METHODOLOGY

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METHODOLOGY

4.1. INTRODUCTION

Methodology refers to the totality of procedures followed by the investigator to make the study scientific and valid to the maximum extent possible. The success of any research depends on the method adopted and the tools and techniques used for data collection and analysis. The nature of the problem and kind of data needed for its solution determines the method of the study.

The present study is an attempt to find out the impact of Information and Communication Technology (ICT) in information seeking and enrichment of researchers in the universities of Kerala. The methodology followed for the study is described under the following headings.

1. Variables used for the study
2. Objectives of the study
3. Hypotheses of the study
4. Selection of sample
5. Tools and methods used for data collection
6. Data collection procedure
7. Consolidation of the data
8. Statistical techniques used in the study
4.2. VARIABLES USED FOR THE STUDY

Variables used in this study are of two types, viz; classificatory variables and study variables.

4.2.1. Classificatory Variables

Two classificatory variables are used for the study. They are universities selected for the study and subject background of the researchers.

4.2.1.1. Universities Selected for the Study

Four major general universities in Kerala were selected for the study. They were University of Kerala (U.K), Thiruvananthapuram, University of Calicut (U.C), Calicut, Mahatma Gandhi University (M.G.U), Kottayam and Cochin University of Science and Technology (CUSAT), Cochin. Though in its inception, CUSAT was an exclusive university for science and technology, later it enhanced its scope into non-science fields also. The other two general universities, Sri Sankara University of Sanskrit and Kannur University are in the growing stage. All other universities are special universities concerned with a specified subject of studies. So the investigator selected these four major universities for the study.

4.2.1.2. Subject Background of the Researchers

Subject background of the researchers are categorized as science and non-science. Since there is diversity in subjects, and the perception of researchers may vary according to their subject background, it was decided to divide the samples broadly in to two strata as science and non-science. Since the perception of the researchers in the field of social science and humanities are similar in several aspects, the investigator grouped them into one group viz, Non-Science. The criterion used for the broad categorization of the subjects is according to the Colon Classification scheme 6th edition by which
A-L (Science to Medicine) fall under science category and M-Z (Useful arts to Law) under non-science which places the subjects in a logical sequence. Moreover efforts were made to ensure that there are adequate number of researchers from the both fields which is the representations of the total science and non-science population.

4.2.2. Study Variables

The following are the study variables used for the collection of data.

a) Use of ICT based information resources/ devices/ tools
b) Frequency of use of ICT based information resources/ services
a) Application and impact of Internet
b) Application and impact of social networking sites
c) Infonet and its applications
d) Searching methods in ICT based resources/services
e) ICT application in libraries
f) Changes that ICT brought in the research process and Reading habit
g) Technostress
h) User Education/Training and workshops

4.3. OBJECTIVES OF THE STUDY

The following are the objectives of the study

4.3.1. To identify and evaluate contemporary utilization of Information and Communication Technology (ICT) resources and services for information seeking and enrichment by researchers in the universities of Kerala.
4.3.2. To identify and ascertain Information and Communication Technology (ICT) skill and expertise of the researchers in the universities of Kerala.

4.3.3. To compare the extent of use of Information and Communication Technology (ICT) based resources and services by the different categories of researchers in the universities of Kerala.

4.3.4. To find out the attitude and level of satisfaction of researchers in the applications of Information and Communication Technology (ICT) for their information requirement.

4.3.5. To examine the various impacts of Information and Communication Technology (ICT) in information gathering and its enrichment by the researchers in the universities of Kerala.

4.3.6. To identify the extent of technological stress (Technostress) among the researchers and methods used by them to cope up with it.

4.3.7. To identify and analyze the hindrances faced by the researchers while using Information and Communication Technology (ICT) resources/tools/services during their information gathering.

4.3.8. To examine the adequacy of training, orientation programmes and workshops on Information and Communication Technology (ICT) resources/tools/services provided by the universities and to identify the specific areas which is to be incorporated in these programmes.

