CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The emergence of a knowledge-based society demands a new kind of university, with the objective not only to act as a provider of educationally qualified personnel but also as a supplier of human resources to industry to promote innovation and consequent economic development. The challenge is how to transform universities, which have few connections with industry and little knowledge of the needs of industry into entrepreneur-creating establishments in which the mission to generate and disseminate knowledge is extended to include the practical application of knowledge for the benefit of society at large. There is a greater need than ever to discuss and understand how to improve the collaboration between players from academia and industry.

The need of the hour is to transform educational institutions, especially the universities into entrepreneurial universities aimed at supporting the economic development of a country by transferring the knowledge created to products, processes and services for the benefit of society at large (Gibb & Hannon, 2006).

An extremely dynamic business world and the rapidly developing knowledge based service economy have led to an increased demand for professionals to manage business effectively and this is precisely the reason why the desire for acquiring required qualifications is growing. Employers today, as a result,
have to operate in an environment that demands newer competencies to retain global competitiveness. In such a scenario, a knowledge worker who can work at the cutting edge of technology, add value to the bottom-line and provide competitive advantage to industry has become a hot commodity to acquire and thus the education in the universities was intended to provide competent human resources to meet the ever-changing needs of business and industry.

Since the beginning of the twenty-first century, globalization has been having a profound effect on government economic and social policies around the world. Education is seen as a primary driver for economic development in the knowledge society. Knowledge is the biggest growth driver, more so in a rapidly changing global economy where the quality of human resources determines a country’s power and competence in the global market. The emergence of knowledge as a driving factor ushers in challenges and opportunities. The challenges are to train people to help them stand their ground and enable them to take advantages of the opportunities offered by globalisation. In such an increasingly competitive world, the need for greater coordination and cooperation between industries on the one hand and the academic institutions on the other for facing challenges and taking advantage of the opportunities offered is recognised (Shyamkumar, 2010).

The university–industry interface has been in place in one form or the other for more than a century, be it consultancy or exchange of personnel. In the present scenario, its role has been widely accepted (Martin, 2000). The primary reason for the presence of a university–industry interface is the difference between what is taught in the universities and what is required in real life (Sigroha & Anjali, 2013).
The interface will ensure that universities produce what is required of them in industries and industries cater to the needs or demand of universities. The benefits of research knowledge can be passed over to industry by the university and in turn the industry can provide to the universities the necessary funding and practical knowledge, which is one of the essential ingredients for survival in the open market.

1.2 HIGHER EDUCATION

Education in general and higher education in particular is a force for individual growth, societal progress and cultural development of any country. Education contributes to economic development and to the quality of life that economic development makes possible (Ministry of Human Resource Development, 2013). Higher education in any country has been a major agent of positive change and development – for individuals, for society and for the state; and it has supported the creation, development and transmission of social, cultural and economic values. Higher education has made a huge contribution in leading, framing and delivering positive changes. Higher education institutions serve and enrich society in many ways and their role is multi-faceted. Higher educational institutions act as gatekeepers, disseminators and creators of new knowledge and serve an ever growing and more diverse student body. They form a nexus of interaction between a complex range of interests on local, regional, national and global bases (Hunt, 2011).

Higher education in a changing society looks at aspects of the relationships that bind higher education to wider society and at how higher education needs to change over the coming decades to meet new economic, social and cultural
challenges. It describes the environment within which the higher education system operates and the challenges to which it must respond to industry needs. In building a strong, well-resourced and renewed higher education system, collaboration with industry and understanding its expectations are crucial.

Higher education is central to the economic renewal; it supports individual well-being and social development. It also plays a fundamental role in fostering a spirit of inquiry and a strong sense of the value of learning among students; it is the positive engagement that students have with higher education that stimulates them to make innovation possible. The quality of their learning experiences and the environment in which students learn will shape the future development of our society. The people who enter higher education in the coming decades are the job creators, policymakers, social innovators and business leaders of the future. They are also citizens who will add to the richness of society – as parents, community leaders and teachers and through their chosen area of work they will create a productive, vibrant and prosperous economy.

