CHAPTER IV
RESEARCH METHODOLOGY

4.1 RATIONALE FOR THE STUDY.

4.1.1 Historical Background:

Economic restructuring efforts of the Central Government presents a whole new context in which it becomes imperative to examine the development in technical education system. An analysis of the newly industrialized economies has shown that our economy would require critical masses of highly diversified human resources and that the proportion of higher level human resources - scientists, engineers, managers and technicians would increase. Accordingly, the development of technically qualified human resources become crucial to the success of implementing economic restructuring and for deriving sustained economic development.

Industrial manpower in India is developed through a system of publicly financed training and education institutions, private institutions and informal sector apprenticeship type training arrangements. The publicly financed education system operate at three levels:

i) Certificate level programmes producing skilled workers, offered by "Industrial Training Institutes" situated all over the country.

ii) Diploma programmes producing middle level managers (supervisors) who are also designated as technicians are offered by polytechnics. Admission to these programmes requires 10 years of basic education and courses are of three year duration in conventional disciplines of civil, electrical and mechanical engineering.
iii) Degree level programmes producing engineers offered by Indian Institutes of Technology (IITs), Regional Engineering Colleges and state/private Engineering Colleges. These institutes offer graduate, post-graduate and research degree programmes.

4.1.2 Present Situation:

Over the past four decades technician education in the country has witnessed a phenomenal expansion. From 53 polytechnics in the year 1947, the number has risen to around 1484 polytechnics in the year 1997. The polytechnics primarily offer 3 year post secondary programmes in the diverse fields of engineering and technology such as Civil, Mechanical, Electrical, Electronics, Computers, Chemical and Plastic Engineering etc.

Efforts have been made by the Central and State Governments to improve the quality of technician education. Some designated studies on technician education had been commissioned and as a result, several schemes on quality improvement started. The schemes included the establishment of Technical Teachers’ Training Institutes for training technical teachers and administrators of polytechnic education; establishment of Curriculum development centers and media centers for the systematic development of curricula and instructional materials; introduction of quality improvement programmes for training staff of polytechnics in the emerging areas of technology and practical training in the industry.

The effects of these schemes on the quality of technician training and its management have been very marginal. In fact, these have been far below those expected. Whereas, there have been marked improvement in the curricula of technician programmes and instructional materials for certain subjects, the quality of teaching and learning in the polytechnics, the procedural structures in the polytechnic education system at all levels and the
image of the polytechnic graduate in the eyes of the employer have hardly changed (GO.I. report)\(^1\).

The industries even today have a very low perception about the quality of the polytechnic product in respect of their knowledge of the basics and the practical skills that they possess (Malhotra et al.)\(^2\). The teaching and learning practice in the polytechnics remains largely chalk and talk with minimal attention being paid to the acquisition of job related practical skills. The motivation of teachers has reached a burn-out stage as they do not perceive any challenge or bright future prospects in their career. Polytechnic education system suffers from identity crisis and very meager avenues / opportunities exist for the professional and / or career development of people working in the system or for those who graduate from the system.

The major flaw lies in the strategy adopted for training technicians. Strategy is the management's vision of what the technician education should be and guides choice about its nature and direction. It relates to the concept of technician manpower spectrum, the curriculum offerings for training of this manpower spectrum, the nature of the curriculum offerings and the system of management.

The second major factor that has affected the quality of technician graduates is the curriculum requirements of passing a prescribed set of subjects which demands primarily acquisition of information, concepts, principles, procedures and their application to solving numerical problems.

Other factors that have affected the capability and capacity of the technician education system to improve are:

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a) the absence or inadequacy of structure for curriculum and instructional material development, manpower assessment, planning and policy formulation and industrial training of students.

b) absence of policies on quality enhancement, career development of teachers, research and innovation in technician education, resource generation, consultancy and relationship with the sectors of employment of technicians.

c) inadequate resources (human, physical and financial) made available to polytechnics.

d) non-development of systematic procedural structure for problem solving, decision making, quality control, management of inputs, planning, monitoring and evaluation at all levels of management of the technician education system.

4.1.3 Management System:

It will be necessary to create real partnership between the industry and the technical institutions for managing the technician education system. Thus participative management in which industry is an equal partner, is essential for implementing the above strategy proposed for technician education and training.

Another essential characteristics of the management system has to be flexibility needed for attaining relevance to the world of work through flexibility in course offerings and participation of industry in managing the system. This calls for autonomy in functioning. In this context, *NPE*³ makes the following recommendations:

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“Technical and management education programmes including education in polytechnics would also be on a flexible modular pattern based on credits with provision for multipoint entry”.

