Chapter II

REVIEW OF LITERATURE
2.1 Introduction

HRM issues related to TQM implementation in technical educational institutions have been studied in several contexts in the past research and this study explores in the regional context. The related area includes total quality management downfall caused by management barriers, faculty commitment, and faculty involvement. This study stimulates the quality working climate...
which exploits the condition for quality TQM-HRM concept.

This is the overall working environment that this study assumes; effective use of HRM practices plays a role of catalyst to increase the quality which ensures performance excellence. The evaluation of research were supported by data collected through structured questionnaire from the grassroots factors of the institutions (Faculty and Student) form eleven engineering colleges within four districts which come under SRTMU, Nanded Jurisdiction.

The research focuses on verifying the truth that HRM-TQM has specific relationship with quality improvement of technical institutions. HRM Practices are commonly used as a part of institutional management which includes factors like acquisition, training and development, institutional working climate, compensation and rewards, performance appraisal, research and development, industry-institutions interaction and retention strategies. Therefore the exercise is not only for management of institutions, but also to increase the performance of the institute stakeholders. This research uses qualitative and quantitative approaches to achieve its objectives focusing on technical institutions that come under SRTM, University Nanded Jurisdiction which provide engineering education.

According to Wilkinson et al. (1992) and Rees (1995) TQM has two aspects “Hard and Soft” which depend on each other. The hard aspect is related to quality control and the soft aspect is related to the use of HRM practices to generate employee commitment towards quality and implementing vision and mission in an effective way which enforces quality working culture, continues improvement and customer focus (Faculty-Student).

The term TQM is mostly used in manufacturing sector which emphasises on the hard aspect of TQM. The technical educational institutions come in service sector organizations which have direct interaction between the employer and the customer (Faculty-Student). In this context institutions must
focus on soft aspects of TQM which affect the quality improvement within institutions.

According to Miller and Cardy (2000) the HRM needs to respond in a creative way to TQM and reengineering in organizational changes. The HR activities in technical educational institutions relate to quality improvement process in which management, HODs and Faculty play an important role in organizational change management. (Noor Azam Ali, November 2006)

Figure-18

Quality HR-TQM Relationship in Quality Initiative

Source: (Noor Azam Ali, November 2006)

2.2 Concept of Technical Education

“Technical education it is a program of education, research and training in engineering and technology, architecture, town planning, management, pharmacy and applied arts and crafts.”

- AICTE Act 1987
Technical Education holds a key role in the development of the nation by creating skilled workforce, increasing productivity of industry and life style of the people. India is witnessing a technical age. There is a huge requirement for skilled workforce with the result the demand of technical education is at its peak in India. Technical education is seen as the most employable education compared to traditional general education in India.

The influence of technology touches the routine life of the people. Humans cannot live without technology. Take an example of mobile phone which has become a part of life of the common person. So to fulfil the technological need there is a huge requirement of skilled workforce in the industry. In order to create the skilled workforce, there is a need of huge number of quality technical institutions within the country which focus on practical and technical base. Quality technical institutions play an important role in the economic development of a country by providing technically sound manpower which places India in the community of prosperous nations (Mitra).

2.2.1 Technical Education in Global Perspective

Industrial Revolution makes a major landmark in human history and socio-economic condition in European countries during the nineteenth century. The Industrial revolution introduced fast development in science and technology and its application. During this period the foundation of many industries such as the textiles, iron making technique, refining coal, etc. was laid down. The growth of technical education was steady in the past. Technical knowledge was passed from generation to generation. The knowledge passed in this way did not have any methodical (Scientific) way of learning like the education given in universities and colleges today. We consider science education to be more precise while technical education as more particular in its form.
The basic concept of technical education emerged after the industrial revolution in Europe to satisfy the need of technically skilled workers who could handle machines and other equipments in a sound way. Many technical schools were set up to produce skilled labour in 1842. These institutions gave rise to a new system of learning by combining academic education with skill-based training to produce trained workforce for industrial and economic development. In 19th century, scientific development was at its peak. But the technicians like masons and artisans were not aware of scientific principles. With the purpose of imparting technical knowledge among the technicians, engineering education was introduced. In the beginning, engineering education was given in the form of training and apprentice to the traders of craftsman and artisans.

John Andersons in 1970 and Dr. Biskbeck in 1794 established two schools in Glasgow in France. Engineering colleges were being setup in 18th century and early 19th centuries in developed countries. At beginning technical education was confined to only two branches civil and mechanical. The Electrical engineering started later late from 1882. In nineteenth century, many branches of engineering like mining, shipping, Textile, Printing, etc. were introduced (Wikipedia).

In the globalization point of view, the world has come on single click of the mouse and this is nothing but the technical revolution in twentieth century. This has led to the demand for the new point of view towards technical education. The inventions of the computer and electricity have played a role of catalyst in the growth of the technical education. The technical educational institutions in world during 18th and 19th century are mentioned below
<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>School/College</th>
<th>Branch</th>
<th>New name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1790</td>
<td>France</td>
<td>School of apprenticeship</td>
<td>Craftsman and artisans</td>
<td>Royal Technical College</td>
</tr>
<tr>
<td>1823</td>
<td>Maine, USA</td>
<td>Bowdolin College</td>
<td>Discontinued</td>
<td>-</td>
</tr>
<tr>
<td>1823</td>
<td>New York</td>
<td>Rensseluer Polytechnique</td>
<td>Civil Engineering</td>
<td>Rensselaer Polytechnic Institute</td>
</tr>
<tr>
<td>1879</td>
<td>Charlotte berg, Berlin</td>
<td>Technische Hoceule</td>
<td>Discontinued</td>
<td>-</td>
</tr>
<tr>
<td>1890</td>
<td>Massachusetts Institute of Technology, USA.</td>
<td>MIT</td>
<td>Electrical Engineering</td>
<td>Massachusetts Institute of Technology USA</td>
</tr>
<tr>
<td>1905</td>
<td>London</td>
<td>Imperial College of Science and Technology</td>
<td>Civil and Mechanical Engineering</td>
<td>Imperial College, London</td>
</tr>
</tbody>
</table>

Source: https://en.wikipedia.org/wiki/Imperial_College_London
2.2.2 Technical Education in Indian Perspective

2.2.2.1 Technical Education in India before Independence

Various emperors rule the India like Mogul, French, Dutch, Shak and British, which has an adverse impact on Indian traditional education system. During Islamic rule technical education growth stagnated due to the Islamic traditional education approach. The original growth of technical education is carried out during British period. British feels that to rule their colonies, they required infrastructure development likes roads, bridges, dams, railways. For building this they required huge infrastructure and skilled workforce. For boosting an education in India, British formed different types of commission for reforms in education.

Sir William Jones established Asiatic society at Calcutta (1784 A.D.) and Lord Wellesley Fort established William College (1800 A.D.). During British rule the Christian missionaries play an important role in spreading education in India. Raja Rammohan Roy said to be the father of modern India. By his own endeavour he established Anglo Hindu School in 1815 A.D. By personal endeavour two English schools were founded in Chinsurah (1800 A.D.) and Bhawanipur (1848 A.D). Few energetic Indians and high-minded English civilians came forward to establish Hindu college in Calcutta in the year 1817 A.D. This is now the famous presidency college.

In the Charter Act of 1813, one lakh rupees budget per year was sanctioned for advancement of education in India. During the rule of Lord William Bentinck (1828-1835 A.D.) there was change in government’s education policy. In 1842, the public instruction committee was rejected and council of education was formed. By his recommendation education department was established. In 1857 A.D. Calcutta, Bombay and Madras universities were established (Chaturvedi, 2014).
Education Policies during British Rule

Charter Act of 1813 A.D.

- Formal Technical Education started in India.
- Industrial revolution laid down the foundation of techno-pro society in India.
- British started to give training in fields of roads bridges, building, railways, and canal, dock, etc. In such training program most of the trainers are British.
- The East India Company sanctioned budget of one Lakh rupees towards the improvement of education in India.

