RESEARCH METHODOLOGY
CHAPTER III RESEARCH METHODOLOGY

This chapter deals with the research methods and techniques used for the study. The chapter has been organised under the following heads:

3.1. Selection of Research Institute
3.2. Selection of sample for the study
3.3. Respondents of the study
3.4. Construction of the job satisfaction scale
3.5. Collection of job satisfaction statements
3.6. Classification of the items
3.7. Instrument of observation
3.8. Testing reliability and validity of the job satisfaction scale
3.9. Pre-testing
3.10. Administration of scale
3.11. Data collection
3.12. Distribution of respondents according to the nature of work
3.13. Statistical processing of the data
3.14. Scoring key
3.1 **Selection of Research Institute**

The study was conducted on the scientists of National Dairy Research Institute at Karnal and its three Regional stations at Bangalore, Bombay and Kalyani. It is the largest institute in dairying not only in India but in whole of Asia. The selection was based on the considerations that it is a National Institute with a fairly large strength of scientific staff (200) with a standing of about half a century. The fact that the author is on the staff of the institute was another strong and cogent reason for choosing this institute for investigation. This facilitated rapport with the respondents to gather data truthfully.

The Institute's main activities are teaching, research and extension work in the field of dairying. Teaching is conducted both at the undergraduate and postgraduate levels. At the undergraduate level, B.Sc. degree in Dairy Technology is awarded while at the postgraduate level M.Sc. degree in 14 disciplines is given. These disciplines are: Dairy bacteriology, Quality control, Dairy chemistry, Animal biochemistry, Animal physiology, Animal nutrition, Animal genetics, Livestock production, Forage production, Human nutrition and dietetics, Dairy technology, Dairy economics, dairy extension and Dairy engineering. Ph.D. degree based on research work
in any of these subjects to be submitted in the form of a thesis is also awarded. The coordination of teaching programmes is done by the Division of Dairy Training (Dairy Science College) which is headed by a Principal. In its task, the Dairy Science College is assisted by more divisions. These are Divisions of Dairy Bacteriology, Dairy Chemistry, Human Nutrition and Dietetics, Dairy Cattle Nutrition and Physiology, Dairy Cattle Genetics and Breeding, Dairy Technology, Dairy Economics, Statistics and Management, Dairy Extension and Dairy Engineering. Besides teaching, the personnel in these divisions also conduct research work in their respective areas of interest.

The Institute keeps a liaison with the industry and the farmers to help solve the problems facing them. It renders advisory service for indigenous dairy products developed at the institute and supplies semen for cross breeding work under the intensive cattle development programme. For greater extension of its activities, it brings out brochures, newsletter, lay publications in Hindi and English. Short courses, Dairy Mela, exhibitions and film shows are also organised round the year.
3.2 Selection of sample for the study

The Indian Council of Agricultural Research Institute at New Delhi is the apex body which governs about 30 research institutes in the field of agriculture, animal sciences and fisheries. Scientific personnel numbering approximately 10,000, though possessing varied qualifications and experience, are governed by the same service rules and very similar working conditions and research atmosphere. Though the present study dealt with the scientists of National Dairy Research Institute, it, in author's opinion, will be equally applicable to the scientists of other ICAR institutes which thus serves the universe for the results obtained.

3.3 Respondents of the study

All the regularly employed staff members of the National Dairy Research Institute at Karnal and its three regional stations at Bangalore, Bombay and Kalyani who had been employed for at least one year constituted the sample of the study. There were 162 males and 3 female scientists. One hundred and eighty seven questionnaires were sent. Out of these one hundred and sixty five, duly filled in, were received back thus giving a rate of response of 88 per cent. The date of birth was not revealed by some of the respondents but it was considered important and was, therefore, obtained in such cases from the Seniority list maintained in the office record.
3.4 Construction of the job satisfaction scale

A rating scale was developed to measure the job satisfaction of scientists using Likert Summated Rating Technique as described by Edwards (1957).