“Active interaction between technical or management institutions and industry will be promoted in programmes planning and implementation, exchange of personnel training facilities and resources, research and consultancy and other areas of mutual interest.”

“Selected institutions will be awarded academic, administrative and financial autonomy of varying degrees, building safe-guards with respect of accountability”.

For enhancing effectiveness in all aspects of training and management of technician education at all levels, it is necessary that the management at national, state and institute levels have clear cut policies laid down for ongoing quality improvement, career development of people in the organization, research and innovation on the various problems relating to the development and growth of technician education, generation of resources for undertaking developmental activities and building relationship with the various sectors of employment and other related organizations and agencies. Most of the above policies have been emphatically articulated in NPE\(^4\). There is an urgent need to operationalize the above policies and implement them in order to nurture the culture essential for implementing the proposed strategy.

For effective and efficient implementation of policies, programmes or activities in an organization it is very essential that adequate roles are assigned and structures established for their implementation. To implement

\(^4\) ibid
the proposals made regarding the strategy of technician education management policies, training process and the procedural structures outlined in the above paragraphs, it is important that the role allocation and or management structures for training, both in theory and practical skills, development of curricula and instructional materials, building industry-institute relationships, examination and certification of students, professional development and career development of staff, policy formulation and planning of technician education programmes and activities, resource acquisition and allocation, implementation, monitoring and evaluation of programmes and activities of the organization and information gathering and dissemination should be established at all levels of technician education system i.e. national, state and institutional.

4.1.4 Thrust on quality of Technician education in the present context.

There has been a shift from expansion to consolidation and quality improvement in technician education since last two decades. The 4 regional Technical Teachers’ Training Institutes have been instrumental in imparting training and re-training of polytechnic teachers and administrators for implementing quality improvement programmes in technician education system.

Through a recent scheme launched by the Ministry of Human Resource Development, Government of India, with the assistance of World Bank, the polytechnics in India have been provided massive funds for overall infrastructure development, capacity expansion and quality improvement. While showing satisfaction over infrastructure development and capacity expansion components, the World Bank review team expressed concern about implementation of the Quality Improvement schemes.

It is, therefore, appropriate to study the organizational effectiveness of polytechnics in selected states of Northern region with an intention that
information gathered will help the polytechnic managers to evaluate their performance and plan strategies for carrying out action to achieve the objectives and goals laid down by the funding agencies and the environment. It is envisaged that the research findings will help the Directors of technical education of respective states. Principles of the polytechnics and teachers to plan and implement new projects and programmes to bring out the desired qualitative change in the technician education system.

4.2 PROBLEM DEFINITION

The states in northern region of our country have shown considerable improvement in the polytechnics by way of increase intake of students, addition of diversified and specialized branches of engineering and infrastructure development, yet the product, that is the pass-out technicians are not considered up to the mark by various employers. The major drawback in these pass-out technicians is lack of technical/managerial skills and practical attitudes in their personality. Various studies made by different agencies reveal that although there exists a gap between required infrastructural facilities and existing ones but more serious is the poor state of curriculum implementation which includes teaching-learning process, evaluation and overall personality development of a students.

The capabilities of a pass-out technician of a polytechnic are put to acid test in the present scenario where new technologies and processes are being increasingly used.

The author, therefore felt concerned with the quality of technicians produced by polytechnics, and made an effort to study the status of achieving set goals by the managers of polytechnics. It is envisaged that the study of organizational effectiveness of polytechnics will spell out the strengths and weaknesses in the existing system and suggestions for enhancing the
organizational effectiveness will enable the managers of polytechnic system to improve the quality of their products and fulfill their objectives.

4.3 OBJECTIVES:

The present study has been conducted in two phases. The objectives of each phase are as shown below:

Phase - I
i) To study the status of effectiveness of polytechnics in the selected states of northern region of India.
ii) To study the perceptions of Principals, Teachers, Students and Employers regarding the effectiveness of their polytechnic.

Phase - II
iii) To compare the perceptions of stake holders i.e. teachers, students and employers about the organizational effectiveness of Government and Aided polytechnics in the selected states.
iv) To compare the perceptions of stake holders about the organizational effectiveness of Co-ed and Womens polytechnics in the selected states of northern India.
v) To compare the perceptions of stake holders about the organizational effectiveness of polytechnics in selected states of northern India.
vi) To suggest strategies for improving enhancing organizational effectiveness of polytechnics.