4.3.9. To suggest measures for the improvement of the existing Information and Communication Technology (ICT) resources and services available in the universities of Kerala.
4.4. HYPOTHESES OF THE STUDY

4.4.1 The utilization of Information and Communication Technology (ICT) facilities by the researchers in the universities of Kerala is not satisfactory.

4.4.2 Researchers are not fully satisfied with the present Information and Communication Technology (ICT) based resources /tools/services for their information seeking and enrichment.

4.4.3 Researchers are much benefited by the use of various ICT based resources/tools/services in relation to their research work.

4.4.4 The Information and Communication Technology resources and services available in the university libraries of Kerala are not effectively exploited by the researchers for gathering and utilizing information.

4.4.5 Science researchers effectively make use of ICT based resources and services more than that of non-science researchers.

4.4.6 There exist a significant difference among the researchers of different universities and between the subjects regarding the utilization of various Information and Communication Technology (ICT) based resources, tools and services.

4.4.7 There exist a significant difference among the researchers in different universities and between the subjects regarding the purpose of conducting searches, different search methods used and the use of advanced search methods in ICT based information resources and services.
4.4.8. Application of Information and Communication Technology (ICT) based resources and services make a significant change in the reading habit of the different categories of researchers in the universities of Kerala.

4.4.9. Proliferation of Information and Communication Technology (ICT) has created technostress among the researchers in the universities of Kerala and it affects the overall research activity.

4.4.10. Researchers are not provided with adequate training programmes in Information and Communication Technology (ICT) based resources, tools and operations in the universities of Kerala.

4.5. SELECTION OF SAMPLE

The present study is intended to find out the Impact of Information and Communication Technology (ICT) for information seeking and enrichment of researchers in the universities of Kerala. It is not possible to study the entire population and to arrive at a generalization if the population is large. If the sample drawn is perfectly a representative, and if it is identical with its parent population almost in every respect then it is possible to draw valid inferences or generalizations (Parasuraman, Zeithaml & Berry, 1998). The population of the study is the full time researchers of four major universities in Kerala and the universities selected for the study are University of Kerala, Thiruvananthapuram, University of Calicut, Calicut, Mahatma Gandhi University, Kottayam and Cochin University of Science and Technology, Kochin. The population for the study consists of the total researchers in these four universities in Kerala. The actual number of full time researchers in the departments of these four universities in Kerala was identified from the official records maintained in each department over the period of 2009-10. Also the investigator conducted discussions with the authorized department
staff wherever the clarification was required. After the thorough examination of these records it was found that the number of full time researchers in these four universities in Kerala were 1408. Out of these 1408 full time researchers, 621 were from science and 787 from non-science background. The total number of researchers from the four universities under study is given in Table. 4.1.

**TABLE 4.1**

*Distribution of Researchers in the Universities in Kerala (Subject-wise)*

<table>
<thead>
<tr>
<th>Subject Background</th>
<th>University of Kerala</th>
<th>University of Calicut</th>
<th>M.G University</th>
<th>CUSAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>172 (32.51)</td>
<td>163 (37.64)</td>
<td>81 (38.21)</td>
<td>205 (87.61)</td>
<td>621 (44.11)</td>
</tr>
<tr>
<td>Non-Science</td>
<td>357 (67.49)</td>
<td>270 (62.36)</td>
<td>131 (61.79)</td>
<td>29 (12.39)</td>
<td>787 (55.89)</td>
</tr>
<tr>
<td>Total</td>
<td>529 (100)</td>
<td>433 (100)</td>
<td>212 (100)</td>
<td>234 (100)</td>
<td>1408 (100)</td>
</tr>
</tbody>
</table>

Table 4.1 shows that total population of the study consists of 1408 researchers from the four universities in Kerala. Out of the 1408 researchers, 55.89 per cent are from non-science subjects and 44.11 per cent are from science subjects.