Higher education itself will need to innovate and develop if it is to provide flexible opportunities for larger and more diverse student cohorts. It will need to do this while simultaneously enhancing quality and relevance, and connecting better with the wider needs of society and the economy, while operating in a more competitive globalised environment. The nature of the learning community and the modes of teaching and learning will also change significantly over the coming years (Hunt, 2011). These changes will be supported through industry collaboration and research-led teaching and learning, programme design, student assessment and
a quality assurance system – all of which will reflect a new emphasis on nurturing creative and innovative minds.

1.2.1 Growth of Higher Education

The impact caused by globalisation has enabled the developing countries to leapfrog ahead in one of the most unexpected areas – higher education. Most recent numbers show that the share of developing countries in total enrolment in higher education has gone up from 54.4% in 1970 to 72.4% in 2006. This is surprising as developing countries continue to lag in both wealth creation and trade, even though they account for 85% of the world’s population.

The globalisation and the growth of the knowledge economy seem to have made a major change in the developed world’s perception of the growing knowledge empowerment in the developing world. Trends from the seventies onwards show that though the enrolment in higher education in the developed countries had almost doubled to 26.6 million in the two decades till 1990, the gains decelerated later with enrolment increasing by just 46.6% to reach 39 million in 2006. In contrast, the enrolment in higher education in the developing countries went up by more than one and a half times over the two decades to touch 41 million in 1990, and then shot up to 102 million over the next 16 years. But what makes the trends more interesting is that the gains and losses are highly skewed with the major changes largely restricted to a few nations such as the US, China and India (Raghavan, 2009).

As in the case of the developed countries excluding the US, the share of the developing countries excluding China and India in higher education enrolment
remained almost stable, with the numbers barely going up from 45.6% to 46.8% between 1970 and 2006. In contrast, the share of China and India in the global enrolment went up almost three-fold from 8.8% in 1970 to 25.7% in 2006. But between these two countries, the real achiever is China, whose share in total enrolment went up from just about 0.3% to touch 16.5%, making it the nation with the highest number of persons enrolled in higher education. The 23.4 million Chinese enrolled in higher education in 2006 was around a third more than the 17.5 million enrolled in the US. Though India’s gains are more limited with its share of persons enrolled in higher education going up from 8.5% in 1970 to 9.1% in 2006, the size of enrolment was an impressive 12.9 million, which was only a third less than in the US. A surprising element is the Chinese gains over India. The number of persons enrolled in higher education in India had been sizably more than that of the Chinese till 2000 (5 million Indians were enrolled in higher education as compared to 3.8 million Chinese). But the Chinese have moved at a scorching pace over the last 16 years and added up 19.6 million to the higher education enrolment while the Indian gains were less than half at just 7.9 million.

1.3 ENGINEERING EDUCATION IN INDIA

India has the vast higher engineering education network. The technical education is imparted through government institutions, government aided institutions, private or self-financing institutions under a government university and deemed to be universities. The government institutions such as the Indian Institutes of Technology and National Institutes of Technology dominated the first few decades of technical education in post independence India. However, the policy shift
of the government in the 1980s towards involvement of private and voluntary organisations in setting up technical institutions on self-financing basis ushered in an era of expansion of the technical education system and this resulted in a sudden growth in the number of private or self-financing engineering institutions especially in the southern states. These engineering institutions are affiliated to a government-run university and the main aim of the self-financing colleges initially was to provide a degree to the students, and later on, to provide jobs to the outgoing students through campus placement programs. There was no emphasis in the initial stages on associating with the industries or to increase research activities. The intense competition among the self-financing colleges led some of them to offer better programs in the departments such as inviting guest lectures, taking students on industrial visits etc. in addition to providing placement through campus. Even at this stage, all these programs took place on a case-by-case basis, depending on the professional relationships of individual faculty members. There was no coordinated effort to bring in all industry-related activities under a single umbrella.

