CHAPTER 3
RESEARCH METHODOLOGY

3.1 RESEARCH FRAMEWORK

Based on the objectives of the study and insight obtained in the review of literature, the framework of research has been developed. Figure 3.1 represents the links between the systematic steps involved in this research. The objectives of the study are discerned based on the research gaps identified. The framework provides an overview of the research design developed from the review of literature.

Based on the selection of research technique, data collection method is chosen. Development of measures and instruments are based on data collection method. Pilot study is conducted to test the instruments used for data collection. The data analysis concludes with summary of the research, major findings, conclusions, recommendations and suggestions for future research.
Literature survey

Problem definition

Initial identification of parameters for Institute–Industry Collaboration (IIC)

Selection of engineering institutions in Tamil Nadu

Institutions under deemed university

Academic administrators
Placement coordinators
Faculty members
Students
Representatives of industries

Pilot study

Main study

Data analysis

Identification of significant parameters of IIC

Development of an appropriate IIC model

Validation of the proposed model

Conclusions & recommendations

Figure 3.1 Research Framework
3.2 RESEARCH DESIGN

Research design is the conceptual structure within which research is conducted and it constitutes a blueprint for pre study and pilot study and arrangement of conditions for data collection, measurement, assumptions, techniques and analysis of data in a manner that aims to combine relevance to research purpose. The research study is analytical and descriptive in nature. The elements of the research design are as follows:

- Survey method has been used for conducting the research study
- Data collection for the research study has been done through primary and secondary sources
- The analysis of data gathered for research is achieved by statistical procedures.

3.2.1 Data Source

The data for the research study on Effectiveness of Institute–Industry Collaboration in Higher Engineering Educational Institutions of Tamil Nadu is basically primary and secondary.

3.2.1.1 Primary Data

The primary data for the main study was collected from engineering institutions under deemed universities in the state of Tamil Nadu.
The details of the sources of primary data are listed below:

A) Academic administrators
   1. Directors and / or Principals of the institutions
   2. Heads of the departments

B) Placement coordinators
   1. Dean of University Placement and Training Cell
   2. Placement Officer
   3. Placement staff in-charges of the department

C) Faculty members
   Faculty members of Civil, Mechanical, Electrical & Electronics, Electronics & Communication and Computer Science Engineering departments

D) Students
   Students of II year, III year and IV year of Civil, Mechanical, Electrical & Electronics, Electronics & Communication and Computer Science Engineering departments. The students of first year have not been considered as they have very little exposure to the Institute–Industry Collaboration

E) Representatives of industries
   The industries were identified from the information available from annual reports, official websites of deemed universities and from the information collected from the placement coordinators.

Data collection from primary sources was done during the period from November 2011 to June 2012.
3.2.1.2 Secondary Data

The secondary data was collected from reference books, State Directorate of Technical Education, Indian Society for Technical Education (ISTE), publications by Ministry of Human Resource Development, Government of India, reports by University Grants Commission of India, United Nations Educational, Scientific and Cultural Organization (UNESCO) reports, FICCI reports and CII reports.

3.2.2 Assumptions

Assumptions regarding the research study on Effectiveness of Institute–Industry Collaboration in HEEI of Tamil Nadu are:

- Academic administrators of engineering institutions under deemed universities are aware of Institute–Industry Collaboration, discussion and decision-making processes that produce mutual agreements and understanding of the real conditions in the work place, the systematic functioning of industries and the industry expectations. The factors that affect the Institute–Industry Collaboration

- Placement coordinators of engineering institutions under deemed universities are aware that Institute–Industry Collaboration improves placement activities and systematic recruitment and the factors that affect the Institute–Industry Collaboration

- Faculty members of engineering institutions under deemed universities are aware that Institute–Industry Collaboration provides a highly effective mechanism to generate feedback based on employer
demands to design academically sound and industry-oriented curricula, understanding the expectations of industries will increase their academic rigour and will orient them towards the industry.

- Students of engineering institutions under deemed universities are aware that Institute–Industry Collaboration will broaden the mental orientation of the students, and also give the true picture of the ongoing projects and works.

- Representatives of industries are aware that close coordination and linkages with the engineering institutions under deemed universities help in supply of the manpower needed under any given circumstances. Employment prospects amongst students, in turn, are heightened by deeper familiarity with existing industrial systems.

