METHODOLOGY
AND
DATA COLLECTION
CHAPTER - V

METHODOLOGY AND DATA COLLECTION

The main study rests on primary source material. Data was collected through structured, unstructured, mailed and directly administered questionnaires. Information is also collected by holding discussions with senior officials of the department. The procedure used is convenience sample. In view of very poor response received to the mailed questionnaires, the convenience sample method is adopted. As the researcher, is working as a Faculty Member in the training institute of the Government of Andhra Pradesh, where a large number of engineering personnel from various cadres of Andhra Pradesh Panchayati Raj Engineering Department are regularly attending a number of training programmes in the Institute, he had the advantage of directly administering questionnaires to these engineering personnel. Sufficient care was taken to ensure that the sample includes all cadres of engineering personnel, working in all the sectors of the department (eg. Panchayati Raj, Rural Water Supply, Roads, Buildings, Minor Irrigation works, CERP works etc.) representing all regions of the State.

The secondary source material is restricted only to understand the conceptual frame work of Training, Training Technology and the systems already in use for identification of Training Needs. The National Training Policy document, the report of the working group on National Training Policy published by the Training Division, department of Personnel and Training (Ministry of Personnel, Public Grievances & Pensions), Government of India and the training action plan of the Government of Andhra Pradesh State training initiative was used.

5.1 Methods Used for collection of data

Development of Questionnaires: - A these day workshop on Identification of Training Needs of Engineering personnel was conducted from June 26-28 1999 at the training centre at Hyderabad. Selected engineering personnel from all cadres of the department participated in the workshop. A diagnostic analysis of Training Needs of engineering personnel was carried out during the workshop. During the deliberations of the work shop, the contents of the questionnaires were prepared. The questionnaires were shown in Annexure 4 to 13, and 18 to 21.

5.1.1 Personal Interviews: - Personal interviews with a number of senior and experienced engineering personnel were conducted to elicit their views and experiences. Based on the job requirements / job description of various cadres of engineering personnel. A list of Tasks/Functions to be carried out by each category of engineering personnel was prepared. Check lists were also prepared by taking feed back from these personnel. In order to assess the training needs, observations were also made at the actual work environment (on the field) and participants were asked to comment on the actual problems they are facing and spell out blockades (if any) for their effective functioning / performance in the department. Discussions held during personal interviews were also recorded in audio tapes. The data collected from several engineering personnel was pooled to indicate the Training Needs in different areas of operation of the department.
5.1.2 Questionnaires

Questionnaires were circulated to engineering personnel working in the department. Care was taken to ensure that all cadres of engineering personnel (i.e.) Assistant. Executive Engineer / Assistant Engineer, Deputy Executive Engineers, Executive Engineers and Superintending Engineers) working in all the sectors of the department (Panchayati Raj, Rural Roads, Buildings, Rural Water Supply, Rural Sanitation, Minor Irrigation, Investigation & Stores etc) were covered. In the questionnaires, the participants were asked to indicate (in a performance scale from 5 to 0 in the order of importance) the areas/topics of training which are more useful to them to improve their current job performance according to their own judgement and assessment.

5.1.3 Check lists

Check list of activities expected to be carried out by the engineering personnel were prepared, on the basis of their job description, duties and responsibilities. Randomly selected engineering personnel were asked to indicate how much time, they are spending on these activities. Participants were also asked to indicate how frequently they are attending to each item of work in the checklist. Pooled data of these personnel was collected, which will indicate the training requirements of these personnel.

5.1.4 Field Studies/Observations

As part of the identification of Training Needs exercise, field studies and observations were undertaken. Engineering personnel were interviewed on the field (i.e. at their work place at site) about the actual duties being performed by them. A list of their actual performance of tasks (as a part of their overall job performance) was prepared through discussions and observation. These engineering personnel themselves were asked to identify the areas in which they may be trained to improve their performance standards. This enabled to discuss about the gaps (i.e. actual performance standards) and training contents were suggested for filling these gaps.

5.2 Sampling

The primary objective of statistical inference is to enable generalization from a sample to a larger population, from which the sample is taken. One should be aware of the two main causes of incorrect inferences, that is, systematic bias and sampling error. The systematic bias results from errors in sampling procedures and it cannot be reduced by increasing the sample size. Common causes of systematic bias are, inappropriate sampling frame, defective measuring device, and natural bias in reporting of data by the respondents.