1.3.1 Engineering Education System in India

Higher education is of vital importance for the country, as it is a powerful tool to build a knowledge-based society of the 21st century. In this context, engineering education, which is a part of higher education in India, mainly consists of two distinct types of institutions as described below.

(i) University / University level institutions

(ii) Engineering colleges / Institutions affiliated with university
Higher Engineering Educational Institutions (HEEI) consist of university / university level institutions.

(i) University / University Level Institutions

Under the University Grants Commission (UGC) Act, 1956, “university” means a university established or incorporated by or under a Central Act, a Provincial Act or a State Act, and includes any such institution as may, in consultation with the university concerned, be recognised by the commission in accordance with the regulations made in this behalf under this Act (Ministry of Human Resource Development, 2012). Thus the following degree awarding institutions are covered in this category:

1. **Central university** – A university established or incorporated by a Central Government Act.

2. **State university** – A university established or incorporated by a Provincial or by a State Government Act.

3. **Private university** – A university established through a State or Central Act by a sponsoring body viz. a society registered under the Societies Registration Act 1860, or any other corresponding law for the time being in force in a state or a public trust or a company registered under section 25 of the Companies Act, 1956.

4. **National institute** – An institution established by Act of Parliament and declared as institution of national importance such as Indian Institute of Technology (IIT) and National Institute of Technology (NIT).
5. **Deemed to be university** – An institution deemed to be university commonly known as deemed university refers to a high-performing institute, which has been so declared by Central Government under Section 3 of UGC Act, 1956.

6. **Institute under State Legislature Act** – An institution established or incorporated by a State Legislature Act.

**(ii) Engineering Colleges / Institutions Affiliated with Universities**

These are institutions that can run degree programmes but are not empowered to provide a degree on their own and necessarily have to be attached with some university for the purpose of awarding degree. These engineering colleges are either government funded institutions / government aided institutions or self-financing institutions. The self-financing institutions, which are managed by an individual, trust, society or other private organization, do not depend on the government for their funds but run their courses through loans and fees collected from the students but are affiliated to the government-run universities and have to satisfy all the rules and regulations laid down by that university to keep their affiliation active.

These institutions offer different levels of programmes as detailed below.

1. **Under Graduate Programmes**: Duration of these programmes is 4 years. Students with 12 years of schooling are admitted into under graduate programmes.
2. **Post Graduate Programmes:** Duration of these programmes is 2 years. Students join these programmes after under graduation.

3. **Doctoral (Ph.D.) Programmes:** After post graduation, scholars join these programmes. The duration ranges from 3–6 years.

1.3.2 **Engineering Educational Institutions in Tamil Nadu**

The Government of Tamil Nadu devotes special attention to strengthen the engineering education system in the state. As on 2012, Tamil Nadu had 520 engineering institutions including government engineering colleges, government aided engineering colleges and self-financing engineering colleges, national institutes and deemed universities (Anna University, 2012). Among these, more than 90% are self-financing type of private educational institutions.