3.3 RESEARCH INSTRUMENTS

Instruments used are structured questionnaires and interview schedules. A total of five instruments were developed by the researcher for collecting information from the following sources.

1. Academic administrators - Interview schedule
2. Placement coordinators - Questionnaire
3. Faculty members - Questionnaire
4. Students - Questionnaire
5. Representatives of industries - Interview schedule
### 3.3.1 Particulars of the Instruments

The particulars of the five instruments are given in Table 3.1.

#### Table 3.1 Particulars of Research Instruments

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Respondents</th>
<th>Instruments</th>
<th>Aspects of Information Collected</th>
</tr>
</thead>
</table>
| 1       | Academic administrators    | Interview schedule | 1. Factors responsible for enhancing the effectiveness of Institute–Industry Collaboration  
2. Factors responsible for limiting the effectiveness of Institute–Industry Collaboration  
3. Suggestions for increasing the effectiveness of Institute–Industry Collaboration  
4. Suggestions for enhancing Institute–Industry Collaboration outcomes |
| 2       | Placement coordinators     | Questionnaire   | 1. Factors responsible for enhancing the effectiveness of Institute–Industry Collaboration  
2. Factors responsible for limiting the effectiveness of Institute–Industry Collaboration  
3. Details of collaborating industries  
4. Suggestions for increasing the effectiveness of Institute–Industry Collaboration  
5. Suggestions for enhancing Institute–Industry Collaboration outcomes |
| 3       | Faculty members            | Questionnaire   | 1. Effectiveness of Institute–Industry Collaboration  
2. Suggestions for increasing the effectiveness of Institute–Industry Collaboration  
| 4       | Students                   | Questionnaire   | 1. Effectiveness of Institute–Industry Collaboration  
2. Suggestions for increasing the effectiveness of Institute–Industry Collaboration  
| 5       | Representative of industries | Interview schedule | 1. Factors responsible for enhancing the effectiveness of Institute–Industry Collaboration  
2. Factors responsible for limiting the effectiveness of Institute–Industry Collaboration  
3. Suggestions for increasing the effectiveness of Institute–Industry Collaboration  
4. Suggestions for enhancing Institute–Industry Collaboration outcomes |
3.3.2 Validity of the Instruments

The content validity of the five instruments was determined by jury opinion. A panel of jury consisting of the following five members was constituted for this purpose.

- Director of a deemed university
- Dean of placement cell of a deemed university
- Head of the department of a deemed university
- A specialist in the field of educational research

Based on the feedback provided by the jury, certain modifications were made to further enhance the validity of instruments.

3.4 PILOT STUDY

Pilot study was designed and conducted to test the instruments used for data collection. Five instruments for pilot study were developed after the review of literature, participation in workshops / seminars, personal discussion with the experienced academicians and industrial personnel and the same was administered to

(1) Academic administrators (N=10)
(2) Placement coordinators (N=8)
(3) Faculty members (N=40)
(4) Students (N=60)
(5) Representatives of industries (N=10).
Based on feedback received from them, the items in the instruments were revised. The revised instruments were used for the main study.

### 3.4.1 Reliability of the Instruments

The reliability of the five instruments was determined based on the data collected for pilot study. This was done by estimating the numerical coefficient of reliability i.e. Cronbach’s alpha score. The Cronbach’s alpha score for the five instruments are furnished in Table 3.2.

**Table 3.2 Details of Cronbach’s Alpha – Reliability of the Instruments used for Data Collection**

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Cronbach’s Alpha Score</th>
</tr>
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<tbody>
<tr>
<td>Academic administrators</td>
<td>0.7154</td>
</tr>
<tr>
<td>Placement coordinators</td>
<td>0.7213</td>
</tr>
<tr>
<td>Faculty members</td>
<td>0.7918</td>
</tr>
<tr>
<td>Students</td>
<td>0.8137</td>
</tr>
<tr>
<td>Representatives of industries</td>
<td>0.7427</td>
</tr>
</tbody>
</table>

As the Cronbach’s alpha score is higher than 0.7 for all the five instruments, the data collected was found to be highly reliable.

### 3.5 SAMPLE DESIGN AND SELECTION

In Tamil Nadu, there were 22 deemed universities offering engineering educational programmes during the study period and the list of deemed universities is given in Table 1.1. Nine deemed universities were selected using purposive sampling technique (Sharma, 1993). The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best
enable the researcher to answer the research questions (Lund Research Ltd., 2010).