The second relevant factor is that of sampling errors, which are the random variations in the sample estimate, different from the true populations parameters. Since it is randomly distributed, an increase in the sample size is likely to reduce the sampling error. However, there are practical limitations to increasing the sample size (i.e. lack of response, non-availability, time constraints etc). In a homogenous population, magnitude of sampling error is smaller. Sufficient care was taken to avoid sampling errors and...
ensure that the sample represents the large population by including all cadres of engineering personnel (i.e.) Assistant Executive Engineer / Assistant Engineer Deputy Executive Engineers, Executive Engineers, Superintending Engineers from different sectors of operations of the department in the sample. All the engineering personnel included in the sample were either graduates or postgraduates in engineering (i.e. either civil or mechanical engineering).

The respondents were assured that the information furnished by them will be kept strictly confidential and it will be used strictly for the purpose of research study only. As all the respondents in the sample are highly qualified and holding positions of responsibility in the government, and as they were assured confidentiality, their objectivity in assessment is beyond doubt. Moreover it is an established fact that for identifying the individual Training Needs, the individual employee is in a best position to correctly assess his Training Needs.

Based on the literature study and examination of various policy documents on Training, a three dimensional analysis consisting of

- Organizational/Departmental analysis
- Task/Functional analysis
- Individual analysis

was followed for identification of Training Needs of engineering personnel of A.P. Panchayati Raj Engineering Department.

5.3 Organizational/Departmental analysis

In Organizational/Departmental analysis, the main activities and areas of operation of the A.P. Panchayati Raj Engineering Department, the role of the department and future expansions etc. were studied. The first part of the research work is to determine the number of performance factors which have a bearing and influence on the overall efficiency and functioning of the department. In consultation with a number of senior and experienced engineers of the department a number of performance factors/categories which are crucial for effective functioning of the department and which will affect the performance of engineering personnel working at all levels in the department were identified. Out of these the following 10 performance factors/categories were selected for diagnostic study and detailed analysis.

1. Organizational Culture
2. General Administration and Management
3. Leadership
4. Staff Development and Maintenance
5. Citizen friendly and Customer orientation
6. Interaction with other Departments and Agencies
7. Technical Competence of the Personnel
8. Human Resource Development climate
9. Job satisfaction and Job involvement
10. Quality of work and conditions
Each of the above mentioned performance categories were further divided into a number of sensitivity indicators for the purpose of assessment. The Training Need analysis was carried out through a diagnostic analysis of these performance category indicators. The questionnaires were designed each intended to measure the extent to which these performance category indicators were prevalent in the department. After pre-testing, these questionnaires (Annexures 4 to 13) were mailed to the randomly selected group of engineering personnel (working in various cadres in the department). The participants were asked to indicate their own assessment to the extent these characteristics/indicators are prevalent in the department in a 6 point graded scale. A rating of 5 (five) indicates excellent. A rating of 4 (four) indicates very good. A rating of 3 (three) indicates good. A rating of 2 (two) indicates all right (satisfactory). A rating of 1 (one) indicates poor. A rating of 0 (zero) indicates bad. The responses received from several engineering personnel were combined and statistically processed in order to determine the indicator index for each performance category.

5.3.1 Calculation of Performance Indicator Indices and Average Performance Category Indices :-

The performance index for each indicator of the category is calculated as given below.

A value of 5 is assigned to an excellent rating given by a respondent. Similarly values of 4, 3, 2, 1 & 0 are assigned to the respondents ratings of very good, good, satisfactory, poor and bad/not applicable, respectively. For example, for Performance indicator at Sl No.1, if \( n_1 \) = number of respondents given an excellent rating, \( n_2 \) = number of respondents given a rating of very good, \( n_3 \) = number of respondents given a rating of good, \( n_4 \) = number of respondents given a rating of satisfactory, \( n_5 \) = number of respondents given a rating of poor, \( n_6 \) = number of respondents given a rating of bad/not applicable, then

\[ N = \text{Total number of respondents} = n_1 + n_2 + n_3 + n_4 + n_5 + n_6 \]

The indicator index value for performance indicator at Sl.No.1 =

\[ i_1 = \frac{5 \times n_1 + 4 \times n_2 + 3 \times n_3 + 2 \times n_4 + 1 \times n_5 + 0 \times n_6}{n_1 + n_2 + n_3 + n_4 + n_5 + n_6} \]

The Arithmetic Mean of all the performance indicators in the category shall be the Average Performance Category Index.