The graphical representation of the distribution of total researchers in the universities in Kerala is given in Figure 4.1.
4.5.1. SAMPLE SIZE

Eight hundred questionnaires were distributed among the researchers in the four universities of Kerala. Multi stage stratified random sampling technique was used to ensure representation of all of the categories of researchers. Out of the 800 questionnaires distributed, duly filled 728 questionnaires were received. Hence, these 728 questionnaires were selected as the baseline sample data for the study. For the selection of sample size, the investigator used a sample formula of Creative Research System of American Marketing Association (http://www.surveysystem.com/).
The formula used for calculating sample size is:

\[ SS = \frac{Z^2 \times (p) \times (1-p)}{c^2} \]

Where:

- **SS** = Sample Size
- **Z** = Z value (e.g. 1.96 for 95% confidence level)
- **p** = Percentage picking a choice, expressed as decimal (.5 used for sample size needed)
- **c** = confidence interval, expressed as decimal (e.g., .04 = ±4)

Using this formula the minimum sample size to be selected for the study is 607 in 99 per cent confidence level and confidence interval 3. Hence 728 samples selected for this study is sufficient and accurate for getting valid inferences and generalizations. The breakup of the sample is presented in Table 4.2 to Table 4.6.
4.5.2. BREAKUP OF THE SAMPLE

4.5.2.1. University-wise Distribution of the Sample

Distribution of samples selected from the universities is given in Table 4.2.

**TABLE 4.2**

*University-wise Distribution of the Sample*

<table>
<thead>
<tr>
<th>Name of the University</th>
<th>Sample Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Kerala (U.K)</td>
<td>275</td>
<td>37.77</td>
</tr>
<tr>
<td>University of Calicut (U.C)</td>
<td>218</td>
<td>29.95</td>
</tr>
<tr>
<td>Mahatma Gandhi University(M.G.U)</td>
<td>112</td>
<td>15.38</td>
</tr>
<tr>
<td>Cochin University of Science and Technology (CUSAT)</td>
<td>123</td>
<td>16.90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>728</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.2 reveals that a total of 728 samples were selected for the study in which 37.77 per cent of the samples were from Kerala University, 29.95 per cent from Calicut University, 15.38 per cent from Mahatma Gandhi University and 16.90 per cent from CUSAT.

The diagrammatic representation of the percentage distribution of university-wise sample is given in Figure 4.2.
4.5.2.2. Subject-wise Distribution of the Sample

Breakup of the samples according to the subject background is given in Table 4.3.

### TABLE 4.3

**Subject-wise Distribution of the Sample**

<table>
<thead>
<tr>
<th>Subject Background</th>
<th>University of Kerala</th>
<th>University of Calicut</th>
<th>M.G University</th>
<th>CUSAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>87 (31.64)</td>
<td>83 (38.07)</td>
<td>44 (39.29)</td>
<td>105 (85.37)</td>
<td>319 (43.82)</td>
</tr>
<tr>
<td>Non-Science</td>
<td>188 (68.36)</td>
<td>135 (61.93)</td>
<td>68 (60.71)</td>
<td>18 (14.63)</td>
<td>409 (56.18)</td>
</tr>
<tr>
<td>Total</td>
<td>275 (100)</td>
<td>218 (100)</td>
<td>112 (100)</td>
<td>123 (100)</td>
<td>728 (100)</td>
</tr>
</tbody>
</table>
Table 4.3 shows that 56.18 per cent of samples belong to the non-science category and 43.82 per cent of samples were from the science field. While selecting the samples, the investigator had taken proportionate samples from each category i.e.; science and non-science subjects.

The pictorial representation of subject-wise distribution of the researchers selected from various universities is given Figure 4.3.

**FIGURE 4.3**

*Subject-wise Distribution of the Sample*
4.5.2.3. Age-wise Distribution of the Sample

Age-wise distribution of the sample selected from various universities is given in Table 4.4.

