CHAPTER – I

INTRODUCTION

1.1 INTRODUCTION

India became politically independent on August 15, 1947. The constitution makers of free India had conceived the Indian state as Sovereign Republic based upon the principles of Democracy, Secularism and Socialism. All these principles determined the direction, free India would take for its future course of development. After independence the main task before our national leadership was a well-balanced socio-economic development of the country. Therefore, Indian Government chalked out detailed plans for such development. It was realized that to gear up the socio-economic development of the country the path of modernization and self-sufficient economic growth should be followed. Moreover, our national leaders recognized that the solutions of problems of socio-economic inequalities at all levels, lie only with the education. Thus the government of India took the financial and administrative responsibility of providing education to the masses with the objectives of social transformation towards equality and orientation of education to work and employment. Although need of primary and secondary education was felt strongly for the removal of illiteracy and to increase the awareness among the masses to move towards an enlightened society, yet the nation could not ignore the role of
technical education to achieve the objectives of modernization and self-sufficiency.

Since when India attained independence in 1947 the country hardly had an industrial base and trained manpower for the task of economic development. The first Prime Minister of India, Pandit Jawahar Lal Nehru who remained in the office for seventeen years, laid down the foundation of heavy industry in India and tried to make the young generation interested in technical and engineering education. At that time, many large projects were undertaken to meet the needs for irrigation, flood control, power and to establish an infrastructure for the steel, machine tools, fertilizers, transportation, drugs and pharmaceuticals, petrochemicals, power equipments, industries, but the major problem in satisfying the needs of these projects was the acute shortage of trained technical manpower. Therefore an ambitious programme of expansion of technical education was undertaken to meet the shortage of skilled workers, supervisory manpower & professionals who could perform functions such as planning, designing, production, maintenance, management etc. in various fields which lead to opening up of new technical institutions like ITIs (Industrial Training Institutes), Polytechniques and Engineering College throughout the country after independence.

Government of India appointed various commissions and committees (University Education Commission, 1948, Mudaliar
Commission, 1952-53, Kothari Commission, 1964-66, New Education Policy, 1986, etc.) from time to time which gave very relevant recommendations regarding expansion of technical education. National Policy (1967) also stressed that, “Education is a powerful instrument of national development – social, economic and cultural. The highest priority should therefore be accorded to the development of national system of education which will emphasize science and technology”. Moreover many government agencies like All India Council for Technical Education (AICTE), University Grant Commission (UGC), National Institute of Educational Planning and Administration (NIEPA), Central Advisory Board of Education (CABE), etc. helped in streamlining the technical education system. In 1976, through the 42nd constitutional amendment, education was incorporated to the concurrent list and technical education also became a joint responsibility of the centre and the states. The objective of incorporating education to the concurrent list was to facilitate evolution of all Indian Policies in the field of education.

Although Kothari Commission (1964-66) recommended some share of private sector in the field of technical education, yet the constitutional commitment of equal opportunities for all in the field of education was unaltered. Even the 44th amendment (1978) of Indian constitution provided, “the state shall, in particular, strive to minimize the inequalities in income and endeavour to eliminate inequalities in status, facilities and opportunities, not only amongst
individuals but also amongst groups of people, residing in different areas or engaged in different vocations”. Being a landmark in the educational development of the country the National Policy on Education (1986) was reviewed during 1990-92. Again the equalization of educational opportunities, women’s education and development, vocationalization of school education, modernization of technical education and improvement of equity content and process of education at all levels were emphasized in this review.