A number of private institutions have been granted the status of the deemed to be universities under section 3 of UGC Act, 1956. Deemed universities are required to possess viability and a management capable of contributing to university ideas and traditions. As on 2013, there were 22 private deemed universities (UGC, 2013) offering engineering education in the state of Tamil Nadu (Table 1.1).
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the University</th>
<th>Location</th>
<th>Year of Establishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Avinashilingam Institute for Home Science &amp; Higher Education for Women</td>
<td>Coimbatore</td>
<td>1988</td>
</tr>
<tr>
<td>2</td>
<td>Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya</td>
<td>Kancheepuram</td>
<td>1993</td>
</tr>
<tr>
<td>3</td>
<td>Sathyabama Institute of Science and Technology</td>
<td>Chennai</td>
<td>2001</td>
</tr>
<tr>
<td>4</td>
<td>Shanmugha Arts, Science, Technology &amp; Research Academy (SASTRA)</td>
<td>Thanjavur</td>
<td>2001</td>
</tr>
<tr>
<td>5</td>
<td>Vellore Institute of Technology (VIT)</td>
<td>Vellore</td>
<td>2001</td>
</tr>
<tr>
<td>6</td>
<td>Vinayaka Mission’s Research Foundation</td>
<td>Salem</td>
<td>2001</td>
</tr>
<tr>
<td>7</td>
<td>Bharath Institute of Higher Education &amp; Research</td>
<td>Chennai</td>
<td>2002</td>
</tr>
<tr>
<td>8</td>
<td>S.R.M. Institute of Science and Technology</td>
<td>Chennai</td>
<td>2002</td>
</tr>
<tr>
<td>9</td>
<td>Amrita Vishwa Vidyapeetham</td>
<td>Coimbatore</td>
<td>2003</td>
</tr>
<tr>
<td>10</td>
<td>M.G.R. Educational and Research Institute</td>
<td>Chennai</td>
<td>2003</td>
</tr>
<tr>
<td>11</td>
<td>Karunya Institute of Technology and Sciences</td>
<td>Coimbatore</td>
<td>2004</td>
</tr>
<tr>
<td>12</td>
<td>Saveetha Institute of Medical and Technical Sciences</td>
<td>Chennai</td>
<td>2005</td>
</tr>
<tr>
<td>13</td>
<td>Kalasalingam Academy of Research and Higher Education</td>
<td>Virudhunagar</td>
<td>2006</td>
</tr>
<tr>
<td>14</td>
<td>Periyar Maniammai Institute of Science &amp; Technology (PMIST)</td>
<td>Thanjavur</td>
<td>2007</td>
</tr>
<tr>
<td>15</td>
<td>B.S. Abdur Rahman Institute of Science &amp; Technology</td>
<td>Chennai</td>
<td>2008</td>
</tr>
<tr>
<td>16</td>
<td>Hindustan Institute of Technology and Science</td>
<td>Chennai</td>
<td>2008</td>
</tr>
<tr>
<td>17</td>
<td>Karppagam Academy of Higher Education</td>
<td>Coimbatore</td>
<td>2008</td>
</tr>
<tr>
<td>18</td>
<td>Noorul Islam Center for Higher Education</td>
<td>Kanyakumari</td>
<td>2008</td>
</tr>
<tr>
<td>19</td>
<td>Ponnaiah Ramajayam Institute of Science &amp; Technology (PRIST)</td>
<td>Thanjavur</td>
<td>2008</td>
</tr>
<tr>
<td>20</td>
<td>St. Peter's Institute of Higher Education and Research</td>
<td>Chennai</td>
<td>2008</td>
</tr>
<tr>
<td>21</td>
<td>Vel's Institute of Science, Technology &amp; Advanced Studies (VISTAS)</td>
<td>Chennai</td>
<td>2008</td>
</tr>
<tr>
<td>22</td>
<td>Vel Tech Rangarajan Dr. Sagunthala R&amp;D Institute of Science &amp; Technology</td>
<td>Chennai</td>
<td>2008</td>
</tr>
</tbody>
</table>

Note: Based on UGC website http://www.ugc.ac.in/deemeduniversitylist.aspx?id=31&Unitype=4 downloaded on 24.03.2013.
1.4 NEED FOR THE STUDY

Many developing countries are trying to transform their economy from resource-based technology to technology-based economic growth. This transformation is guided by their desire to make their economy less dependent on natural resources, and other limiting factors that inhibit growth. Technology-based economic growth is guided by a number of factors and their successful integration in an economy. A common characteristic of highly industrialised economies is their investment in knowledge production and translating the knowledge into innovative products. Production patterns in highly industrialised economies have changed from mass scale production to product differentiation, i.e. novel innovations in an existing product or creation of a completely new innovative product. Formal and informal networks among various actors are becoming a key feature in the innovation process. Many of the novel products can be traced to the collaboration and partnerships between the firms and HEEI and R&D institutions, which are fast becoming the engines of innovation. Emergence of high-tech industries have motivated HEEI to have a more direct role in the innovation process in the highly industrialised economies.