Macauley minutes

Lord William Bentinck believes in filtration theory of education. He introduced the policy to spread western education in India as recommended by ‘Macauley minutes’ executed on 2nd February 1838.

Wood’s Despatch

Sir Charles Wood, recommended to combine the streams (lowest and the highest) form of education in 1854. This is known as ‘Wood’s Despatch’. It is called as ‘Magna Carta’ in the history of British education in India. Its recommendations were: likes separate education department, establishment of universities in Calcutta, Bombay and Madras presidencies, to take adequate measures to reform the government schools and colleges, to start grants-in-aid in private schools, to increase in women education, mass education, progress in vernacular language and to set up of teacher's training, to increase in government school, arranged for inspection and to initiate secular education system, etc. Charles Wood first played an important role in spreading higher education in India. Under that recommendation ‘Calcutta University’ was
formed in 1857. Sequentially in Lahore (1882) and Allahabad (1887) universities were founded.

**Hunter Commission**

It was formed in 1882 under the leadership of Sir William Hunter during the period of Lord Ripon. The following were the recommendation mentioned in the report.

- Schools and colleges will be subsidized by the governments.
- All government restrictions were removed from schools and colleges.
- The responsibility of primary education goes towards municipality and the district boards.
- Special attention is to be given to higher education. (Mishra, 2014)

**During 1902-1921,** Indian government (British ruled) did not pay any attention towards technical and professional education. In 1906 the first 20th century college of engineering and technology was established at Jadhavpur in Bengal by the National Council of Education. This college started to grant diploma courses (Polytechnic) in mechanical and electrical engineering in 1921.

**In 1920** Harcourt Butler Technological Institute was established .During 1921-1937 a number of institutions established such as Indian School of Mines, Dhanbad, The school of chemical technology, Bombay.

**In 1931-1940** Bengal engineering college Sibpur, Guinday and Poona started mechanical, electrical and metallurgy courses. During Second World War ten to eleven engineering colleges in India are formed with intake of 200 students.
In 1936–1937 Abbot –Wood report recommended major reforms by suggesting a proper structure of vocational and technical institutions parallel to that of institutions imparting general education. On their recommendation a new type technical institutions called Polytechnic come into existence for training of middle level technical personnel. Delhi Polytechnic (1941) was the first in chain of such polytechnic. Technical education committee of the Central Advisory Board of Education (1943) and the Sarget Report (1944) also recommended the development of institutions as an integral part of national system.

Thirdly in 1945, an adhoc committee, popularly known as Sarkar Committee was appointed for advising on the lines of the Massachettues Institute of Technology (MIT). The Committee recommended that not less than four (Zone wise in North, South, East and West) higher technical institutes would be required to satisfy the post war requirements.

Fourthly, on 30th November, 1945, the All India Council for Technical Education (AICTE) was set up by a resolution of the Government of India (GOI) on the recommendation made by Central Advisory Board of Education (CABE).

Lastly in March 1947, Scientific Manpower Committee was appointed to assess the country’s requirements for different grades of the scientific and technical personnel for upcoming ten years (1947-1957). The Committee carried out a quantitative and qualitative assessment, according to which as many as 54,000 engineers and 20,000 technologists would be required for the period. This committee for the first time in the country introduced the concept with a capacity to predict the future requirements for manpower and to meet through an organized effort. The pre-independence era witnessed the establishment of various technical institutes that laid down the base for extending it further in future (Mishra, 2014).
Period from 1944 to 1947 was a turning point of transition in the technical education. In 1948, AICTE with the help of board of studies reviewed the situation of polytechnic education in India. It laid down the norms for accommodations, workshops, laboratory and staff required. After the year 1950, most of the polytechnics have strictly followed these norms.

Table-13

Foundation of Technical Schools and Colleges in India (1847-1917)

<table>
<thead>
<tr>
<th>Year</th>
<th>College name</th>
<th>Branch</th>
<th>New name</th>
</tr>
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<tbody>
<tr>
<td>1847</td>
<td>Thompson’s Engg. College, Roorkee</td>
<td>Civil</td>
<td>Roorkee University IIT, Roorkee</td>
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<td></td>
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<tr>
<td>1856</td>
<td>Calcutta College of Civil Engg., Writers building</td>
<td>Civil Mechanical (1931), Electrical (1939)</td>
<td>Bengal Engg. College</td>
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<tr>
<td>1858</td>
<td>Poona College of Engg.</td>
<td>Civil</td>
<td></td>
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<tr>
<td>1858</td>
<td>Industrial School, Gun Carriage Factory</td>
<td>Civil</td>
<td>Guindy College of Engg.</td>
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<td></td>
<td></td>
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<tr>
<td>1887</td>
<td>Victoria Jubilee Technical Institute, Bombay</td>
<td>Electrical Mechanical, Textile</td>
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</tr>
<tr>
<td>1908</td>
<td>College of Engg. And Technology, Jadavpur</td>
<td>Mechanical (1908) Chemical (1921)</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>1915</td>
<td>Indian Institute of Science, Bangalore</td>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1917</td>
<td>Banaras University</td>
<td>Mechanical, Electrical, Metallurgy</td>
<td></td>
</tr>
</tbody>
</table>

Source: Enhancing Teaching Effectiveness of Technical Teachers (Indian Journal of Technical Education)
2.2.2.2 Technical Education after Independence

After Independence in November 1948, the Government of India (GOI) appointed a commission under the chairmanship of Dr. S. Radhakrishnan (Professor of Eastern Religions and Ethics at the University of Oxford) to report on Indian University Education and suggested improvements and extensions which fulfilled the future requirement of country. In the field of technical education, the Radhakrishnan Commission emphasized the need for new types of engineering and technical institutes in India. It advocated closer liaison between engineering and technical colleges and the universities. It also made the significant recommendation to improve the quality and quantity of different classes of engineering and technologies in the country. After independence in 1950 world biggest democratic country recognized the supreme importance of technical education for the future development of the country and founded many committees for evaluation and designing framework for technical education system in country.

Dr. S. Radhakrishnan, from Radhakrishnan Committee (1948-1949) submitted the report in 1949 with the recommendations regarding the improvement in the quality of university education. This report suggested that quality of the secondary and university education should be improved. There should be vocational training institutes in the country.

Committee recommended that the duration of the post-graduation course should be 2 years and honours degree should be of 3 years. Curriculum of the first year in engineering college should be similar for all the disciplines. Related work experience should be given equal importance as formal education. There should be quality check before giving recognition new institutions.

There should be an assessment of quality measurement. If we are opening new technical institutions then should be an increase in the workforce. There should be a provision of giving practical implant training in the industry.
to all the students. This will help students to improve their practical skill and knowledge. Provision of higher education and research should be made available in engineering education. This committee was established to analyse critically the problem of university education in India. UGC (University Grant Commission) was established in response to the report of Radhakrishnan committee report and 10+2+3 pattern was formed for the higher education.

**In 1946, Shri. Nalini Ranjan Sarkar from Sarkar Committee** (1945-1949), submitted the report which includes recommendations regarding financial and administration set up for establishment of higher technical institutions after the independence of India. The Sarkar Committee recommended that there should be technical institutes in each region of India as West, East, North, and South. These institutes should be on the pattern of Massachusetts Institute of Technology. The Sarkar Committee stressed on the point that there is huge difference between the quality and quantity in the higher technical education of the country. There is an urgent need to address this gap. Committee recommended that there courses like hydrolysis in northern institutes. There should be an appointment of higher level management like dean, head of departments, and other faculty and clerical staff. There should be a planning for building equipment and course curriculum. This committee was the first committee which was established after the independence of the country. Sarkar committee focused on developing skilled workforce in the country which will become economically productive for the growth and development of India.