4.4 HYPOTHESES:

In order to achieve above objectives the study has been conducted to accept/verify the following hypotheses:
i) There is no significant difference between the organizational effectiveness perception of stakeholders of polytechnics in selected states in northern India.

ii) There is no significant difference between the organizational effectiveness perception of stakeholders of Government and aided polytechnics in selected states of northern India.

iii) There is no significant difference between the organizational effectiveness perception of stakeholders of Co-ed and Women polytechnics in selected states in northern India.

4.5 SCOPE OF THE STUDY

There are in all 7 states under the northern region namely Punjab, Haryana, H.P., J. & K, Rajasthan, UP, Delhi and one U.T. namely Chandigarh. 4 out of the 8 states (including one UT) are considered purposively for this study. The numbers of polytechnics in these states are as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Numbers</th>
<th>Govt.</th>
<th>Aided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>18</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Haryana</td>
<td>23</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>H.P.</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>2</td>
<td>2</td>
<td>0</td>
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</tbody>
</table>

Criteria for selecting these four states is a common curriculum followed by them which is designed and developed at TTTI, Chandigarh. The remaining states in northern region follow their own curriculum.

There are two types of polytechnics in these states, one managed by state government and the other managed by private organizations receiving financial aid from the state government. Both types of these polytechnics are under academic control of state boards of technical education. Majority of
polytechnics are co-ed (with small percentage of women students) but few women polytechnics are also in operation in each state.

Only those polytechnics have been considered for the survey which offer civil/electrical/mechanical/electronics engineering diploma programmes for the purpose of commonality. These are the well established branches where sufficient infrastructure is available. The remaining polytechnics offer diploma in diversified branches of engineering which are in different stages of establishment and hence were not considered for the comparison. The polytechnics for the study were selected randomly from the short listed polytechnics as shown below:

Table 4.1 Number of Polytechnics in identified states.

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Punjab</td>
<td>18</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>13</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Haryana</td>
<td>23</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>H.P.</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>Chandigarh</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Total</td>
<td>Polytechnic</td>
<td>50</td>
<td>18</td>
<td>11</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>37</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td>6</td>
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</table>

Thus out of a total of 50 polytechnics in these 4 states, 13 polytechnics have been selected (9 co-ed and 4 women) for conducting the survey. The state wise list of selected polytechnics is as follows:
1. Punjab
(i) Govt. Polytechnic, Amritsar (Govt. Co-ed)
(ii) Govt. Polytechnic, Hoshiarpur (Govt. Co-ed)
(iii) Govt. Polytechnic for Women, Jalandhar (Govt. Girls)
(iv) Mehar Chand Polytechnic, Jalandhar (Aided, Co-ed)

2. Haryana
(i) Govt. Polytechnic, Ambala (Govt. Co-ed)
(ii) Govt. Polytechnic, Nilokheri (Govt. Co-ed)
(iii) Govt. Polytechnic for Women, Ambala (Govt. Girls)
(iv) Govt. Inst. of Engg. and Tech, Hisar (Govt. Co-ed)
(v) Vaish Tech. Institute, Rohtak (Aided, Co-ed)

3. H.P.
(i) Govt. Polytechnic, Sundernagar (Govt., Co-ed)
(ii) Govt. Polytechnic for women, Kandaghat (Govt. Girls)

4. Chandigarh
(i) Central Polytechnic, Chandigarh (Govt., Co-ed)
(ii) Govt. Polytechnic for women, Chandigarh (Govt. Girls)

The questionnaires were given to all the students and teachers of identified branches and Principal of the Polytechnics. All the responses received back (as per details given in Appendix E) have been included in the study. Perception of only those employers have been collected who have visited the polytechnic for either campus interview, expert lecture or any other official or personal work and have interacted with the students and faculty. The details of such employers were collected from the respective training and placement officers in the polytechnics or heads of the departments. The number of respondents from each polytechnic has been summarised in table 4.2.
Table 4.2 Number of respondent from selected Polytechnics of Punjab, Haryana, HP and Chandigarh