3.5 Collection of job satisfaction statements

A large number of statements concerning job satisfaction were collected from various sources including review of literature and informal discussions with the professionals in the field.

3.6 Classification of the items

A list of various aspects included in various scales as discussed and reported by Pestonjee (1973), Pelz and Andrews (1966), Schneider and Snyder (1975) was prepared on the basis of different job aspects included by them. These are: facilities, interpersonal communication, accomplishment, status, autonomy, supervision, nature of work, general policy, promotion, salary, job security, recognition. In the present study, some of these aspects were merged together and the items on the questionnaire were grouped after discussion with a panel of Social Scientists. The following modified items were finally selected for the job satisfaction questionnaire.
Research performance variables

(I) Rationality in the selection of research problem

It referred to the determining factors in case of scientists for selecting problems for research. Four alternative situations were presented which were quantified according to the weightage decided by the judges. Two way scoring was done for each statement. Maximum score could be fifty.

(ii) Sources of selection of research problem

It referred to the quantification of data on the contribution of sources which enable scientists to take up a research problem. Seven sources were listed and weightage to each of the source ranging from one to seven was assigned. Two way scoring was done. Maximum score could be 140.

(iii) Publication

It referred to the research performance of the scientists in the form of papers published in the past five years. A weightage was given for each publication.

Personal traits

(1) Pay scale

Six pay scales were listed ranging from Rs. 1500-2500
to Rs. 425-700.

(11) **Area of specialisation**

Different fields of specialisation like dairy science, pure sciences, veterinary sciences, agricultural sciences, social sciences and any other were listed.

(iii) **Age**

The actual age of the respondents was recorded.

(iv) **Experience in the Institute**

A scale ranging from less than one year to twenty five years or more was given in terms of class intervals.

(v) **Education**

The qualifications of respondents in terms of Ph.D., M.Sc., B.Sc., Indian Dairy Diploma or any other diploma were listed.

(vi) **Weekly hours**

The number of hours put in work by the respondents were recorded.

**Job satisfaction variables**

(i) Institutional participation

(ii) Environment

(iii) Recognition

(iv) Affiliation

These variables are explained under 3.8, Instrument of observation.

On the basis of the above variables, a conceptual Model for the study was framed (Fig. 3.1.).
FIG. 3-1 CONCEPTUAL MODEL FOR PATH ANALYSIS.
Instrument of observation

There were in all 39 items concerning job satisfaction. These items were classified into four categories depending on the specific aspects of the organisation they referred to. These four components of the job satisfaction are briefly explained here under:

Institutional participation

It refers to the administrative provision of the institution to encourage and permit participation of the employees in the affairs of the institution. It has been measured in terms of the extent to which democracy is allowed to prevail in the institution, supervisory satisfaction, job incentives and interpersonal relations between the employees. Since there are sixteen items and each item was rated on a five point scale, the maximum possible score of any respondent could be 80 and minimum 16.

Environment

Work environment refers to congeniality of the working atmosphere prevalent in the organisation. It has been operationalised in terms of "we feeling" among the staff, trust in each other "team spirit", achievement oriented climate and
mutual help for development and growth. The maximum and minimum possible scores could be 65 and 13, respectively.

**Recognition**

The word recognition means to receive praise, respect and prestige. In the present study, respondents feelings whether he felt or did not feel respected for his worth as an individual were recorded. The maximum possible and minimum score could be 15 and 3.

**Affiliation**

The term affiliation means connection or association. Affiliation is the individual's need to draw near and enjoyably cooperate with another to form friendship and remain loyal. In the study under report, scientists feeling of belongingness and their affinity with the work and workplace was measured through this item. The maximum and minimum score could be 20 and 5.

3.9 **Testing reliability and validity of the job satisfaction scale**

**Reliability**

Among the various techniques of measuring reliability, the
split half method being the most convenient was used. The procedure applied to split the test into two halves was by making two sets of scores by combining alternate items in the test (Y₁ to Y₄).