The performance indicator index so determined for each category reflects the extent to which the performance category was prevalent in the department, as assessed by the respondents. A hypothetical indicator index of 5.00 (i.e. excellent on all indicators of the performance category by all 100% respondents) represents the most desirable situation. A rating between 4.00 to 5.00 for each performance category
indicator represents very good to excellent. These performance indicator were compared with the desirable index of 3.00. For this purpose, a point scale was used, for each of the performance indicator, the stage at 3.00 (i.e. at 60% sensitivity level) represents the minimum acceptable performance standard. The indicator indices above the point are considered pro-synergic and the indicator indices below the point are considered non-synergic. The strengths and weaknesses of each performance category were analyzed. The performance category indicators with less than the minimum desirable index of 3.00 called for immediate attention and suitable remedial actions/interventions were suggested. The details of respondents received cadre wise are as shown below.

1. Superintending Engineers 12
2. Executive Engineers 58
3. Deputy Executive Engineers 183
4. Asst.Executive Engineers/Asst.Engineers 379

Total 632

The abstract of all the responses of questionnaire for Organizational / Departmental Analysis received are shown in Annexure – 1. The questionnaires are given in Annexure 4 to 13.

5.4 Task/Function Analysis :

In Task/Function analysis, the duties and responsibilities of each category of engineering personnel (i.e., is Asst. Engineer, Asst. Executive Engineer, Deputy. Executive Engineer, Executive Engineer, Superintending Engineer and Chief Engineer) were prepared, based on the discussions held with the engineering personnel, information from the functionary manual of the department, the Job description of various cadres of engineering personnel, a list of Tasks/Functions to be carried out by each cadre of engineering personnel was prepared. The abstract of Task/Function analysis is shown in Annexure 2.

5.5 Individual Analysis :-

An engineer working in the department has to discharge managerial, technical and administrative functions. Every engineer working in the department must have working knowledge on these areas. In the individual analysis, the knowledge levels and familiarity of all engineering personnel on all these aspects to the department were assessed. A list of these areas is included in the OMR questionnaires which were circulated to all the personnel working in the department. The OMR sheet questionnaires received from all the cadres of engineering personnel (N=3323) were processed to identify their general training needs. In addition, randomly selected group of engineers were administered questionnaires to identify their technical training requirements. (132 Number questionnaires that were received were processed. The results are given in Annexures -3).
The present cadre strength of engineering personnel of AP.Panchayati Raj Engineering Department is as follows.

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer – in – Chief</td>
<td>1</td>
</tr>
<tr>
<td>Chief Engineers</td>
<td>6</td>
</tr>
<tr>
<td>Superintending Engineers</td>
<td>27</td>
</tr>
<tr>
<td>Executive Engineers</td>
<td>140</td>
</tr>
<tr>
<td>Deputy Executive Engineers</td>
<td>695</td>
</tr>
<tr>
<td>Asst.Executive Engineers/Asst.Engineers</td>
<td>3455</td>
</tr>
<tr>
<td>Joint Director (Geology)</td>
<td>1</td>
</tr>
<tr>
<td>Senior Geologists</td>
<td>6</td>
</tr>
<tr>
<td>Junior Geologists</td>
<td>41</td>
</tr>
<tr>
<td>Draughtsmen</td>
<td>890</td>
</tr>
<tr>
<td>Tracers</td>
<td>250</td>
</tr>
<tr>
<td>Work Inspectors (Technical)</td>
<td>2800</td>
</tr>
</tbody>
</table>

**Total** 8312

The total number of OMR questionnaire forms processed are as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer – in – Chief</td>
<td>0</td>
</tr>
<tr>
<td>Chief Engineers</td>
<td>0</td>
</tr>
<tr>
<td>Superintending Engineers</td>
<td>20</td>
</tr>
<tr>
<td>Executive Engineers</td>
<td>92</td>
</tr>
<tr>
<td>Deputy Executive Engineers</td>
<td>525</td>
</tr>
<tr>
<td>Asst.Executive Engineers/Asst.Engineers</td>
<td>2686</td>
</tr>
</tbody>
</table>

**Total** 3323

In Organizational / Departmental analysis, 632 responses were processed. In Task / Functional analysis, 57 Tasks / Functions of various cadres of engineering personnel were analyzed. In individual analysis, 3323 OMR sheet questionnaires were processed for identifying the general / common Training Needs of engineering personnel. In addition, 132 questionnaires were processed for identifying the Technical Training Needs. The abstract of all the responses analyzed are shown in Annexure 1 (Organizational / Departmental analysis), Annexure 2 (Task / Functional analysis) and Annexure 3 (Individual analysis) respectively.