The evolution of Institute–Industry Collaboration presents different patterns according to the level of development and to the historical and institutional traditions of individual countries (Mowery & Sampat, 2005). Collaboration with industry are important in providing the best opportunities for engineering graduates, for bringing practical, real-world problems into the classroom and laboratory, for engaging faculty members to apply their expertise and for providing a platform for
the institution to address industry challenges. A measure of the extent of Institute–
Industry Interaction is the level of support from industry (Was, 2005). A framework
was developed to analyze the quality and prioritized the factors under the National
Board of Accreditation (NBA) criteria with respect to the criticality of assessing the
performance of an engineering programme (Viswanadhan, 2007). According to the
framework, the institute initiatives are essential in improving the industry–institute
interaction.

There are only a few studies that have explored university–industry
interactions in developing countries and a detailed empirical investigation is
important to understand the collaboration pattern in a developing economy
collaboration has been increasingly valued by the academia and the degree of
interaction has been increasing over the years and with the possible exception of
a few studies, university–industry interactions in India remain an unexplored
area (Joseph & Abraham, 2009).

Generally, HEEI were looking for internships and placements for their
students and the industry for fresh recruits who are well trained and equipped with
the right knowledge skills and attitude to be able to contribute to the organization’s
growth. When it is realised that HEEI and industry are so inter-dependent on each
other, with the institutions engaged in educating engineers and the industry
providing employment for these engineers, it becomes necessary to explore avenues
for improved collaboration between these partners in national development.
Additionally, there can be no doubt that we cannot have an active innovative
technology without the continuous stimulation provided by research, whether basic or applied. Since HEEI are also the place for most research, and industry necessarily the place for most technology, what is called for is enhanced collaboration between HEEI and industry.

Collaboration with industry should be an important feature in HEEI development. Fostering a close working relationship may bring in various cross sections of practitioners into the academic fold for mutual benefit and make higher engineering education more meaningful in equipping graduates with marketable skills. Such a kind of relationship is not developed easily, since the culture and values of HEEI and industry are different.

The above observations have motivated the researcher to undertake a research study to determine the effectiveness of Institute–Industry Collaboration in HEEI. The outcome of the research study will be highly useful to HEEI for the continuous improvement of quality of education.

1.5 RESEARCH GAP

1. In India, research on Institute–Industry Collaboration is still in its infancy and it remains an unexplored area

2. In India, the research studies carried out on Institute–Industry Collaboration in HEEI are general in nature. They mainly deal with modes of interactions

3. There is not much literature support available on the effectiveness of Institute–Industry Collaboration in HEEI
4. There is not much literature support available on the enhancing and limiting factors that play an important role on the effectiveness of Institute–Industry Collaboration in HEEI.

1.6 STATEMENT OF THE PROBLEM

The problem of the research study is titled as “Effectiveness of Institute–Industry Collaboration in Higher Engineering Educational Institutions of Tamil Nadu”.

The research study was carried out to analyze the effectiveness of Institute–Industry Collaboration in HEEI located in the state of Tamil Nadu. The main purpose of the research study was to identify the parameters in Institute–Industry Collaboration, to determine how far they have been effective and the factors that play a major role in enhancing as well as limiting their effectiveness. The research study also aimed to develop an appropriate model and strategies for effective implementation of Institute–Industry Collaboration.