The first set of scores represented performance of eight scientists on the odd numbered items 1, 3, 5, 7 etc. and the second set of scores performance of the same eight scientists on the even numbered items 2, 4, 6, 8 etc. The correlation was worked out for these two half tests with the product moment Coefficient of Correlation Technique. The coefficient by the Pearson product moment formula was found to be .846 which is significant at .01 level of significance. From the correlation of the half test, the self correlation of the whole test test was estimated by the Spearman-Brown prophecy formula as given below:

\[
rtt = \frac{2\text{roe}}{1 + \text{roe}}
\]

where \( rtt \) = reliability coefficient  
\( \text{roe} \) = correlation between odd and even items.

The reliability coefficient for the entire scale was found to be .92 which is quite high signifying that the scale had a high internal consistency.
Validity scale

The items for the construction of job satisfaction scale were collected by content analysis of a large volume of literature and talks with the experts in the field, research workers who had done similar work at Sri Ram Centre for Industrial Relations, Delhi. Thus, it was ensured that the entire spectrum of both positive and negative statements regarding job satisfaction aspects were covered. Therefore, there was genuine ground to believe that the job satisfaction scale had adequate content validity.

3.9 Pretesting

The cyclostyled questionnaire was administered on a sample of 25 scientists of a non-sample institute, i.e. Central Soil Salinity Research Institute at Karnal for adjudging its applicability. This led to some modifications in the original questionnaire which was finally got printed (A cyclostyled copy of questionnaire is attached in in the Appendix as the printed questionnaires are out of stock).

3.10 Administration of scale

All questionnaires were intended to be filled personally.
However, this was not feasible because of the sample being in three regional stations. The questionnaires, however were got filled personally at Karnal but were mailed to the regional stations under code numbers. No respondent was supposed to disclose his identity by writing his name on the questionnaire.

Data collection

The entire data were collected within nine months. The completion of questionnaire required about 30-45 minutes. Instructions were given for each item and the subjects were asked to rate themselves on each of the statements that described them the most. The five points of the rating scale were assigned scores as indicated in Appendix; almost always (5), usually (4), sometimes (3), rarely (2), never (1), for the statements positively worded. For the items negatively worded, weightage assigned was reversed; Never (5), rarely (4), sometimes (3), usually (2), almost always (1).

Distribution of respondents according to the nature of work

The respondents were categorised as Researchers, Teachers and Extension workers according to the main activity they were engaged in. Out of the one hundred and sixty five respondents
one hundred and sixteen reported research as their main activity, twenty four reported teaching and twenty two extension as their main job. Three respondents were engaged in administration full time. An activity which consumed seventy five per cent of the respondent's time was considered his main activity (Table 3.1).

3.13. **Statistical processing of the data**

The statistical techniques used to analyse the data collected in the study are described here under:

From the scores available of the scientists, a frequency distribution table was set up with a suitable size and number of class intervals. From the data in the frequency distribution table, a histogram was prepared to illustrate the data diagrammatically and to compare it with normal curve on the basis of skewness and kurtosis.

Mean was found out for each of the variables to know the central tendency. Standard deviation was also computed from the scores to study variability of the scores.

Correlation coefficient values were computed between independent variables and between the different components of a variable between independent and dependent variables to find out the nature of relationship.
Table 3.1 - Nature of Work of the Respondents

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Trait</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nature of Work</td>
<td>Research (5)</td>
<td>116</td>
<td>70.3</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Teaching (4)</td>
<td>24</td>
<td>13.33</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Extension (3)</td>
<td>22</td>
<td>14.54</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Administration(1)</td>
<td>3</td>
<td>1.81</td>
</tr>
</tbody>
</table>

Mean = 4.5 (Research and Teaching)
Fig. 3-2 Nature of work of the respondents.
Correlational and path analyses were carried out between the variables personal traits and job satisfaction, and between personal traits and job satisfaction and research performance variables. Conceptual model for the path analysis has been described in Fig. 3.1.