**In 1947, Dr. Santi Swarup Bhatnagar**, Secretary to Ministry of Education and Education Advisor to Government of India (GOI) from S.S. Bhatnagar committee submitted the report. This report recommended that there is a requirement of scientist, engineers, technologists, and doctors in post-independence era. S.S. Bhatnagar committee has assessed the requirement of the technical manpower in different government sector for upcoming 10 years. The analysis was done for the past 10 years for demand and supply ratio of
technical manpower, it was 4:1. This is the first systematic study made by the committee for knowing the future requirement of technical manpower.

In 1958, due to recommendations of National Development Council, the Planning Commission decided to appoint working groups on different subjects in order to consider the various issues relating to the third five year plan.

Later in 1959 Thacker Committee was established which lasted till 1961. Prof. M. S. Thacker submitted the interim report in 1961 regarding the postgraduate engineering education and research. Report suggested that candidates with the higher merit should be admitted in technical colleges and scholarships should be provided to them. In post graduate curriculum of engineering, focus should be on research. Committee suggested that there should be a limited number of students should be admitted in the course so that teacher – student ratio can be maintained. This will help institutes to deliver quality education to the students and retain the international standards of technical education. Report suggested that institutes should develop the strong relationship with an industry. It will help students to find suitable position in the industry and use their technical skill and this become easier for the industry as well to hire best technocrats from the neighbouring environment those who are well versed with the area and work. Thacker committee also suggested the promotion of teaching as profession among the students to fill up the shortage of technical education professors in the academic institutions. There are different types of courses are available for the technical education. First is one year post graduate diploma course and second is 2 years master’s course. This course curriculum should contain mathematics, material science, technology, and instrumentation. Post graduate level project should be research oriented and well structured. There should be an availability of the funding for the post graduate courses in third five year plan. The amount was recommended by the committee was 10 crores. The entire focus of this committee was to improve the quality of the post graduate engineering education and research which was
the need of the hour.

**The Apprentices Act of 1961** was approved by the central government in consultation with Central Apprenticeship Council. Under this Act, a voluntary scheme known as “Programme of Apprenticeship Training” was arranged by the Ministry of Education, GOI. The object of this scheme was to provide practical training facilities to unemployed engineers and diploma holders (Polytechnics) in order to furnish them for gainful employment in industry.

Dr. D. S. Kothari from Kothari Commission (1964-1966) also supported the report of Radhakrishnan Committee of 10+2+3 pattern for higher education. Education Commission popularly known as Kothari Commission was appointed under the chairmanship of Prof. D.S. Kothari. It is a landmark in the development of technical education in India. Greatest and sincere efforts were made to vocational and specialization of technical education at polytechnic level. It was recommended that polytechnic institutes should be established for those students who have passed secondary school classes. Part time training or correspondence courses should be arranged for industrial training to benefit those children who are mostly engaged in domestic work. The Kothari Committee was advising government on “National Pattern of Education, general principle and policies for the development of education.” The Kothari Committee recommended parallel improvement of higher education and research. University administration is responsible for the higher education expansion. IITs should be expanded and training in IIT should be based on practical exposure. There should be eligibility criteria for the admission in the institute and the minimum age should be fourteen. Institutes should be collaborating with the industries. Curriculum should be flexible and it should be as per industry requirement, hence need regular revision. Staff should be adequately compensated as per their qualification and experience. This report reviewed the entire educational system in detail and focused on vocational, technical and science education.
In 1967, Govt. of India appointed a Committee of Members of Parliament to prepare the draft of a statement on national policy on education. This committee made a significant remark that practical training should be given to technicians and they should be given a better status in industry and in society.

In 1968, the document on “National Policy on Education”, which was published by the Government of India (GOI), mostly reiterated the recommendations of the committee of members of parliament on education. In the last four decades since independence, there was a phenomenal expansion of technical education in India at the polytechnic diploma level. In 1947, there were only 53 diploma level and 38 degree level courses in technical education and they could admit only 3,670 students each year.

However, there was widespread criticism of the system of polytechnic education prevailing in the country. It was felt that the diploma courses in our polytechnics were “mostly theoretical with very little practical bias”. So, to make polytechnic education more practical, Govt. of India on the advice of AICTE, constituted a “Special Committee for Development of Polytechnic Education” under the Chairmanship of Prof. GR. Damodaran popularly known as Damodaran Committee. This Committee looked into all aspects of technical education and suggested consolidated and quality improvement programme of polytechnic education, autonomy of state boards, examination reforms, sandwich courses, entrepreneurship programme were major reforms recommended by the Committee. Like, many other reports, this too was only partly implemented because several states did not agree to follow many of the recommendations. This Committee highlighted the importance of polytechnic education and covered the different aspects and areas of polytechnic education under Five Year Plan (FYP).

1970, the report submitted by Damodaran Committee focusing on unemployment of the technocrats and solutions regarding the same. This report
was focused entirely on the polytechnic education and the requirement of the manpower in the industry. This report is considered as the base for the future growth of technical education. Damodaran Committee recommended that diploma offers the narrow specialization. Committee suggested that diploma courses should be spread within important branches of technical education. Crash courses on various latest technologies should be organized for the technocrats. Basic diploma courses for technocrats should be of 3 years. Case studies from the industry should be based on the problem which is relevant and important should be included in the curriculum. This report has become the base of the polytechnic education of the country.

In 1973, the Apprentices Act (1961) was amended with a view to bringing within its purview the training of engineering graduates and diploma holders. It continued to be implemented to train the trainees at Kanpur, Bombay, Calcutta and Madras. In the end of 1982, 11,500 trainees (3,500 Engineering graduates and 8,000 Diploma Holders) were in position.

In 1976, Dr. P. K. Kelkar - Ex. Director IIT, Mumbai from Kelkar Committee submitted the report. This report recommended that there should be 4 Technical Teacher’s Training Institutes (TTTI’s) at Chennai, Calcutta, Bhopal, and Chandigarh to train expert teachers for Polytechnic education. This report focused on the improvement of the level of teaching in polytechnic institutes in India. Kelkar committee also recommended introduction of pedagogy in industrial training. It can be short term or long term. There should be a designated six months programme for faculties in polytechnic institutes. Institute should design special appreciation courses for senior faculty members. Coordination centre for four institutions should be set up. Institutes should take responsibility to develop film libraries, film production, language library and computer centre.

Immediately 2 years after the Kelkar Committee, Jha Committee was founded. In 1978, Jha Committee submitted the report regarding the staff
requirement in technical institutes and technical teacher’s training institutes.
Major recommendation of this committee was to divide curriculum. It suggested that Technical Teacher’s Training Institutes should divide weight-age as training (50%), Curriculum Development (30%), and supporting activities (20%). Teacher – student ratio should be 1:8 for training programme. Overall staff structure should be 1:1:1 for Professor, Assistant Professor, and Lecturer. There should be minimum 10 participants for the short term course.

In 1976-1977, a scheme named “Direct Central Assistance” was started to select engineering colleges and polytechnics in order to bring about qualitative improvement in the standard of technical education in the country. Under this scheme, the important projects were identified on the approval of All India Council for Technical Education (AICTE). Government of India (GOI) from time to time has taken keen interest in developing the community polytechnic which aims at sustainable community development without environmental degradation by way of science and technology applications for socio-economic upliftment and improvement in the quality of life of common man through ground level planning with participation of people’s at the grass root level.

In 1977-1978, several community polytechnic were initiated for establishment of Community Development Cells (CDC) within the polytechnic campuses and with extension arms in rural areas for contributing relevant technologies and reorient their own training program based on the feedback from rural areas. As on March 1996, 375 Community Polytechnics were functioning all over the country out which 74 were exclusively for women. During this period, it has trained 4,50,000 out of which about 60% are self employed. It offers about 100 technical/vocational trades.