But by the end of Nehruvision era, private sector was also developed along with the public sector and with new economic policy that came into existence in 1986, privatization in all the fields of national development got the upper hand. Socialist oriented self reliant development with the human face suffered a lot and the interest of private capital got the highest place. With the defeat of socialist block in the beginning of the 10th decade of the last century. India became dependent mostly on imperialist designs working under the influence of America and other capitalist countries of the world and under the pressure of imperialist forces Government of India also adopted the policy of liberalization and privatization. This happened especially during 1991, when the country faced the balance of payment crisis and accepted the structural adjustment programme of the World Bank and the IMF. This paved the way to India joining slowly the new economic discourse called ‘globalization’. It required the state to enforce the policies of WTO
and international trends in trade rather than allowing the state to watch the interests of its own citizens. Under the preview of World Trade Organization (WTO), a new agreement, General Agreement of Trade in services (GATS) was signed in 1995. This agreement has made education, a commodity which can be sold and bought. This has been applied to higher and technical education in many countries of the world. Ultimately, higher and technical education in India was influenced by this trend. However, the Indian state, operating within its constitutional framework has been faced with certain inherent contradictions in the sphere of education. This has been in consequence of the commitments enshrined in the constitution to egalitarian objectives on the one hand, the right guaranteed to private interests through Article 19(i) g on the other. It is not possible to understand education as a state function without recognizing the conflicting demands placed upon it.

It is due to the abovesaid conflicting demands that in the sphere of education also, as in other sectors, the Indian state has permitted the growth of private sector together with that of the state sector. Private initiative has been allowed in terms of freedom of choice, while state efforts have been directed to meet the constitutional demands for equality and justice. This dichotomy should be examined.

The constitution has conferred vide personal freedom consistent with public good. Through its several legislative measures
and legal norms, it has assumed the right to income through ownership, viz., profits, rents and interests, as not merely proper and just, but as a guiding principle for inducing development. Economic individualism, accepted in India’s liberal democratic set-up, has also encouraged, ‘Competition a legitimate strategy for the betterment of one’s fortunes’. The norm of profit in business or trade has not been ruled out. However, in the context of free competition, private ownership and profit motive, the definitions of freedom and equality, according to Micheal Apple (1989), no longer remain ‘democratic’ but turn ‘commercial’.

The welfare state that was stipulated in the constitution has reiterated its egalitarian values to gain legitimacy. The state, based as it is on a certain coalition of classes has sought to legitimize its dominance while still retaining the rhetoric of equality and justice in order to counter the growing tensions of civil society. A concrete example is provided in the constitution in the form of a clear distinction between fundamental rights and non-justiciable Directive Principles of state policy. The need for technicians and engineers and growth of private enterprises, including self-financed capitation fee colleges and management quota seats should be examined in the light of such contradictions.

Cast politics has also played a major role in changing the face of equity of technical and engineering education especially in the southern states. In the Indian political system, community and cost
have been utilized as solid blocks of support by political contenders. Amongst the prosperous sections of the middle caste particularly the competition to get good engineering education has been intense, and it has been a significant avenue used for upward mobility.

There has been a phenomenal growth in the number of technical institutions and sanctioned intake after independence. But this expansion in technical education in India has been inadequately planned and is haphazard with the result that there exist a number of sub-viable institutions. It is also a well-known fact that quality of technical education in India at present is getting diluted at an alarming rate. Upto late 70’s there were only a few engineering institutions in each state imparting technical education. There has been a phenomenal growth (10 fold increase) in the technical education institutions in the country during the past one and a half decade and also in some cases even the considerations for fulfilling minimum requirements laid down by statutory bodies like AICTE and UGC have been overlooked. Moreover during the four years from 1996-97 to 2000-2001 while there has been a marginal increase in the universities (from 229 in 1996-97 to 237 in 2000-2001) and the number of polytechnics (from 1051 in 1996-97 to 1231 in 2000-2001) there has been two fold increase in the number of degree level technical institutions (from 458 in 1996-97 to 1058 in 2000-2001). But the success of these technical institutions in the country, today, is doubtful in that they are unable to meet either industry’s demand
for well-prepared graduates or their own objectives of securing placement for their students. Technical institutes are producing graduates in larger number than the industry and other services can absorb. The industry on the other hand is quite dissatisfied with the level of knowledge and skills of graduates they recruit and feel that institutions have failed in their objective of imparting the quality education. The dissatisfaction of industry has led them to narrow down their recruitment to a few selected institutions and virtually ignore the remaining ones. This trend has only bred frustration amongst institutions that are becoming averse to industry’s disinterest in their products. This is a very undesirable and demotivating trend.