Analysis of variance was applied to see the significance of difference in the mean performance of researchers, teachers and extension workers on different variables.

3.14. Scoring key

**Job satisfaction variables**

Scientists performance on each of the four aspects of the job satisfaction scale e.g. institutional participation, environment, recognition and affiliation was scored. The total score of the respondents was converted into percentage score by dividing the score obtained by the individual by the maximum job satisfaction score possible and multiplying the fraction by 100 for the sake of uniformity. A scoring key for the questionnaire items produced below was evolved for evaluation.

**Personal traits**

(1) Pay scale

Six categories of pay scale were quantified as under:-
(ii) Area of specialisation

To find out the scientific field in which the scientist was basically trained, six areas of specialisation were mentioned. The institute being the one on dairying, highest rating was kept for specialisation in Dairy Science. Other areas of specialisation were given the ratings as under according to the judges choice.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Dairy sciences</td>
</tr>
<tr>
<td>5</td>
<td>Pure sciences</td>
</tr>
<tr>
<td>4</td>
<td>Veterinary sciences</td>
</tr>
<tr>
<td>3</td>
<td>Agricultural sciences</td>
</tr>
<tr>
<td>2</td>
<td>Social sciences</td>
</tr>
<tr>
<td>1</td>
<td>Any other</td>
</tr>
</tbody>
</table>

(iii) Age

The actual age of the respondents N (165) was recorded.

(iv) Experience in the institute

Midpoints for the experience in years were taken for each of the eight categories as follows:-
0.5 - less than one year
1.5 - one to two years
3.5 - three to four years
4.5 - four to five years
7.5 - five to nine years
12.0 - ten to fourteen years
19.5 - fifteen to twenty four years
27.5 - twenty five or more

(vi) Education

Respondents educational level was measured; the quantification was done as under:

4 - Doctoral degree
3 - Master degree
2 - Bachelor degree
1 - Indian Dairy diploma or other diploma

(vi) Weekly hours

Midpoints for the weekly hours spent on the job by each respondent were recorded. Midpoints taken were as under:

5.5 - 1-10 hours
15.0 - 10-20 hours
25.0 - 20-30 hours
35.0 - 30-40 hours

Research performance variables

Rationality in the selection of research problem

Criteria for research problem scores on the determining factors for selecting problems for research were quantified
as under according to the weightage decided by the judges.

<table>
<thead>
<tr>
<th>Problems of current interest (4)</th>
<th>Percent contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest in the problem (3)</td>
<td></td>
</tr>
<tr>
<td>Problems where acceptable results are sure to come (2)</td>
<td></td>
</tr>
<tr>
<td>Changing from one problem to another instead of probing deeply (1)</td>
<td></td>
</tr>
</tbody>
</table>

Two way scoring was done for each statement on the item. Maximum score could be 50.

Sources of selection of research problem

To quantify the data on the contribution of sources which enable scientists to take up a research problem, the following seven sources were listed and weightage to each of the source ranging from 1 to 7 and assigned according to the judges ratings. Two way scoring was done. Maximum score could be 140.
Problems of immediate application based on national needs (7)

Technical literature (6)

Listening to seminars and symposia (5)

Problems based on curiosity (4)

Guide/supervisor (3)

Higher technical Advisor (2)

Any other source (1)

Publication

To elicit information regarding the papers published in the past five years, a weightage was given for each publication as under:

- Technical papers - 2
- Technical books - 5
- Unpublished Technical manuscript/reports or formal talks - 1

Nature of work

Respondents breakup of work time on the following activities was quantified as under. A weightage of 1 to 5 was assigned according to the ratings given by judges. Activity which took two third of the scientist’s time was considered his main activity.

- Research - 5
- Teaching - 4
- Extension - 3
- Administration - 1