1.7 RESEARCH OBJECTIVES

Collaboration between HEEI and the industry is seen as the platform for showcasing best practices, latest technological advancements and their implementation and impact on the industry. It is basically considered to improve the quality of higher engineering education adequately to meet the needs of the industry and economy. Having a close collaboration in place, industries are able to participate in technical and vocational education programs, with the goal of cross-fertilizing ideas for systems improvement, to integrate industrial training and other inputs from the industry with the teaching-learning processes. It develops students’
awareness on job functions in the industry, attitudes to adapt to industrial environment, proper practical and relevant knowledge, skills and competencies in preparation to becoming self employed or entrepreneur. Industry expectations are also echoed through sound interaction, particularly the requirements from new recruits who are expected to be orientated to industrial disciplines, job descriptions within the workplace with industrial practices. Mutual benefit is derived from the shared expertise and experiences between the institute and the industry (Majumdar, 2008).

The purpose of this study is to determine the effectiveness of Institute–Industry Collaboration and to identify the enhancing and limiting factors that play an important role on the effectiveness of Institute–Industry Collaboration in HEEI in the state of Tamil Nadu. With a view to achieving the above purpose, the objectives are framed as given below:

1. To identify the important parameters that contribute to Institute–Industry Collaboration

2. To determine the effectiveness of Institute–Industry Collaboration in Higher Engineering Educational Institutions of Tamil Nadu

3. To identify the factors that play an important role in enhancing as well as limiting the effectiveness of Institute–Industry Collaboration

4. To develop an appropriate model and strategies for effective Institute–Industry Collaboration.
1.8 HYPOTHESES

The hypotheses have been grouped into four categories, namely

Category 1 – Hypotheses relating to the difference between the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Category 2 – Hypotheses relating to the difference between the mean ranks of parameters assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Category 3 – Hypotheses relating to the difference between the students with respect to the effectiveness of Institute–Industry Collaboration.

Category 4 – Hypothesis relating to the difference between the mean ranks of parameters assessed by the students with respect to the effectiveness of Institute–Industry Collaboration.

A total of 12 hypotheses have been formulated. They are presented below under the four categories.

Category 1:

Hypothesis I

There is no significant difference between the assessments of faculty members of different departments with respect to the effectiveness of Institute–Industry Collaboration.
Hypothesis II

There is no significant difference between the assessments of faculty members with different designation with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis III

There is no significant difference between the assessments of faculty members with different years of teaching experience with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis IV

There is no significant difference between the assessments of faculty members handling different programmes with respect to the effectiveness of Institute–Industry Collaboration.

Category 2:

Hypothesis V

There is no significant difference between the mean ranks of parameters in General Collaboration assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis VI

There is no significant difference between the mean ranks of parameters in Academic Level Collaboration assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.
Hypothesis VII

There is no significant difference between the mean ranks of parameters in Institutional Support Type Collaboration assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis VIII

There is no significant difference between the mean ranks of parameters in Service Type Collaboration assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis IX

There is no significant difference between the mean ranks of parameters in Cooperative Type Collaboration assessed by the faculty members with respect to the effectiveness of Institute–Industry Collaboration.

Category 3:

Hypothesis X

There is no significant difference between the assessments of students of different departments with respect to the effectiveness of Institute–Industry Collaboration.

Hypothesis XI

There is no significant difference between the assessments of students in different years of study with respect to the effectiveness of Institute–Industry Collaboration.
Category 4:

Hypothesis XII

There is no significant difference between the mean ranks of parameters in Student Level Collaboration assessed by the students with respect to the effectiveness of Institute–Industry Collaboration.

1.9 DELIMITATIONS

The scope of the research study is delimited by the following aspects:

- The study is delimited to the engineering institutions of Tamil Nadu on which the status of deemed university is conferred. During the study period, there were 22 deemed universities offering engineering education in the state of Tamil Nadu.