According to Singla (1989) a technical education system would be compatible with development requirements of developing nations if it concerns with considerations of comparative advantage of investment on education with optimal contribution to achieve socio-economic goals. Such a schematism should have the following objectives.

i. To further national cause of socio-economic development according to the constitutional commitments

ii. Optimum utilization of visible and hidden resources.

iii. Promotion of problem oriented research on vital domestic development issues.
iv. To enhance the quality of existing physical and human resources and to upgrade the skills.

v. To bridge the over increasing technology gap between developed and developing nations

vi. Promotion of low cost between labour intensive technology.

vii. To select, to fit, or to optimize new and old technologies.

viii. To suit existing standards of the economy.

ix. To have increased awareness of the bonds between an academic institute and the community.

x. To integrate widely dispersed activities and to mobilize amalgamated effort initiating planning and implementing development programme, etc.

But in case of Indian technical education system it seems that the above stated factors have not been paid the required attention while developing the system.

Moreover technical and engineering education like infrastructure constitutes the backbone of social and economic development of a nation. We cannot afford to compromise on the quality of education if we hope to achieve a higher degree of social and economic development. The education we provide must be of high quality so that the students are not compelled to go abroad to get better quality of engineering education. Many a scholar feels that the engineering courses opted by the average Indian students are without much relevance towards the discharge of their duties and
responsibilities properly and efficiently after completing their courses. This is so because the existing system of engineering education which is the legacy of British colonialism is far too academic and less vocational in its relevance to the needs of developing countries. Parents and pupils choose to remain indifferent to the problem. They expect the government to do things for them. They do raise their voice only when their own personal interests are affected. They do not think it necessary to form a powerful block to fight for their rights to have quality education at affordable costs and to violently oppose these forces that prevent quality education from being a reality.

Consequently, the status of technical education is progressively sliding down the line of all standards of qualitative viability. However, excellent centres of technical education, like the IITs, NITs, RECs, IISCs NITIE and many departments in the better known universities, do exist. The overall picture is one of some islands of excellence in a sea of mediocrity. Moreover many engineers who get qualitative education from these institutions leave India to work abroad. At the time when the country is liberalizing economy and entering the global competition, it is facing the serious problem of brain drain. Without high quality engineers it will be difficult for the industry and technical institutions to survive. Technical institutions are also facing a faculty crunch as competent and well qualified teachers are not easily available.
Further in the present age women is marching forward in every walk of life and she has proved her mettle even in some highly technical jobs. Although girls are getting technical education in various institutions of the country yet their participation in engineering and technical education in India has not been satisfactory. Thus it requires a detailed enquiry into the growth in percentage of women getting technical education over the past years.

Moreover India being a vast country with regional climatic, economic and geographical disparities, it demands in depth study to find out whether the expansion of technical education in different states and different regions has been in equal proportion? As far as the expansion of technical education in India is concerned it is generally believed that development has been very heterogeneous. This proposition should also be tested on the basis of facts and figures and the backward regions in the field of technical education should be pointed out and measures should be taken to establish new technical institutions in these regions.

Thus it becomes imperative in the present context to conduct meaningful SWOT (strength, weakness, opportunities and threats) analysis to identify the deficiencies existing in the present system of technical education in India.

1.2 NEED AND IMPORTANCE OF THE STUDY

It is an established fact that development of a country depends upon its natural and human resources. But the optimum use of
natural resources for the development is possible only, if first, the human resources are developed. Whereas in order to develop the human resources, a well-planned programme of education and training of the masses is essential.