In November 1977, Education and Social Welfare ministry of Government of India (GOI) established a working group on technical education. This group made detailed study of the technical manpower, research
and development, diversification and redesigning of the existing programme, quality enhancement and industry-academic tie up. This working group also underlines the need for continually examining the system of technical education for “Harnessing Science and Technology for economic growth and social well being”.

Dr. Y. Nayudamma from Nayudamma Committee (1978-1980) submitted the report in 1978. This committee focused on the post graduate education and research in engineering and technology institutes. The major recommendation of the committee was master courses in the engineering education should be of 2 years. First year should consist of course work and dissertation and viva should be conducted in second year. GATE (Graduate Aptitude Test) score should be criteria for admission into master course. Curriculum for post-graduation should have 20-50% core area subject and 50-70% should cover optional subjects. Dissertation should be a live project. Project and dissertation should be carried out in the industry. Government or the industry should provide sponsorship to the students to encourage research based projects. Tax relaxation should be given to the industries those who are involved in the academic research project. Part time post-graduation programmes should start for the industry technocrats. PhD should be the eligibility criteria for the post graduate teaching. AICTE is an main statutory body through an act of parliament.

Nayudamma Committee reported its views about the functioning of five IIT’s at Kharagpur, Mumbai, Chennai, Kanpur and Delhi. The committee first reviewed the functioning of the IIT’s. After the inspection, the Sarkar Committee and Nayudamma committed suggested student ratio of undergraduate and post graduate should be 1:1. Instead of establishing new IITs, there is a need to improve the quality of education in the existing regional engineering institutes. Extra amount of autonomy delegated to the IITs. Under graduation and post-graduation programmes should be reviewed regularly. There should be strict assessment of the faculties should take place to assess
the performance of the faculty. Academia-Industry collaboration should be increased.

Amitabha Bhattacharya Committee was founded to review the progress made by Technical Teacher’s Training Institutes (TTTI’s). This committee submitted its report in 1991. This committee recommended that expertise and resource of TTTI’s should be fully utilized by the system. TTTI’s should offer highly flexible training programme. It should give importance on the development of new innovative instructional material by using latest technology. It should provide innovative research and development activity to improve the quality of technical education.

In 1979, the Government of India (GOI) published a new draft of national policy on education, 1979” which monitor the need for manufacture of machinery for publishing the information relating to manpower needs at the field of diploma level. Foreign technical support received from friendly countries contributed a great deal to the development of technical education in India, during the last three decades. It has enabled the technical institutions in the country “to develop benchmarking for international standards and to develop competent research and development setup in a wide variety of scientific and technological fields”.

In order to verify the impact of foreign technical assistance on the development of technical education, The Ministry of Education, Government of India (GOI) appointed a Review Committee in June, 1978 under the Chairmanship of Dr. A. Rama Chandaran, Secretary and Department of Science and Technology. Prof. Nayundamma, former Director General of Council of Scientific and Industrial Research (CSIR) was appointed as chairman of the review committee. It was suggested that this committee should examine how the IIT’s could offer technical assistance to academic institutions of lower formations such as engineering colleges.
Another Committee was also appointed by the GOI in 1978 to review the progress so far made in the area of technical education and research in engineering and technology to report on all aspects of its further development. Once again, Prof. Y. Nayudamma, distinguished Scientist and Former Director General, Council of Scientific and Industrial Research, was selected as a chairperson of this review committee.

From 1978-79 onwards, development programme were carried on by different organizations and councils in the field of polytechnic education. Role of five year plan is also highlighted in this period. To strengthen the Indian education system, Indian government adopted an educational policy passed by the Indian Parliament in 1968. Education was made an important and integral part of the national development efforts. After independence there has been an effort made by the government to spread technical education to all levels of Indian society. With regard to the pattern of secondary education experiments have been going on since Independence. With recommendation by Kothari commission of 1965 a new system of education (10+2+3) is implemented and currently it is followed by almost all the states and union territories of India. Higher education system in India is imparted through about one eighty universities and neatly four thousand five hundred colleges. In addition there are several institutions imparting specialized knowledge and technical skills.

During the year 1982-1983, two national experts committees selected 12 engineering colleges and 22 polytechnics for grant of assistance involving a total expenditure of Rs. 111 Lakhs. The State Governments in India are free to open new university. University Grants Commission (UGC) is authorities which provide grants to the universities. But its formal sanction is not necessary to open a university. Taking advantage of this provision many state governments in India have opened a large number of universities in recent years. The tremendous increase in the number of students and of educational institutions has given rise to the term ‘education explosion’. This has resulted in serious problems such as deficiency of financial resources and infrastructure,
dilution of personal attention to the education and character-formation of the students. Also there is the undesirable side-effect of enormous increase in the number of educated unemployed. However, we cannot ignore the advantages of education explosion in India. Mere increase in the percentage of educated people does not indicate a qualitative change in the educational standards of the people and a substantial improvement in human resources of India. Unemployment issue in the country cannot be blamed on the availability of large masses educational people in India.

**During the year (1995 – 1999)** P Rama Rao Committee was formed under the chairmanship of P Rama Rao in 1995 and submitted its report in 1999, committee given its recommendation as replenish post graduate education and research in engineering and technology and freshly review the post graduation education in technical institutes. This committee recommended that duration of the master programme should be increased to 21 months. One year post graduate diploma programme on specialized topic should be continued. Scholarship of post graduate students should be increased and reviewed periodically. National Doctoral Programme (NDP) should be started to motivate the scholars. Induction training or quality improvement programme should be given to faculties those who have joined new. Ph.D. scholars should be compulsorily involved in teaching parallel to their research. Ph.D. scholars need to be increased by twice each year to meet faculty shortage in the institute.

**In 1996-1998 Mashelkar Committee** was formed to reassessment the development of Regional Engineering Colleges (REC) and advises the future role of regional engineering colleges in building the quality base for technical education and to review the progress of Regional Engineering Colleges (REC). This committee gave recommendations on issues like governance, academic problems, and faculty issue and staff development. The recommendation of Mashelkar committee was complete accepted. In response to this report, 17 REC transferred their governance to National Institute of Technology (NIT).
**Indiresan Committee** was established to review lacunas in Technical Teachers Training Institute (TITI) at central and state level and submitted its report in 2000. This committee recommended that TTTIs should provide training to teachers from other fields as well. There should be an importance to the technology in education. Teachers from overseas also should be trained as well. TTTIs should help technical institutions to set up practical based education. It should reorganize the structure of Board of Governors (BOG) and administrative staff. TTTIs name was changed to National Institute of Technical Teacher’s Training and Research (NITTR). It was recommended by the committee.

**In Nov-2002,** Department of Human Resource of India formed the review committee to study the functioning of the AICTE and to reformulate the role in view of emerging changes and recommended some steps for improvement.

**U. R. Rao Committee (2002-2003)** gave recommendation regarding the functioning of AICTE and it redefined AICTE’s role. Committee suggested institutions should be shut down, if it fails to maintain the enough quality and quantity of the qualified teachers and required infrastructure. Remuneration and appointment issues should be given priority. There should be reduction in fees for the students from lower socio-economic group. There should not be any new institutions in the next five years. Post-graduation and Doctoral programmes needs to be restructured. For the first time this committee suggested that there should not be collaboration between industry and technical institutions.

**P. Rama Rao committee** reviewed the working of IIT and gave the major recommendations as well. This committee suggested that there should be a provision to set up PAN IIT synergy committee which will be highest decision making body in IIT governing structure. There should be separate human resources department for faculty recruitment and their retention in the
institute. To motivate young minds towards research, under graduation to doctoral programme schemes to be established. There should be effective screening for selection of research students. Institutes should collaborate with overseas institutes.

**In June 27, 2002,** Government of India (GOI) formed a committee under the chairmanship of Dr. P. Rama Rao to reassessment the working of top institutions like IIT's.