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Polytechnic</th>
<th>No of Teachers</th>
<th>No of students</th>
<th>No of Employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Govt Poly Amritsar</td>
<td>C/E/M</td>
<td>16</td>
<td>69</td>
</tr>
<tr>
<td>2</td>
<td>Govt Poly Hoshiarpur</td>
<td>C/E/M/Elx</td>
<td>20</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>Govt Poly for Women Jalandhar</td>
<td>Elx.</td>
<td>08</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Mehar Chand Polytechnic Jalandhar</td>
<td>C/E/M/Elx</td>
<td>17</td>
<td>89</td>
</tr>
<tr>
<td>5</td>
<td>Govt Poly Ambala</td>
<td>C/E/M/Elx</td>
<td>19</td>
<td>171</td>
</tr>
<tr>
<td>6</td>
<td>Govt Poly Nilokheri</td>
<td>C/E/M/Elx</td>
<td>24</td>
<td>157</td>
</tr>
<tr>
<td>7</td>
<td>Govt Poly for Women Ambala</td>
<td>Elx</td>
<td>05</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>Govt Instit of Engg. &amp; Tech. Hisar</td>
<td>E/M</td>
<td>15</td>
<td>49</td>
</tr>
<tr>
<td>9</td>
<td>Vaish Tech Instt. Rohtak</td>
<td>C/E/M/Elx</td>
<td>17</td>
<td>79</td>
</tr>
<tr>
<td>10</td>
<td>Govt Poly Sundarnagar</td>
<td>C/E/M</td>
<td>21</td>
<td>61</td>
</tr>
<tr>
<td>11</td>
<td>Govt Poly for Women Kandaghat</td>
<td>Elx</td>
<td>08</td>
<td>23</td>
</tr>
<tr>
<td>12</td>
<td>Central Poly Chandigarh</td>
<td>C/E/M/Elx</td>
<td>23</td>
<td>130</td>
</tr>
<tr>
<td>13</td>
<td>Govt Poly for Women Chandigarh</td>
<td>E1x</td>
<td>09</td>
<td>56</td>
</tr>
<tr>
<td>Total</td>
<td>13 Polytechnics</td>
<td></td>
<td>201</td>
<td>1042</td>
</tr>
</tbody>
</table>

C : Civil Engineering.
E : Electrical Engineering
M : Mechanical Engineering
Elx. Electronics Engineering

Note:-- 1. Teachers include response of Principals from each polytechnic.
2. Detailed branch-wise number of respondent are given at appendix. E.

Delimitations of the study

i) Though Principals are one of the important stake holders of polytechnics, their perception has been clubbed with that of the teachers of the polytechnic as only one response (of a principal) was available at each polytechnic and hence was not suitable for statistical analysis.
ii) The perceptions were collected from the student and teachers of Civil, Electrical, Mechanical and Electronics Engineering disciplines only.

iii) In the states of HP and Chandigarh, only Govt. Polytechnics have been covered, as there were no aided polytechnics existing.

iv) Only those employers were considered for each polytechnic who have some interaction with the staff, students and polytechnic itself.

4.6 METHOD OF DATA COLLECTION:

Since the study involves determining the organizational effectiveness of polytechnics as perceived by Principals, Teachers, students and employers, descriptive research (survey) design has been used in carrying out the work.

A set of four questionnaires have been prepared, one each for Principals, teachers, students and employers for measurement of their perception about the organizational effectiveness of respective polytechnics, based on six key effectiveness parameters identified earlier. The perception has been recorded against each statement on a five-point scale.

Secondary data has been collected from polytechnic records, reports and other Government documents through visits, interviews and observations.

The researcher visited all the identified polytechnics with pre-appointment. The objectives and methodology of collecting feedback from teachers were first explained in a joint meeting followed by filling up of the questionnaires. The researcher visited final year classes of Civil/ Electrical/ Mechanical/ Electronics and distributed the questionnaire amongst the students after explaining the objectives and procedure for filling it up. The local/nearby employers were visited personally and questionnaires were got filled from concerned persons. Few questionnaires were left with the HOD /Training and placement officer of the polytechnic to get them filled from the visiting employers over a reasonable period. The numbers of respondents for each polytechnic are given in table 4.2. The data was collected during the years 1995 to 1997.
4.7 ANALYSIS OF THE DATA:

In order to find out significance of difference between the perceptions of teachers, students and employers of identified polytechnics, one-way ANOVA has been applied. Wherever F-values were found significant, t-test was applied in order to determine the significance of difference in mean value of perceptions of teachers, students and employers. Bar-charts are drawn for mean values of perceptions of different stake-holders in order to draw conclusions from such data. The response from principals of each polytechnic have been clubbed with the teachers of that polytechnic for the reasons explained above.