- The data collected for the study pertain to activities of five departments – Civil Engineering, Mechanical Engineering, Electrical & Electronics Engineering (EEE), Electronics & Communication Engineering (ECE) and Computer Science Engineering (CSE) departments of the engineering institutions of Tamil Nadu under deemed universities.
1.10 DEFINITION OF TERMS

The key terms considered in the study are defined as follows.

Institute

The Oxford Advanced Learners’ Dictionary of Current English (1989) – Fourth Edition describes the institute as a society or organization for a special, professional or educational purpose. In this study, institute is used in the sense of an organization for educational purpose. Since this research study is concerned only with the higher engineering educational system, institute in this study means a deemed to be university offering engineering education.

Industry

The term industry is used as a manufacturing or technically productive enterprises in a particular field, country, region, or economy viewed collectively, or one of these individually. Industry in this study means medium and large scale enterprises.

Higher Engineering Educational Institutions

The higher engineering educational system in India includes both private and public universities. Public universities are supported by the Government of India and the state governments, while private universities are supported by trusts and societies. Universities in India are recognized by the UGC, which draws its power from the UGC Act, 1956 and in addition to the above universities, other institutions are granted the permission to autonomously award degrees, and while not called "university" by name, act as such. They usually fall under the administrative control
of the Department of Higher Education. In official documents, they are called "autonomous bodies", "university-level institutions", or even simply "other central institutions".

Deemed to be Universities

Deemed to be universities (also called as deemed universities) are the institutions of higher education and research, which grant academic degrees in a variety of programmes and enjoy the academic status and privileges of a university under section 3 of UGC Act, 1956.

Collaboration

The term collaboration refers to a cooperative arrangement in which two or more organizations (which may or may not have any previous relationship) work jointly towards a common goal.

Institute–Industry Collaboration

In this study, Institute–Industry Collaboration is an interactive and collaborative arrangement between higher engineering educational institutions and industry for the achievement of certain mutually beneficial goals and objectives, wherein the institute initiatives are essential in improving the collaboration.

Stakeholder

The term stakeholder includes a person, group or organization that has interest or concern in an organization. Academic administrators,
placement coordinators, faculty members, students and representatives of industries are the stakeholders considered in the study.

**Parameter**

Wikipedia defines a parameter as an important element to consider in evaluation or comprehension of an event, project or situation.

**Effectiveness**

The term effectiveness (Nagasubramanian, 2001) is the extent to which each type of Institute–Industry Collaboration has brought about the result intended, as assessed by the stakeholders.

1.11 STRUCTURE OF THE THESIS

The detailed structure and content of this thesis is illustrated in Figure 1.1.

The first chapter begins with introduction to the role and growth of higher education especially in the field of engineering in India, need for the study, research gap, statement of the problem, research objectives, hypotheses and structure and contents of thesis chapters.

In the second chapter, review of literature provides introduction to concepts, historical developments, global scenarios in higher engineering education, and practices of Institute–Industry Collaboration in HEEI in India and in other countries.
In the third chapter, research methodology discusses the framework of the study, research design, instruments development, data collection methods and data analysis plan.

The fourth chapter, analysis and findings presents analysis of the effectiveness of Institute–Industry Collaboration, testing related to hypotheses and analysis on the identification of important enhancing and limiting factors of effective Institute–Industry Collaboration. In the last section, the model developed for Institute–Industry Collaboration is presented and the strategies for effective Institute–Industry Collaboration are described.

The fifth chapter offers the summary of the research work, major findings, conclusions and recommendations and suggestions for future research.

Appendices, references and annexure are given at the end of the thesis.
Chapter 1
Introduction to role and growth of higher education, need for the study, research gap, statement of the problem, research objectives, hypotheses

Chapter 2
Review and analysis of existing research literature, research journals and reports

Chapter 3
Research framework, research design and methodology of the thesis

Chapter 4
Analysis of data and findings, suggested model and strategies

Chapter 5
Major findings, conclusions, recommendations and suggestions for future research

Figure 1.1 Structure and Contents of Thesis