**In Feb 2008,** Government of India (GOI) formed the Yashpal Committee to assess the role and functioning of University Grant commission (UGC) and All India council of Technical Education. Yashpal Committee (2008-2009) critically assessed the quality improvement in higher education, technical education, and university system. Yashpal committee suggested that there should be a transparency in between university self-regulatory bodies. Universities should be responsible for the academic content of the professional courses. Higher Education Committee (HEC) should be created which will replace existing regulatory body like UGC, AICTE, NCTE, etc. institutes should reform and restructure the under graduate programme. There should be single discipline or specialized university to be created. IIT and IIIMs should be converted into universities.

**In Feb 3, 2010,** Ministry of Human Resource Development founded a committee under the chairmanship of Dr. Anil Kakodkar – Chaiman BOG, IIT-Mumbai for proposing the guideline for straitening the financial, administrative and academic autonomy of the IIT's. And also suggested a roadmap for strengthen the financial, administrative, and academic autonomy of the IITs. This committee suggested that number of PhD graduates should be increased up to 10,000 per year till 2025. Tuition fees of IIT should be between 2-2.5 lakh per year. Ministry should provide all the facilities to the post graduate or research students which include accommodation and other facilities. There should be provision for operational governance autonomy to IIT. Government
funded institutes should produce 1 lakh engineers per year.

Bhimensen – Executive director International education consortium states conducted a study called “Development of technical education in India and State policy – A history perspectives”. This study reported that in pre independence period many reforms were suggested in growth of technical education system. The reason for the steady growth is deliberated policy adopted by colonial government. After independence, government realize to make reforms in technical education system due to shortage of technical workforce. These reforms were done through formation of various committees, policy implementation through five year plans. In 1980s due to lack of definite industrial, technological policy, personal recruitment policy, the industrial and economic sector have stimulated large scale brain drain. The major failure of the technical education system policies in 1980s is the growth of research and development was neglected. There was lack of proper industrial development framework model, proper technology policy, too much importance given to labour incentive technology rather than development of modern technology and productivity, and lack of adequate funds for technical education. The major reason for these failures of technical education system is the lack of implementation of human resources management practices like incentive appreciation, opportunities, and less attractive remuneration (Samir Kumar Saha, 2012).

Table 14

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Five years plan</th>
<th>Year</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Five Year plan</td>
<td>1951-1956</td>
<td>1. Establishment of IIT, Kharagpur post graduate studies in engineering where further included in IISc, Banglore.</td>
</tr>
</tbody>
</table>
2. IIT, Kharagpur, VJIT Mumbai, and IIS, |
Banglore where started post graduate courses in industrial engineering and industrial management.

3. Administrative Staff College was established at Hyderabad.

4. Institute for the training of technical teachers at Bilaspur that was established by Ministry of Labour.

5. The private enterprise played a vital role, as in 1960, 296 institutes of degree and 177 institutions of diploma were started by central and state governments and 31 by universities and 88 by private agencies.

<table>
<thead>
<tr>
<th>Year</th>
<th>Plan</th>
<th>Duration</th>
<th>Details</th>
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<tbody>
<tr>
<td>3</td>
<td>Fourth Five Year plan</td>
<td>(1969-1974)</td>
<td>1. In this duration the policy was shifted towards improving the Quality and Standard of Technical Education.</td>
</tr>
</tbody>
</table>
2. Technical Teacher Training Institutes were set up at Madras, Calcutta, Bhopal and Chandigarh in 1966-67.  
4. Cooperation between industrial and technical education was emphasized by the Kothari commission 1964-66 and various other committees and working groups on technical education. |
| 5    | Ninth Five Year Plan    | (1997-2002)     | 1. Creating information in IT manpower  
2. Promoting initiatives in Information technology with focus on bridging the digital divide, innovation in pedagogy, etc.  
3. Monitoring requirement of IT professional by institutes with the objective to double the intake by 2001-2002 and triple the intake by 2003.  
4. Setting up of exclusive IT institutes improving their quality, infrastructure and promoting networking.  
5. Initiate the IT faculty development program. |
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<tr>
<td>6</td>
<td>Tenth Year Plan</td>
<td>2002-2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>During the Tenth Plan, the number of AICTE approved degree engineering/technology institutions rose from 1057 to 1522 and the annual intake from 2.96 lakh to 5.83 lakh.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>During the Tenth Plan, there is increase in number of IIT to seven and Roorkee was upgraded to an IIT.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Establishment of New Indian Institute of Information Technology, Manufacturing and Design at Jabalpur making it the third institute in the series.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>The AICTE has setup 106 virtual classrooms in identified technical institutions under Education Satellite (EDUSAT) scheme to promote the approach of web based learning.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The key issues in technical education during the Tenth Plan had continuing focus on increasing intake; quality of education, including research in technology.</td>
<td></td>
</tr>
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</table>

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<tr>
<th>7</th>
<th>Eleventh Year Plan</th>
<th>2007-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intake of technical education institutions needs to grow at an estimated 15% annually, to meet the skilled manpower needs of our growth economy.</td>
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</table>


Definitions of Human Resource Management (HRM)

Definition of Management

“Management in all business and organizational activities is the act of coordinating the efforts of people to accomplish desired goal and objective using available resources efficiently and effectively” (Johnson, 2013).

Definition of Resource:

“Resource, in its organizational context, is defined as anything that could be thought of as a strength or weakness of a given firm including tangible and intangible assets” (Wernerfelt, 1984).

Definition of Human Resources:

According to William R. Tracey defines human resources as “The people that staff and operate and organization, as contrasted with financial and material resource of organization” (Healthfield).

Definition of Human Resource Management

According to Beer “Human Resource Management involves all management decisions and actions that affect the relationship between the organisation and employee-its human”.

According to Pettigrew and Whipp (1991) “Human Resource Management relates to the total set of knowledge, skills and attitudes that firms need to complete. It involves concern for the action in the management of people, including: selection, training and development, employee relation and compensation. Such actions may be bound by the creation of an HRM philosophy”.
According Storey (1989) “Human Resource Management can be regarded as a set of interrelated policies with an ideological and philosophical underpinning”

Now a day’s every technical institution in India facing management challenges. As the role of academic leadership has been changed dramatically from last one decade, a theoretical approach (traditional) of management has made an adverse impact on the technical educational institutions management. Now a day’s most of the technical institutions are taking interest in the concept of good governance with concern about control, accountability and efficiency. According to Nadine L. "people are the most important resources in the educational enterprise" (Nadine L. McCrea, 12 Sept 2006).

Cranston says that “the interface across management of change, organisation culture and HRM in education is crucial if change is to be meaningful”

Every technical institution, at every level, depends heavily on teaching and non-teaching staff. Maintaining and improving technical educational quality and standards is only possible through the development of teaching and non-teaching staff of the institutions. Human resource development deals with the establishment of methodology that deals with HR functions like Acquisition (Recruitment and Selection), Development through training, Morale and Motivation, Performance appraisal, Industry interface, Retention strategies and the issues encountered in implementation of these practices.

In the context of technical education we can define, “Human Resource Management as methods of integrating and maintaining the staff in institutions, so that institutions can achieve the purposes, vision and mission for which it is established”. In other words Human Resource Management is the process of motivating and coordinating the staff and resources in the institutions so as to obtain maximum output from them. Larger technical educational institutions need to have one separate Human Resource Department which deals with HR
functions in an effective manner.

HR functions in technical institutions are divided in several sections with their heads like training and placement, research and development, administration, accounts etc. Human Resource Department (HRD) in technical institutions has two objectives, the first is to improve staff performance and that of second is to enhance organizational effectiveness. Selection process in technical institutions was providing staff with knowledge, abilities, and skill pertinent to their role within institutions. Human Resource Management activities motivate them by providing satisfactory pay, benefits, good working environment. Many academic observers of work organizations recognized that conflict between individual employees, within teams or between management and employees are inevitable and can enhance, rather than decrease, performance. (Dr. Out D.O., 2016)

An employee has always been a key asset to any organization. So development and success of every organization rests on its core asset, the employee. Human Resource Management plays an important role in managing their people in effective manner to fulfil the vision and mission of the organization. The current study finds out the perception of the key stakeholders of the engineering institutions (Faculty and Student).

