because it is assumed to be constant across time and settings. The findings of the quantitative research are replicable and can be generalised to the general population of the sample used. The questionnaire survey method was employed in this research because
it allows the participants to examine the questions carefully at their own pace and to provide more reliable information. Questionnaire is a structured instrument and serves as an effective means to gather data from a potentially large number of respondents (Bryman and Bell, 2003).

As the respondents in this study consists of Post-Graduate students and faculty members who are accessible very much in their class rooms and departments respectively, the researcher was of the opinion that the personal visit would help in distribution of questionnaires and also help in collecting them. Accordingly, the researcher distributed the questionnaires to the respondents by visiting each university under study and took initiatives to observe and supplement data regarding the background information on demand by the respondents. Both primary and secondary data was collected and used for the study. Primary data was collected from students, faculty members, and from the librarians through questionnaire. Secondary data was collected from the scholarly article from reputed journals, reports, conference papers, books, websites etc.

4.3. Research Sample

The population for this study consisted of Post Graduate students and faculty members of department of Masters in Business Administration (MBA) in universities of Karnataka. An official request was made to the head of the departments in each university to circulate questionnaire to the respondents to obtain necessary data for the present study. There were about 1374 students and 128 faculty members all together in the universities under study. The population included both male and female post graduate students and faculty members in all these universities. But Karnataka State Women’s University, Bijapur constituted only female students as it is a Women’s University constituted under Karnataka State universities act.

The researcher attempted to ensure a sample that would represent the population and hence selected simple random method for the study. 50% of total strength of management departments from each university was selected randomly. Further, among the total of 1374 student respondents, 687 questionnaires were distributed and collected
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the same from them. The questionnaires were distributed to the respondents and were given enough time to go through it and respond to the questions therein. Further, the researcher also distributed 120 questionnaires among the total of 128 faculty members from all the universities and managed to collect 112 questionnaires completely filled indicating the response rate of 93.33%.

Table-4.1: Distribution of questionnaires

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the University</th>
<th>Students</th>
<th>Faculty members</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Collected</td>
</tr>
<tr>
<td>01</td>
<td>Kuvempu University</td>
<td>130</td>
<td>66</td>
</tr>
<tr>
<td>02</td>
<td>University of Mysore</td>
<td>240</td>
<td>119</td>
</tr>
<tr>
<td>03</td>
<td>Bangalore University</td>
<td>153</td>
<td>77</td>
</tr>
<tr>
<td>04</td>
<td>Karnatak University</td>
<td>114</td>
<td>58</td>
</tr>
<tr>
<td>05</td>
<td>Mangalore University</td>
<td>139</td>
<td>70</td>
</tr>
<tr>
<td>06</td>
<td>Gulbarga University</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>07</td>
<td>Davangere University</td>
<td>236</td>
<td>117</td>
</tr>
<tr>
<td>08</td>
<td>Tumkur University</td>
<td>63</td>
<td>32</td>
</tr>
<tr>
<td>09</td>
<td>Vijayanagara Sri Krishnadevaraya University</td>
<td>114</td>
<td>56</td>
</tr>
<tr>
<td>10</td>
<td>Karnataka State Women’s University</td>
<td>63</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1374</strong></td>
<td><strong>687</strong></td>
</tr>
</tbody>
</table>

4.4. Major Variables of the Study

Variables represent concepts or constructs among which there are relationships that researchers wish to study. Ary et al. (1996) defined two main types of variables, based on use, as either independent or dependent; the dependent variable is the phenomenon that is the object of study and investigation. The independent variable is the factor that is measurably separate and distinct from the dependent variable, but it may relate to the dependent variable (which is called as extraneous relationship). Many factors that may function as independent variables such as social class, home environment, classroom conditions etc are discriminable aspects of the environment. In addition, such personal characteristics as age, sex, intelligence, and motivation may be independent variables that can be related to the dependent variable.
In this study the dependent variables are the survey scores that measured the respondents experience in an electronic environment. They are derived from the qualified factors associated with the perceived utilisation of electronic resources by the students and faculty members of management studies. The major dependent variables have been derived from the following indicators:

- For what purpose respondents visit the library
- To what extent respondents use electronic information resources
- Purpose of using Internet
- Extent of problems faced in using the Internet
- Frequency of use of management databases
- Perceptions of respondents towards features associated with electronic information resources
- Factors qualifying as hindrances for using electronic information resources

One must define the variables operationally that designates some kind of overt behaviour or event that is directly observable and measurable by ones-self and other to represent those concepts. Therefore, the research questions explores here is how students and faculty members of management studies in universities use electronic resources and its relative influence of the following independent variables/factors such as age, gender, social background, qualification, designation, experience etc.