**TABLE 4.4**

*Age-wise Distribution of the Sample*

<table>
<thead>
<tr>
<th>Age Range</th>
<th>University of Kerala</th>
<th>University of Calicut</th>
<th>M.G University</th>
<th>CUSAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>57 (20.73)</td>
<td>54 (24.77)</td>
<td>32 (28.57)</td>
<td>26 (21.14)</td>
<td>169 (23.21)</td>
</tr>
<tr>
<td>25-30</td>
<td>177 (64.36)</td>
<td>131 (60.09)</td>
<td>66 (58.93)</td>
<td>86 (69.92)</td>
<td>460 (63.19)</td>
</tr>
<tr>
<td>31-35</td>
<td>31 (11.27)</td>
<td>27 (12.39)</td>
<td>10 (8.93)</td>
<td>9 (7.32)</td>
<td>77 (10.58)</td>
</tr>
<tr>
<td>36-40</td>
<td>6 (2.18)</td>
<td>6 (2.75)</td>
<td>2 (1.79)</td>
<td>2 (1.63)</td>
<td>16 (2.20)</td>
</tr>
<tr>
<td>&gt;41</td>
<td>4 (1.45)</td>
<td>0 (0.00)</td>
<td>2 (1.79)</td>
<td>0 (0.00)</td>
<td>6 (0.82)</td>
</tr>
<tr>
<td>Total</td>
<td>275 (100)</td>
<td>218 (100)</td>
<td>112 (100)</td>
<td>123 (100)</td>
<td>728 (100)</td>
</tr>
</tbody>
</table>

Table 4.4 shows that majority of researchers (63.19 per cent) are within the age group of 25-30. Among the respondents 23.21 per cent are below 25 years and 10.58 per cent are within the age group of 31-35. Only a few of them are above 41 years of age.

The graphical representation of the age-wise distribution of samples selected from various universities is given in Figure 4.4.
4.5.2.4. Gender-wise Distribution of the Sample

Gender-wise distribution of the sample selected from various universities is given in Table 4.5.

**TABLE 4.5**

**Gender-wise Distribution of the Sample**

<table>
<thead>
<tr>
<th>Gender</th>
<th>University of Kerala</th>
<th>University of Calicut</th>
<th>M.G University</th>
<th>CUSAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>99 (36.00)</td>
<td>48 (22.02)</td>
<td>39 (34.82)</td>
<td>48 (39.02)</td>
<td>234 (32.14)</td>
</tr>
<tr>
<td>Female</td>
<td>176 (64.00)</td>
<td>170 (77.98)</td>
<td>73 (65.18)</td>
<td>75 (60.98)</td>
<td>494 (67.86)</td>
</tr>
<tr>
<td>Total</td>
<td>275 (100)</td>
<td>218 (100)</td>
<td>112 (100)</td>
<td>123 (100)</td>
<td>728 (100)</td>
</tr>
</tbody>
</table>
The analysis shows that majority of respondents (67.86 per cent) are female and only 32.14 per cent of the total samples are male. Female dominates in number in all the universities under study compared to males.

The pictorial representation of gender-wise distribution of the researchers selected from various universities is given in Figure 4.5.

**FIGURE 4.5**

*Gender-wise Distribution of the Sample*
4.5.2.5. Stage of Research Work-wise Distribution of the Sample

Stage of research work-wise distribution of the sample selected from the various universities are given in Table 4.6.