In the second half of the twentieth century, the world has gone through a scientific and technological revolution. As a result not only the methods of production have changed tremendously, new techniques in production, new materials and energy generating devices and new machines are being used throughout the world. Thus, education and training of the new generation to enable them to acquire the scientific and technological knowledge and skills has become much more important.

Countries like Japan, Sweden, Norway, Korea, Holland, etc. have developed themselves with the efficiency of human beings, though they have very scarce natural resources as compared to the other countries of the world. On the other hand, there are countries like India, having large natural resources but they have not developed at the expected pace. According to the World Bank report (2002) percentage of trained workers in the age group of 20-24 in some countries of the world is as shown in table 1.1 below:
<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of Trained Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>5.06%</td>
</tr>
<tr>
<td>Australia</td>
<td>64.11%</td>
</tr>
<tr>
<td>Canada</td>
<td>78%</td>
</tr>
<tr>
<td>France</td>
<td>68.57%</td>
</tr>
<tr>
<td>Germany</td>
<td>75.33%</td>
</tr>
<tr>
<td>Italy</td>
<td>43.68%</td>
</tr>
<tr>
<td>Japan</td>
<td>80.39%</td>
</tr>
</tbody>
</table>


We can easily infer from the table 1.1 that as far as the number of technically trained workers is concerned, India is far behind the developed countries of the world.

But on the other hand the technical education system in India has made a very significant quantitative progress after independence. India possessed only 42 technical institutions at degree level and 53 institutions at diploma level with an annual intake of merely 2950 and 3650 students respectively which have now grown to approximately 1511 technical institutions at degree level and 1697 institutions at diploma level. In the year 2003 which is one of the highest growth rates in the world.

In this context, many eminent economists feel that most of the developing nations have been led to believe that the rapid quantitative expansion of technical and engineering education holds
the key to their economic development and as a result these countries have expanded their technical and engineering education at a rate which is extremely difficult to justify either socially or financially in terms of optimal resource allocation and India is one of such countries.

There is no doubt that since independence, India has produced a large number of competent, qualified engineers who have contributed to the success of many Indian companies and industries. Also a large number of our engineering graduates have made an impact in the corporate world internationally. Despite these positive outcomes there are many limitations in the engineering education system of India.

Before as well as after Independence, especially until late eighties most of the institutions were opened in the southern states. But it has happened only after late eighties that engineering colleges in Punjab has started increasing but after that there has been a haphazard mushroom growth of engineering institutions.

Though there are a variety of institutions imparting different types of engineering education in Punjab. Yet most of them are maladjusted and are out of step with the real needs of development of the state. Since the government has declared that it cannot afford to finance the higher and technical education for all, therefore a number of self-financed colleges of engineering and technology have been established in Punjab like other parts of the country.
Consequently, the problem of commercialization of education and inequality of opportunity has become more in Punjab. Though there is a mechanism for accreditation (National Board of Accreditation) and an Umbrella Agency, the All India Council for Technical Education (AICTE) setup to monitor and control engineering education at the national level, yet the quality of engineering education in many institutions is suspect. The participation of the women, SCs, STs, OBCs and other underprivileged classes in engineering education in the country in general and Punjab in specific has also not improved according to the goals.

Further, there are different types of institutions of engineering education in Punjab. Some are managed by central government others by state government, others are private, but aided by state government, whereas others are run by the universities. While there are self-financed institutions also. This variety leads to unequal rates of fees and heterogeneous quality of education in different type of institutions.

Further, Punjab has been fast emerging as a state with a large pool of scientific and technological manpower. The sheer number may boast of significant success in terms of the generation of graduates in various branches of engineering and technological education, but it reveals a shortsighted policy making that produces more unemployed engineers every year. Though the planned development of higher engineering and technology education in
Punjab is only fifty years old, it has brought into sharp focus the issues of uneven growth, quality and social coverage of engineering and technology education.