*Human capital theory suggests that “individuals and society derive economic benefits from investments in people”* (Zula and Chermack, 2007).

There is an increase in the competitive environment as there is an increase in the private stakeholders in technical education in India. In order to survive and succeed in the competition they need to focus on complete utilization of resources and human capital. In technical institutions the Human Resource Management practices are done in the most traditional way, which are not that much effective in the management of institutions. So it needs to adopt strategic human resource management practices for coordinating the human capital and resources in an effective way within institutions.
In most of the technical institutions the HRM practices were labelled as personal management which were limited to just managing the administrative tasks, compensation and fees collection. But now the approach has changed, there are various departments in institution similar to that of an industry as:

1. **Finance and Accounts** deals with staff salary, student fees collection, and handling other financial tasks of institutions.

2. **Administration** deals with staff management, clerical work, and compensation and authentication tasks.

3. **Training and Development** deals with providing training to staff (Teaching, Non Teaching), students, and higher management to increase their technical as well as personal skills.

4. **Research and Development** deals with industrial interaction, research activity, consultation work.

5. **Personal Section** deals with acquisition (Recruitment and Selection), performance appraisal, grievance, and retention.

These departments must work in coordination with each other for improving positive working relationship. So it needs to set up HRM department in technical institutions which strategically handles the entire functions of HRM in an efficient way, so that institutions can attain organizational goals and objectives in a short period. There is a need to evaluate to what extent the HRM practices are attracting, retaining, motivating and developing the abilities, knowledge and competencies of the faculty which are required for achieving the quality in technical institutions. Technical institutions need to implement SHRM (Strategic Human Resource Management) practices by coordinating all the departments in the institutions. This will help the institutions to motivate the employees, quality work culture which will result in to a quality product (the students).
2.3.1.1 Theoretical Framework of Human Resource Management

Technical institutions consist of the following categories

1) **Competent Authority** (Governing Board)

2) **Academic Staff**

   a) Members of the Faculty (Directors, Deputy Directors, Principal, Professor, Associate Professors, Assistant Professors, Lecturer)

   b) Librarian, Deputy Librarians, and Assistant Librarians.

3) **Non Academic Staff** (Administrative staff, Technical Staff, Accountant, Clerk, House Keeping, Security)

   The human resource management factors in technical (Engineering educational institution) are as follows

   a) **Acquisition (Recruitment and Selection)**

   No activity takes place in HRM without any planning. That is why, in the case of acquisition, Human Resource Planning (HRP) is an ongoing, continuous process of systematic planning to achieve optimum use of the most valuable asset of an organization, the human resource. Once the requirement is identified the major role is to go for Recruitment and Selection. While hiring the faculty, the first step is to recognize the best talent available which is suitable for the position required.

   Johnson and Kristonis (2007) quoted that, “*The most valuable resource in education of students is the quality of the people hired for specific assignment*”.

   In traditional approach, the technical institutions go for “panic hiring” just before the academic session has begun. Most of the private technical institutions hire the faculty based on salary negotiation. Due to this the
selection error (selecting a wrong person) and rejection error (rejecting a right person) are high which affects the quality of the institutions.

Recruitment can be defined as searching for and obtaining a pool of potential candidates with the desired knowledge, skills and experience to allow an organization to select the most appropriate people to fill job vacancies against defined position descriptions and specifications. And once a pool of candidates has been identified through the recruitment process the most appropriate candidate, or candidates are identified through a selection process includes interviewing, reference checking and testing (AHRI, 2016).

Figure 19

The Fombrun, Tichy and Devvana Model of HRM

Source: (AHRI, 2016)

Following two factors Internal and External affect the acquisition process of technical institutions.
Internal Factors

Internal factors play an important role in acquisition, and they are controllable within the institutions. The internal factor includes:

1) **Size of the institutions:** The size of institutions directly affects the recruitment process. Larger institutions find recruitment and selection process less problematic compared to that of the smaller size institutes, due to availability of resources, infrastructure and finance.

2) **Acquisition policy:** Most of the technical institutions follow the traditional approach of recruitment like recruitment based on references from existing employee, as per availability of faculty, based on salary negotiation etc. They do not have standard acquisition policies followed in industrial sector.

3) **Reputation of the institute:** Reputation of any institute directly affects the recruitment and selection process. Good reputation of institutions can motivate the potential candidates to join due to surety of their self-development and career progression facilities.

4) **Infrastructure:** Good infrastructure like transportation service, medical service, staff hostels, cafeteria and hygienic environment also attract the potential candidates.

External Factors

External factors are not under control. They are dynamic in nature. They affect the recruitment and selection process of potential candidate indirectly.

External Factor includes:

1) **Demographic Factor:** The demographic factor is the personal factor related to individual which includes gender, age, economic status etc.

2) **Demand and Supply:** If there is demand for certain skill, then availability of manpower affects the recruitment process.
3) **Unemployment:** These days unemployment ratio is high in technical field, so the supply of candidates is more compared to demand. The potential candidates get jobs as they possess the required skill. But the candidates lacking these skills remain unemployed and they are ready to choose teaching profession as a career in less salary. So there is dearth of potential candidate in teaching profession and this is, directly, affecting the quality of education.

4) **Political Interference:** Placements are subject to political interference and nepotism. In most of the technical institutions candidate are selected for the post of lecturer, professor, faculty on basis of recommendations. This affects the recruitment and selection process of the institutions due to which wrong candidate gets placed for that position. Due to which quality issues get increased in the technical education.

**Recruitment and Selection Sources**

**Employee Internal Reference:** A candidate is selected through the reference given by existing employee within the organization. It is easy to hire those candidates who have internal reference of the existing employee because the existing employee knows both the working environment of organization and the potential of the candidate. So the potential candidate can be easily identified who suits the job profile.

**Advertisement:** It is the most traditional way to approach towards the candidate. In this method institutes give an advertisement for the number of requirements in local news papers. But due to this method candidates out of the particular area remain unaware of the recruitment process and institute needs to depend solely on the local candidates those are available. This is why institutions do not get multiple pool of option to select the potential candidate.
**E-recruitment**: All the technical institutions have their own websites (as per the AICTE instruction). The institutes can use their websites to display the vacant positions and advertisement.

**Recruitment Consultancy**: Institutions outsource the recruitment process to private consultancy. This consultancy helps the institutions to hire the potential candidate by taking certain consultation fees. Most of the technical institutions prefer to hire a potential candidate through consultancy to save their valuable time and money.

**Types of Employment**

1) **Permanent Employment**: This is the most secured employment in any organization where an employee gets the entire benefits and facilities like medical, pension scheme, various allowances, and job security.

2) **Contractual Employment**: This type of employment is given for a particular period of time like 1, 2, or for 3 years depending upon the need of the institute and nature of work. The candidates appointed on the contractual basis are paid fixed wages mentioned and agreed in the contract. The contractual employee does not get any facilities which the permanent employee is entitled.

**Part time /Visiting Employment**: In this type of employment an employee visits the institutions for a particular time slot during the working hours. The part time employee is not liable to obey the working time of organization. Only he/she needs to complete his/her work in allotted time span and the wages are paid on working hour basis.

**Selection Process**

1) **Screening round**: Preliminary Screening is done on the basis of eligibility criteria, experience (Teaching, Industrial) and professional competencies. Once the candidate fulfils the basic eligibility criteria he/she are promoted to the next round.
2) **Demo Lectures:** In this method a topic is given to a candidate based on his own subject of interest and adequate time is given for preparation. Then the candidate takes a live classroom session in front of students or in front of the expert committee. Here, the candidate’s subject knowledge, presentation skill, and confidence are assessed. Those candidates who qualify for this round are eligible to go for the next round.