The data required for the research study were collected from the following sources:

1. Academic administrators
2. Placement coordinators
3. Faculty members
4. Students
5. Representatives of industries

The methods used for selecting the samples are described below:

3.5.1 Academic Administrators

1) Heads of institutions (Director and/or Principal)
2) Heads of the departments

Data were collected from 47 academic administrators (N = 47). This includes 14 heads of the institutions and 33 heads of the departments. The total number of academic administrators working in all 9 institutions is 59. The random sampling method was used. Data were collected from 80% of academic administrators.

3.5.2 Placement Coordinators

The placement coordinators work at two levels viz. at university level and at department level.

University placement and training cell is headed by Dean and duly supported by a Placement Officer and the department placement works are
coordinated by a staff member. Data were collected from 47 placement coordinators (N = 47). This includes 9 from university placement and training cell and 38 from placement coordinating staff members of the departments. The total number of placement coordinators working in all 9 institutions is 63. The random sampling method was used. Data were collected from 75% of placement coordinators.

3.5.3 Faculty Members

The number of faculty members in the institutions ranges from 85 to 240. The total number of faculty members working in all 9 institutions is 1,460. In each institution, the faculty members were subdivided into programme wise homogeneous groups viz. Civil Engineering, Mechanical Engineering, Electrical & Electronics Engineering, Electronics & Communication Engineering and Computer Science Engineering. Stratified random sampling method was used for selecting the faculty members. Data were collected from 20% of faculty members i.e. from 294 faculty members (N = 294).

3.5.4 Students

The number of students in the institutions ranges from 750 to 1,900. The total number of students studying in all the 9 institutions is 11,925. In each institution, the student population was stratified into sub-groups using the two variables i) programme of the study and ii) years of study (II year, III year and IV year) as the basis of stratification. Stratified random sampling method was used for selecting the students. Data were collected from 7% of students i.e. from 850 students (N = 850).
3.5.5 **Representatives of Industries**

By studying the Institute–Industry Collaboration documents published in the annual reports, information available in the official websites and information collected from the placement coordinators, it was arrived that the number of industries collaborating with the institution ranges from 10 to 50. The total number of industries collaborating with the 9 institutions is 270.

The representatives of industries for the study were selected by purposive sampling method and data were collected from 36 industries, with 2 persons from each of the industries, thus the total number is 72 \( (N = 72) \). Data were collected from 27% of representatives of industries.

3.6 **PROCEDURES USED FOR COLLECTION OF DATA**

The following procedures were used for collecting the data for the research study:

1. Mailing the questionnaires in advance to the faculty members, students and placement coordinators of the engineering institutions under deemed universities.

2. Two visits to each of the engineering institutions under deemed universities for the following purposes:
   
   (i) Collecting the filled-in questionnaires
   
   (ii) Interviewing the academic administrators
(iii) Interviewing a small sample of placement coordinators, faculty members and students for cross validation of their responses collected through the questionnaires

3. On-site visit to the collaborating industries for interviewing their representatives.

3.7 DATA ANALYSIS PLAN

The data which were collected with reference to the objectives of the study are used for the analysis as detailed below:

1. Assessment of the effectiveness of Institute–Industry Collaboration in higher engineering educational institutions (HEEI) of Tamil Nadu in two parts - viz.

   • Determination of the effectiveness of the Institute–Industry Collaboration as assessed by the faculty members

   • Determination of the effectiveness of the Institute–Industry Collaboration as assessed by the students and calculation of the percentage of effectiveness of each type of collaboration.

2. Testing of the six hypotheses from Category 1 and Category 3 by applying ANOVA followed by Duncan Multiple Range (DMR) test.

3. Testing of the six hypotheses from Category 2 and Category 4 by applying Friedman test.
4. Identification of enhancing and limiting factors that play an important role on effectiveness of Institute–Industry Collaboration by determining the overall perception of the three categories of respondents:

   (i) Academic administrators

   (ii) Placement coordinators

   (iii) Representatives of industries, by using weighted mean score for each factor.

5. Development of a generic model for effective Institute–Industry Collaboration by referring the various Institute–Industry Collaboration models presented in the literature and by studying the suggestions given by the stakeholders of HEEI to increase Institute–Industry Collaboration and validation of the model by a panel of experts.

6. Formulation of the strategies for effective Institute–Industry Collaboration on the basis of the multiple perspectives obtained by analyzing the data collected from various information sources.