This situation calls for a number of questions to be answered: Has the engineering education system in the country in general and in Punjab in specific been able to provide the required quantity and quality of engineers for the growth of the Indian economy? Is the engineering education system in Punjab catering to the different societal needs of the state? Has the self-financing engineering education system provided the similar education as provided by the public system? In the context of globalization, is there a need to modify the engineering education system in India? There are no clear-cut answers to these and many more other questions.

This calls for a rethinking as to what is wrong with the current policies and strategies of the state government and the union government and what should be the policy direction for the future. Thus keeping in view this need, the investigator planned to conduct this study so that the growth and development of engineering education in Punjab after independence can be studied in detail.

Although some research work has been done in the field of engineering education, yet the present study is new as it will specifically study the Growth and Development of Engineering Education in Punjab focusing on the issues of expansion, regional distribution, social distribution, faculty availability, financing and
employment of engineering graduates. The community response to the different issues related to engineering education in Punjab will also be studied.

A survey of the research also reveals that the issues related to engineering education i.e. policy making, expansion, regional distribution, social distribution, faculty availability, financing and placement of engineering graduates happen to be the topics, which though of great importance have hitherto remained unexplored.

Moreover the findings of the present study will be helpful in planning and organizing engineering education at the national level as well as in Punjab to meet the needs of the state and society and to stop the wastage of resources.

Also this study will be helpful to the students and parents for in-depth understanding about various issues related to the field of engineering education. Further Government of India, Ministry of Human Resources, AICTE and government of Punjab would all be benefited by actively implementing recommendations of the present.

1.3 STATEMENT OF THE PROBLEM


1.4 OBJECTIVES OF THE STUDY

The present study has been undertaken with the following objectives:
i. To study the policy perspective in engineering education in India.

ii. To study the general growth and development of engineering education at the national level after independence.

iii. To study the general growth and development of engineering education in Punjab after independence.

iv. To study the views and perceptions of teachers, administrators, intellectuals, social activists and beneficiaries with regard to various issues related to engineering education in Punjab.

v. To conduct the case studies of some engineering institutions of Punjab.

1.5 OPERATIONAL DEFINITIONS

i. **Critical Study**: A critical study, critically evaluates the effects of policies and programmes on their targets in terms of the objectives they are meant to achieve. It assesses the extent to which goals are realized and looks at the factors associated with successful and unsuccessful outcomes. The assumption is that by critically analyzing the facts evaluation assists decision-makers to make wise choices among future course of action. Criticism of the consequences of programmes should improve decision-making.

ii. **Growth and Development**: Growth and development of engineering education in Punjab in the context of the present study connotes the policy perspective, achievements in engineering education, institutional network, sanctioned intake, enrolment, output, regional and social distribution,
financing pattern and demand and supply of engineers at the national level as well as in Punjab to be studied through trend analysis along with the views and perceptions of the respondents regarding the issues related to engineering education in Punjab and case studies of some selected engineering institutions of Punjab.

iii. Engineering Education: Engineering Education connotes the education provided to the students in various engineering colleges, universities, IITs, IISCs, NITs and other institutions of the country for Bachelor of Engineering (B.E.), Master of Engineering (M.E.), Bachelor of Technology (B. Tech), Master of Technology (M. Tech) and Doctor of Philosophy (Ph.D) in engineering in the following trades.

a. Aeronautics
b. Architecture
c. Civil Engineering
d. Computer Science Engineering
e. Chemical Engineering
f. Electrical Engineering
g. Electronics & Communication Engineering
h. Electronics & Instrumentation
i. Leather Technology
j. Mechanical Engineering
k. Information Technology
l. Textile Engineering

m. Production Engineering, etc.

1.6 DELIMITATIONS OF THE STUDY

(i) The Study has been delimited to the growth and development of engineering education during the period 1947-2004. But the analysis of secondary data has been delimited to the data and material available in the secondary sources. Therefore in those cases where the data beyond 2004 has been available it has also been included in the study.