3) **Structured Interview:** On the basis of qualification, experience, and performance in demo lecture the candidate is interviewed by the expert panel. After a thorough interview expert panel decides the potential candidate for the job post and an offer letter is given to the selected candidate. (IMS, 2016)

Figure 20

**Recruitment and Selection Chart for an Engineering Colleges**

Source: (Prasad, 2013)
b) **Staff Training and Development**

Training and development can also be described as ‘an educational process which involves the sharpening of skills, concepts, changing of attitude and gaining more knowledge to enhance the performance of the employees. Training is the framed process of imparting relevant skills among the faculty and the students. It is an important process of organization. The intention of training is to prepare the faculty with the set of skills required to meet the job and students to meet the industry requirement. “Development” is a continuous process which depends on training. A trained workforce is an asset to an organization especially the technical institutions. They must invest in faculty so that they will successfully meet the institutional vision and mission.

Training and Development categories in three major processes

**Training:** This process is assessed against the current job.

**Education:** This process is assessed against their future responsibilities.

**Development:** This process focuses to their current job.

(Wikipedia, Training and Development, 2016)

Training and development helps to increase the quality outcome. A trained workforce needs less supervision. It increases the job satisfaction amongst the employee which decreases attrition ratio amongst faculty. Training enhances the skill of faculty which enables the faculty to remain up to date with current skills used in the industry.

"The technical education sector in the country is in the growth path. Though ours is one of the largest technical education sectors in the world and the number of engineering graduates passing out annually are very high, the quality factor is missing." (Pallam Raju, 2013).

"As majority of our engineering graduates are not industry-ready, the employers are forced to give them special training to equip them to meet their
demands. It is a shortcoming of our technical education system.” (Pallam Raju, 2013).

**Staff Training and Development aim at following points.**

1) To improve the current level of performance of compelling in their present job.

2) To get ready for higher level of responsibility

   Campbell (1970) states, “Training and Development is a teaching activity planned and initiated by an organization to train staff”.

   Harris (1980) quotes, “Training and Development as the part of administration process, implies the training of an individual in organization to enhance his performance”.

   According to Ngu (1989), “Faculty Development is the process of behavioural modification or moulding of employee in order to integrate organizational needs with their characteristics”.

   Novit (1979) says, “Staff development is the training in personnel in an organization towards motivating them to become competent and work hard in achieving the goal of an organization” (Dr. Out D.O., 2016).

Institutions have to give minimum training to their staff to make them at least become attainted with vision and mission, policies, standards and procedures of the institutions and to a particular job. In other way training and development can be defined as a continuous program of education and planned experience. The institutions must ensure that sufficient staff should undergo continuous training and development program in order to meet the challenges of quality in technical education.

Longenecker (1977) states that institutions important asset is its workforce and so is it make sense to ensure that every staff is trained for the job he is doing and developed to take future responsibilities within his scope.
Sharma (1979) says that the objective to widen the experience of an individual, it become necessary to offer him opportunity to develop their skills with longer range of institutional operation. It is observed that most of the technical institutions though provide an opportunity to their staff, but it cannot actually develop staff. In any institutions personal section is responsible to planning and coordinating training activities.

According to Hurst (1970) personnel management deals with a broad program, including placements, induction and training for the new candidate for the provision of courses of the management. The efforts are made to focus the development of careers and progress within the institutions by utilizing the educational resources and infrastructure available at each stage.

**The Types of Training for Faculty**

1) **Faculty Development Programs (FDP):** This type of training is given to the faculty to update their knowledge in their subject area.

2) **Refreshers Training:** This type of training is given to the young faculty to learn about the teaching methodology and the use of technology in their teaching.

3) **Induction Training:** This type of training is given to the fresher who joins the teaching profession for first time. The main intention of training is to make aware of the responsibilities, vision and mission of the institutions, work culture, code of conduct, nature of duty etc.

4) **Industry based Training:** This training is implant training in industry. In this type of training the faculty must spend some time in industry to be aware of the current technologies in market.

5) **Others Types:** This type of training consists of faculty development program, quality improvement program, personality development program, entrepreneurshipships training where the faculty is made aware
regarding research related activities and entrepreneur skills. These types of training are sponsored by the Government of India (GOI) or well-known institutions from India.

Types of Training for the Students

1) **Industrial Training:** This is a kind of implant training in industry. In this type of students must undergo training in specific technology and spend some time in an industry during their academics.

2) **Sandwich short term training courses:** This training is given to the students in between their two academic sessions for a week or a month. An industrial expert trains them in handling the current technology. This type of training is beneficial for the institute to produce industry ready candidates.

3) **Personality Development Training:** This training is a part of curriculum. Students can gain confidence, improve their communication skill, develop positive attitude and learn etiquettes, etc. which will support a student to become complete package for industry.

4) **Group Leaning Activity:** This activity is used by faculty in day to day teaching. It consists of three steps:

   **Step 1:** In the first step faculty gives the teaching topic to students for over viewing purpose and feedback is taken from the student on their learning basis.

   **Step 2:** In the second step a group of students is formed, where they share their views about the topic and give a combined feedback to the faculty.

   **Step 3:** In the third step individual feedback is taken from the student about the awareness of the topic.

   **Step 4:** In this step Faculty comes across the questions raised by the students.
This type of activity helps the students to understand the complete topic and they can clear the doubts at the end of the activity. In other words the activity can be named as “Self Learning Activity”. By using this activity the students can get motivation to solve the problem in a group.

5) **Internship:** This type of training is almost done with an industry, this training is compulsory to all the students in technical education. Students need to complete their project in an industry in the final year of their course.

**Training through ICT**

National Mission on Education through ICT has been envisioned as centre sponsored scheme to take advantage of Information and Communication Technology (ICT) with the help of internet and intranet for conducting training programme remotely to all faculty of technical educational institutions.

The program consists of high quality learning e-content for the related learner. The mission of the program is to make connectivity with 400 universities and 18,000 colleges in the country of national importance. A budget of almost Rs. 4,612 crore is proposed in Eleventh Five Year Plan for the National Mission on Education through ICT (AICTE, 2016).

In this initiative the top premium institute in technology like Indian Institute of Technology (IIT’s) is taking initiative to promote the online training through EDUSAT satellite and Internet. IIT has trained a large number of technical faculties across the country through the distance training mode. Approximately, 640 faculties in programming languages are trained under National Mission on Education through ICT. So IIT is emerging as a central hub of training workshop (Kalpana Kannan, 2016).

There are various training institutes in India established to provide training for faculty which include NITTR, IIT, BITS, and NIT etc.
Advantages of Training for Faculty

1) Training enables the staff to increase quality in their job.

2) By attaining the training the faculty adds into the value to the institutions and thus gets appraisal benefits.

Advantage of Training for Student

1) Through training and development programs, a student is trained better to handle the machinery and the equipments resulting into the reduction of the damage to the minimum extent.

2) It creates a sense of satisfaction of achievement of knowledge among the students besides increases the weight-age of the resume with the result the chance of employability is increased.

c) Allowances and Benefits

Allowances and benefits motivate the employees to give their best. Poor salary is the main reason of the faculty to change the job. Newly formed private technical institutions prefer to hire the fresher’s for the post of lecturer in engineering institutions as the fresher’s are ready to work in less salary compared to experienced candidates, they are ready to work in any time slots, and they don’t demand any allowances or benefits. Newly hired candidates work for some time and shift their jobs. So the attrition rate is high in newly formed institutions. The reason behind this is that those young colleges mostly invest their money in college building construction, campus greenery and other amenities. The newly formed institutions hire the candidates on contractual basis with a fix pay or for a period basis. So Madhavan says that there is deficiency of best brain in the technical institutions to create quality students (Madhavan, 2016).