**TABLE 4.6**

<table>
<thead>
<tr>
<th>Stages of Research</th>
<th>University of Kerala</th>
<th>University of Calicut</th>
<th>M.G University</th>
<th>CUSAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning</td>
<td>112 (40.73)</td>
<td>60 (27.52)</td>
<td>48 (42.86)</td>
<td>28 (22.76)</td>
<td>248 (34.07)</td>
</tr>
<tr>
<td>Data Collection</td>
<td>77 (28.00)</td>
<td>113 (51.83)</td>
<td>32 (28.57)</td>
<td>43 (34.96)</td>
<td>265 (36.40)</td>
</tr>
<tr>
<td>Analysis</td>
<td>57 (20.73)</td>
<td>35 (16.06)</td>
<td>25 (22.32)</td>
<td>38 (30.89)</td>
<td>155 (21.29)</td>
</tr>
<tr>
<td>Report writing</td>
<td>29 (10.55)</td>
<td>10 (4.59)</td>
<td>7 (6.25)</td>
<td>14 (11.38)</td>
<td>60 (8.24)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>275 (100)</td>
<td>218 (100)</td>
<td>112 (100)</td>
<td>123 (100)</td>
<td>728 (100)</td>
</tr>
</tbody>
</table>

Table 4.6 gives the information that 36.40 per cent of researchers are at the data collection stage and 34.07 per cent of researchers are only at the initial stage of their research work. It also shows 21.29 per cent of researchers are at the analysis stage and a few of them are at the report writing stage (8.24 per cent).

The diagrammatic representation of the distribution of sample based on stages of research is given in Figure 4.6.
4.6. TOOLS AND METHODS USED FOR DATA COLLECTION

Appropriate tools and methods are necessary for collecting the required data. Hence constructing tools and methods are an important task for an investigator. In the present study, the investigator, with the help of the guide and experts has constructed the appropriate tools and methods for collecting data.

The sources of data used in this study are:

- Questionnaire administered to the researchers in the four universities in Kerala to solicit information about the use and impact of Information and Communication Technology (ICT) for information seeking and enrichment. A specimen questionnaire is given in Appendix.
Discussion with the heads/in charge of the various sections of the universities including libraries, Internet and Infonet centres and the head of the departments.

Personal observation of the use of ICT based information resources/services/tools by the researchers in these universities

A thorough study of related literature on the subject.

4.6.1. Questionnaire

The questionnaire is the most popular instrument for collecting the required data. The investigator structured a questionnaire and distributed among the researchers for collecting the required data. The questions were designed after consultation with experts and pre-tested before the final use.

This questionnaire has eleven sections. Section A, which has seven subdivisions dealing with the general information of the researchers, such as name of the university, name of the researcher, subject, gender, age, duration of the research and stages of the research.

Section B contains two questions related to the use of ICT based information resources/devices/tools/services and its frequency of use. Here the respondents have to indicate whether they have used any ICT based resources and services. In the second question four category of ICT based resources are listed and the respondents have to indicate the frequency of the use of these major ICT based resources.

Section C consists of twelve questions related to the Internet. It mainly consists of questions relating to the use of various tools in Internet, purpose of use, sources for getting latest information about websites, level of satisfaction,
various impact of Internet on the research activity and hindrances faced by them while using the Internet.

Section D consists of six questions relating to the use of Infonet and its impact in the research activity. Satisfaction of the researchers with available information in Infonet, the reasons for their dissatisfaction, sufficiency of terminals provided etc. were asked.

Section E deals with questions relating to social networking sites, and its use and impact in researchers. This section contains six questions, regarding the awareness of social networking sites, frequency of use of social networking sites, types of information communicated through these sites, whether it is helpful for the research and main problems faced while using these sites.

Section F consists of three questions relating to the information search pattern. This includes purpose of conducting searches, frequency of use of various search methods and use of the advanced search methods.

Section G deals with six questions relating to ICT application in the university libraries. Various aspects of ICT application in the university libraries and researchers opinions are enquired here.

Section H deals with five questions relating to the changes that ICT has brought in research world and reading habits of the researchers. It mainly consists of questions relating to the changes that ICT brought in the research process, reading habit of printed documents, shift from printed to electronic resources and preference of reading.

Section I consists of eight questions regarding the technological stress due to the prolonged use of ICT based resources and services. It include various feelings of researchers while using ICT based resources,
psychological and physical outcomes of technostress, major external and internal factors of technostress, and strategies used by the researchers for coping with the technostress.