(ii) The analysis of secondary sources of data about the growth and development of engineering education at the national level has been delimited to the data regarding the brief recommendations of various committees, admission procedure for engineering institutions in different states of the country expansion in number of institutions, sanction strength, student intake and outturn, engineering graduates per million population in India, average intake per institute, doctorates degrees awarded in India, international comparisons of growth rates of graduate engineers, engineering doctorates, percentage of engineering Ph.Ds. to Bachelor engineering degrees, growth rates of academic output and growth in faculty of Indian Engineering institutions, social distribution of engineering education, regional distribution of engineering institutions and sanctioned intake per million population, gender participation, financing of engineering education, demand and supply of engineers.

(iii) The analysis of secondary sources of data regarding growth and development of engineering education in Punjab has been delimited to the data regarding increase in number of engineering institutions, sanctioned intake, comparison of student intake in Punjab with neighbouring states, output strength ratio of different branches, teacher-student ratio in different disciplines in Punjab, distribution of teachers in highest qualifications at degree level, regional distribution, social distribution, gender participation, financing of engineering education and demand & supply of engineers.

(iv) The views and perceptions towards various issues related to growth and development of engineering education of only following groups have been studied:

    a. Administrators
b. Teachers  
c. Students  
d. Intellectuals  
e. Parents  
f. Social Activists  

Administrators include the Vice-Chancellors, Registrars and Deans of the universities, Principles, Registrars of various colleges of engineering and Heads of various departments of engineering institutions whereas teachers include the faculty members of engineering institutions only. In the sample of intellectuals only the university and college teachers who have been teaching different social science subjects i.e. sociology, political science, economics, education, history and public administration and who have been well aware of the socio-economic conditions of Punjab as well as policy of the government have been included. While social activists include only those persons who have been actively involved in social work and have been related to the field of education in one or the other way. Whereas beneficiaries include the students studying in final year of graduate degree courses of engineering or first or second year of the masters degree courses of engineering and their parents.

(v) The views and perceptions of administrators, teachers, students, intellectuals, parents and social activities with regard to various issues related to growth and development of engineering education in Punjab have been studied by following the qualitative approach.

(vi) Case studies of following institutions of engineering education of Punjab have been conducted.

a. National Institute of Technology, Jalandhar  
b. Giani Zail Singh College of Engineering & Technology, Bathinda  
c. University College of Engineering, Patiala  
d. Yadvindra College of Engineering, Talwandi Sabo  
e. Guru Nanak Dev College of Engineering & Technology, Ludhiana
(vii) Under the case studies of the eight engineering institutions of Punjab mentioned above, only the study of following aspects of these institution have been covered:

a. Recognition and Accreditation  
b. Procedure for admission  
c. Courses available and intake  
d. Social distribution of seats 

e. Infrastructure  
f. Faculty  
g. Fee structure  
h. Placement  
i. Research and development  
j. Feedback from the faculty and students

1.7 ORGANIZATION OF RESEARCH REPORT

After having presented the introductory remarks, statement of the problem, objectives, delimitations and significance of the research study in the first chapter, the second chapter has been devoted to review of related literature, while the third chapter describes the conceptual framework, in the fourth chapter methodology applied to conduct the present research work has been discussed in detail. To achieve the first objective, policy perspective in engineering education has been studied and elaborated in the fifth chapter. Sixth chapter deals with the general growth and
development of engineering education at the national level and in Punjab based on secondary analysis. The seventh chapter has been devoted to the analysis of views and perceptions of respondents towards various issues related to engineering education whereas Eighth chapter deals with the case studies of eight selected engineering institutions of Punjab. The summary, conclusion and suggestions for further research have been given in the ninth chapter. The Bibliography has been provided at the end of the research report. The copies of the tools used have also been appended with the thesis.