4.5. Research Instruments

The survey instrument was constructed in the form of a structured questionnaire with the supervisor’s approval after thorough examination of related research studies that identified variables considered important in the description of electronic resources and its associated utilities. The variables identified in the design of questionnaire includes use of information resources, types of electronic resources used, use of databases, electronic journals, perception on utilities of Internet and the barriers faced while using electronic resources among the users. The preference has been given to the closed ended questions as they provide the advantage of convenience to answer. A closed type question ensures
that answers given in a frame of reference that is specifically relevant to the purpose of
the study. The questionnaire was designed to ascertain the availability, accessibility and
utilisation of electronic information resources among students and faculty members of
management studies. The researcher developed two separate questionnaires i.e. one for
users and other for librarians to collect the required data for the present study.

The questionnaire was formatted in multiple answer and the respondents were
asked to respond to the questions by indicating their extent of use, frequency of use,
priority, degree of agreement or disagreement etc. The nature of response for some
question used Likert scaling technique to obtain a picture of sense the users made on the
variables related to present study. The study intended to collect data on the following
sections:

1. Demographic information of respondents.
2. Use of library and information resources.
3. Use of electronic information resources and services.
4. Use of Internet and search engines.
5. Use of databases.
6. Use of electronic journals.
7. User perceptions towards electronic information resources.
8. Problems in using electronic information resources.

4.6. Pilot Study

The pre-testing of a measuring instrument consists of trying it out on a small
number of persons with characteristics similar to those of the target group of respondents.
The pilot study must take all heterogeneous factors into consideration. It can alert a
prospective researcher to possible unforeseen problems that may emerge during the main
investigation (Strydom, 1998). In order to test the validity of the questionnaire in terms of
the efficiency of identified variables to answer the underlying research problem, the
questionnaire constructed was distributed to select respondents and experts as part of
pilot study. The purpose of the test was to verify the clarity of the questions, and modify
them based on feedback received. As such, the researcher tested the questionnaire by
undertaking the pilot study at Bangalore University and Kuvempu University. The feedback was successful. Based on the comments and the suggestions voiced out by the respondents particularly by faculty members during the pilot study, the researcher made appropriate changes and improvised the questionnaire with clear guidelines from the experts and the supervisor. The supervisor then reviewed the revised questionnaire to ensure readability and verified the content validity.

4.7. Data Tabulation for Statistical Analysis

All the data gathered from the responses to the questionnaire is numerically coded and then entered on to a spreadsheet which was then imported into and analyzed using Statistical Packages for Social Sciences (SPSS) v.19 for Windows to develop descriptive and inferential statistics. Following the survey data analysis procedure shown in Figure-3.1, the first step was to prepare the data for analysis. After importing the CSV-format file into SPSS, variables were defined for each of the single-choice questions. Separate variables were prepared for multiple choice questions, so each of them had to be a separate variable as there is possibilities of respondents marking all the choices.

![Figure- 4.1: The procedure for tabulating survey data for analysis](image)

In addition to defining the variables, the results of the questionnaire responses had to be converted into numerical codes. A Likert scale was used to record the extent/frequency of use of electronic resources and the rating scale comprising with three-four-five point categories. Five-point Likert-scale responses were used to code the
attitude statements of impacting factors, ranging from ‘2’ indicating ‘strongly agree’, ‘1’ as ‘agree’, ‘0’ as ‘uncertain’, ‘-1’ as ‘disagree’ and ‘-2’ as ‘strongly disagree’. Similarly, in other some other cases the range of categories starts from ‘4’ indicating ‘most frequently/greater extent’ and ‘-1’ indicating ‘not at all/do not use’. For categorical variables, a whole number was assigned to each category. For example, the age of respondent fell into any of four categories, with ‘1’ assigned to the category of ‘20 to 29 years’ and ‘4’ to the category of ‘50 years and above’. For multiple-choice questions, as it is said, each option was treated as a single variable with ‘1’ indicating ‘Yes’ (selected) and ‘2’ indicating ‘No’ (not selected). Then the findings were synthesised and presented in figures, tables and narrative form. Survey data were explored by comparing their specific value and interdependence, highest and lowest values, totals, proportions, and distributions. The survey data were analyzed using descriptive statistics to obtain a demographic snapshot of respondents. Cross-tabulation was employed to identify the relationship among the user demographic characteristics with purpose, frequency, problems and perceptions of electronic information resources. Chi-square tests were carried out to determine if there were statistically significant relationships between variables and their use and non-use of electronic resources. Tables and charts were used to present the data.