Section J deals with seven questions relating to the user education/training in the ICT based resources and services. It mainly consists of questions relating to the computer education attained by the researchers, sufficiency of the attained computer education by them, seeking assistance from staff, opinion regarding existing user education/training programmes, need of more training programmes and the areas that they want to incorporate in the training programmes.

Section K deals with an open question to the researchers for their valuable suggestions to improve the ICT based information resources and services available in the universities.

4.6.2. Personal Observation

The investigator visited all the universities under study for the personal observation of the use of various ICT based resources and services by the research community.

4.6.3. Related Literature

In order to get an idea about similar studies conducted in the present research area an exhaustive literature search was carried out. For this, many primary periodicals, online journals, online databases, secondary periodicals like LISA and its CD Version LISA Plus, bibliographies etc. were consulted. The review assisted the investigator to identify previous and present research projects and has provided valuable knowledge for the understanding of the theoretical and methodological issues surrounding the use of ICT and its impacts in information seeking behavioral studies.
4.7. DATA COLLECTION PROCEDURE

For the present study the investigator has taken 728 sample researchers from four universities in Kerala. The investigator already conducted this study in two universities in Kerala viz. Calicut University and Mahatma Gandhi University as part of the M.Phil programme. On the basis of the result and discussion with the experts, investigator made some modification in the questionnaire and method of data collection. Investigator visited all the university departments and sought permission from the head of the departments for distributing questionnaires among the researchers in these departments. After making necessary copies of the questionnaires, the investigator met the researchers in person from their concerned departments. Necessary discussion were made with them and some of them asked more time to fill the questionnaires and self addressed stamped envelopes were given for them. A very few of the researchers responded through email. Most of the researchers responded positively by filling up and returning the questionnaires. The responses were encouraging. A total 800 questionnaires were distributed among the researchers in four universities in Kerala, among which 769 questionnaires were received back. Out of the 769 questionnaires returned, 728 questionnaires were correctly filled indicating various use of ICT and was analyzed statistically using SPSS (Statistical Package for Social Science).

4.8. CONSOLIDATION OF THE DATA

The data collected through questionnaires were obtained and percentage of responses arrived from the questionnaires were consolidated. Data pertaining to classificatory and study variables were consolidated separately by using spread sheet package MS-Excel. The data were then subjected to further statistical treatment by using SPSS package, version 17.
4.9. STATISTICAL TECHNIQUES USED

The statistical analysis of data was done with the help of computers. Tables and diagrams with frequencies and percentages were drawn to exhibit the relevant data. Detailed analysis were made from three angles

1. General analysis, consisting the whole sample
2. University-wise analysis
3. Subject-wise analysis

Various statistical techniques are used at the different stages of the study to draw valid conclusions. They are:

1. Percentage Analysis
2. Chi-square Test: Chi-square test is used to find out whether there exists any association between variables using the formula (Ferguson, 1976) \[ \chi^2 = \sum \frac{(O-E)^2}{E} \]

\( O \) = Observed Frequency
\( E \) = Expected Frequency

The quantity Chi-square describes the magnitude of the discrepancy between theory and observation. The expected frequencies are computed based on a hypothesis H0. If the computed value is greater than critical value, H0 is rejected because the observed frequencies differ significantly from the expected frequencies. Otherwise, accept it or at least not reject it. This procedure is called Chi-square test of hypotheses or significance. If Chi-square is greater than zero they do not agree exactly. The larger the value of Chi-square, the greater is the discrepancy between the observed and expected frequencies.
4.10. CONCLUSION

Keeping in view the objectives of the study interpretations were made through analysis. The findings were compared with the hypotheses to assess its tenability. Based on the analysis, suggestions for improving ICT based resources and services for the benefit of researchers and suggestions for further research have been given.
REFERENCES