4.8. Statistical Tools for Data Analysis

In order to test the objectives and the formulated hypothesis the researcher used some basic standard statistical tools such as percentages, weighted averages, and chi-square test.

4.8.1. Percentage

As absolute figures are unfit for relative study and in statistical analysis where most of the data is compared relatively, percentages have been used for the study to evaluate relativity. A percentage is a fraction whose denominator (base) is 100. These are simple derivations obtained by a combination of two or more figures. In calculation of percentage one figure is taken as base and the other figure is expressed as ratio of the base.
4.8.2. Weighted Average

An average in which each quantity to be averaged is assigned a weight. These weightings determine the relative importance of each quantity on the average. Weightings are the equivalent of having that many like items with the same value involved in the average.

In the calculation of simple average, each item of the series is calculated equally important. But there may be cases where all items may not have equal importance. Some of them may be comparatively more important than the other. If an average has to maintain its representative character, it should take into account the relative importance of the different items from which it is calculated.

In calculating the Weighted Average of Arithmetic Average, each value of the variable is multiplied by its corresponding assigned weights and the products so obtained are aggregated. This is divided by the weights and the resulting figures are the weighted arithmetic averages.

Symbolically:

$$\bar{X}_w = \frac{X_1W_1 + X_2W_2 + X_3W_3 + \cdots + X_nW_n}{W_1 + W_2 + W_3 + \cdots + W_n}$$

Where, $\bar{X}_w$ stands for the weighted arithmetic average. $X_1, X_2, X_3$ etc..., for the values of the variable and $W_1, W_2, W_3$ etc..., for the respective weights.

4.8.3. Chi-Square test

Chi square test is one of the simplest test used for testing the association between the variables and is widely used in non-parametric tests in statistical work.

It is denoted by $\chi^2$, and expressed as:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where, $\Sigma$ refers to summation, $O$ refers to observed value, $E$ refers to expected value of observations. For testing the hypothesis, the investigator had fixed level of significance at 5%.
The following are steps followed to arrive at $\chi^2$

a. Take the difference between observed values and expected values using the formula,

$$E = \frac{(\text{Row total} + \text{column total})}{\text{Total number of observations}}$$

b. Take the difference between observed values and expected values of and square them to obtain the values $(O-E)^2$.

c. Divide the value of $(O-E)^2$ by the corresponding expected frequencies and obtain the total of $\Sigma (O-E)^2 / E$. This is the calculated value of chi-square.

d. The calculated value of chi-square is compared with table value at 5% level of significance. If the calculated value of chi-square is greater than the table value then the difference between the theory and observation is considered to be significant. It could not have arisen due to fluctuations of sampling.

On the other hand, if the calculated value of chi-square is less than the table value, then the difference between the theory and observation is not considered to be significant. It may be due to fluctuations of sampling and hence ignored.

4.8.4. The F-test or the variance ratio test

The F-test is named in honour of the great statistician R.A. Fisher. The object of the F-test is to find out whether the two independent estimates of population variance differ significantly, or whether the two samples may be regarded as drawn from the normal population having the same variance. For carrying out the test of significance, we calculate the ratio $F$ defining as:

$$F = \frac{s_1^2}{s_2^2}$$

Where

$$s_1^2 = \frac{(x_1 - \bar{x}_1)^2}{n_1 - 1}$$

and

$$s_2^2 = \frac{(x_2 - \bar{x}_2)^2}{n_2 - 1}$$

$S_1^2 > S_2^2$
It should be noted that $s_1^2$, is always the larger estimate of variance, i.e., $s_1^2 > s_2^2$
or

$$F = \frac{\text{Larger estimate of variance}}{\text{Smaller estimate of variance}}$$

$$V_1 = n_1 - 1 \quad V_2 = n_2 - 1$$

$V_1$ = degrees of freedom for sample having larger variance

$V_2$ = degrees of freedom for sample having smaller variance.

The calculated value of $F$ is compared with the table value for $V_1$ and $V_2$ at 5% or 1% level of significance. If calculated value of $F$ is greater than the table value then the $F$ ratio is considered significant and the null hypothesis is rejected. On the other hand, if the calculated value of $F$ is less than the table value, the null hypothesis is accepted and it is inferred that both the samples have come from the population having same variance.

Since $F$ test is based on the ratio of two variances, it is also known as the variance ratio test. The ratio of two variances follows a distribution called the $F$ distribution named after the famous statistician R.A. Fisher.

References