It is proved that proper allowances and benefits motivate the employees to give their best in work. The more the institutes invest in their employees, the more they will get back in return.
Allowance and Benefits Includes

1) All types of leaves (Casual Leave, Earned Leave, Duty Leave, Maternity Leave, Study Leave, Vacation, and Paternity Leave).

2) Provident fund and gratuity

3) Medical care facility in technical institutions

4) House Rent Allowance (HRA) and Dearness Allowance (DA)

5) Salary as per government norms and pay scale

6) Various incentives

7) Hostel facility

8) Transportation facility etc.

Allowances and other benefits are the critical part of faculty and management relationship. So it needs to deal with this issue in a systematic way.

d) Appraisal for Performance

A performance appraisal (PA), also referred to as a performance review, performance evaluation, (career) development discussion, or employee appraisal is a method by which the job performance of a staff is documented and evaluated (Wikipedia, 2016).

Having right people in right position at right time is one part of human resource management practices. The problem arises when technical institutions have to determine how much appraisal is to be received for the work he or she performs. Staffs receives salary from the institutions for the work performed, but how much work constitutes a reasonable work for a prescribed salary is to be thought by the management. This requires equitable standards incentive plan, rewards and appraisal. The basic need of the employee towards its organization is appropriate salary or wages towards its work. But the work
proportion in private technical institutions is not equal to the wages given by the institutions. “Appraisal administration is a systematic procedure for establishing a sound structure which is based on staff work output” (Dr. Out D.O., 2016).

Appraisal for performance is based on some pre set standards. But in most of the technical institutions performance of the faculty is measured in terms of student feedback which is not a good standard measurement scale. A good faculty gets bad feedback from students due to language barrier, student staff conflict etc. So there is a need to set a pre set of standards to assess the performance of the faculty. In government sector performance appraisal is based on government rules and regulation.

The technical educational institutions need to set up performance appraisal standards through their human resource department. After getting a feedback it is evaluate by using proper methods. Methods for performance appraisal is categorised in following types.

Table 15

Methods of Performance Appraisal

<table>
<thead>
<tr>
<th>Traditional Methods</th>
<th>Modern Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ranking method</td>
<td>1. Management by Objectives (MBO)</td>
</tr>
<tr>
<td>2. Paired comparison</td>
<td>2. Behaviourally anchored rating scales</td>
</tr>
<tr>
<td>3. Grading</td>
<td>3. Assessment centres</td>
</tr>
<tr>
<td>4. Forced distribution method</td>
<td>4. 360-degree appraisal</td>
</tr>
<tr>
<td>6. Checklist method</td>
<td></td>
</tr>
<tr>
<td>7. Critical incidents method</td>
<td></td>
</tr>
<tr>
<td>8. Graphic scale method</td>
<td></td>
</tr>
<tr>
<td>9. Essay method</td>
<td></td>
</tr>
<tr>
<td>10. Field review method</td>
<td></td>
</tr>
<tr>
<td>11. Confidential report</td>
<td></td>
</tr>
</tbody>
</table>

Source: (You’re Article Library, 2016)
Performance appraisal form should include the following traits of faculty as

1) Involvement in academic process: Includes academic planning, course development, research planning.

2) Workplace and Environment: Includes effective participation in decision making.

3) Teaching and Learning: Includes conveying knowledge in an effective manner, using different activities in the classroom, effective use of technology.

4) Research Activity: Involvement in research, number of research papers published, books published and also number of patents.

5) Leadership Quality: Good strategic planner, taking initiative and responsibility, good listener, positive attitude etc. are included in this area.

6) Effective Student -Faculty communication skill.

e) Development through Research and Industrial Tie-up

The aim of research and development system in technical educational institutions is to focus on the quality of the research done by the faculty and the students in collaboration with the industry. After liberalization and globalization there is a rapid change in the economic and industrial scenario in India, due to this technical education has become more jobs oriented. In 1992, India opened the doors of market with the result IT sector has grown up exponentially. As the Indian economy grows and modernizes, the Indian technology also needs to change to fulfil the demands that are being made. This would require adjustments in the existing governance and management models in our universities, research institutions. Current practices and policies do not promote this objective sufficiently. So there is a need for a well designed technology and innovation policy, for rapid growth. The main focus is on technology development and issues related to innovation.
We need huge investment and resources with strong technically sound workforce for creating a strong research and development system. At present, Research and Development expenditure in the country is estimated at 44 million US $ and about 0.88% of GDP, of which about three-fourth is in the public sector and only one-fourth is in the private sector. This is not sufficient to develop strong Research and Development. Total expenditure in Research and Development increases to 2.0% of GDP by the end of the Twelfth Five Year (TFY) plan till 2017. This could consist of about 1.0 per cent in the public sector and 1.0 per cent in the corporate sector. India spends less than 1% of the GDP on Research and Development. We need to spend at least 2-3% of GDP on Research and Development to become a knowledge driven society (IBEF, 2016). The private sector Research and Development expenditure is around 25.0% only. So to increase it up to 50% there should be significant changes in current interaction of publicly-owned technology establishment with industry. Both public and private industries should invest at least 2.0 % of their sales turnover in research and development. Multinational Corporation (MNC) such as General Electric, Motorola, Texas Instruments, CISCO, DuPont, Honda etc. supports some research and development activities for technological development. And by setting up of research and development centers within every technical institutions under academia-industry tie-up in India creates highly skilled scientists and technologists (IBEF, 2016).

Table 16

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Expenditure on R&amp;D in (US $)</th>
<th>Percentage of GDP</th>
<th>Expenditure on R&amp;D per Capita (US $)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>473.4</td>
<td>2.742</td>
<td>1,442.51</td>
<td>2013</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>409</td>
<td>2.1</td>
<td>298.56</td>
<td>2015</td>
</tr>
<tr>
<td>Country</td>
<td>Amount</td>
<td>% of GDP</td>
<td>Total</td>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>--------</td>
<td>----------</td>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>European Union</td>
<td>334.3</td>
<td>1.94</td>
<td>657.48</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>170.8</td>
<td>3.583</td>
<td>1,344.31</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>106.5</td>
<td>2.842</td>
<td>1,313.46</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>91.6</td>
<td>4.292</td>
<td>1,518.47</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>72</td>
<td>0.88</td>
<td>55.88</td>
<td>2015</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>58.4</td>
<td>2.256</td>
<td>914.54</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>43.7</td>
<td>1.701</td>
<td>677.44</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>42.6</td>
<td>1.187%</td>
<td>290.21</td>
<td>2014</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Wikipedia, List of countries by Research and Development spending, 2016)

**Framework of Research and Development in Technical Educational Institutions in India**

Over the years, several areas of technology have been identified with appropriate institutional frameworks to enhance India’s research and development base and capability. It is necessary to create a framework that takes into account creation to commercialization, extension and value addition. To achieve this, current institutional structures and mechanism would require:

1. A holistic approach to public funding for Research and Development.
2. Projects and treat the entire knowledge domain of research and development as connected.
3. Much larger base of full time researchers and flexibility in hiring them.
4. Greater autonomy to work in a clearly defined charter.
5. More flexibility to the younger generation of scientists to pursue their ideas and greater mobility between industry and academia for research and development in institutions.
by way of mobility and suitable parameters for women re-entry programs in research and development.

7. Enhanced scope and process of inter-institutional and international collaborative research.

8. A culture of world class publicly owned and privately/autonomous managed technology institutions;

9. A well-crafted strategy for technology acquisition in high-tech areas;

10. Significant changes in HR, financing, procurement policies and importantly a transparent performance appraisal system for research faculty.

11. Projects and treat the entire knowledge domain of research and development as connected.

12. Much larger base of full time researchers and flexibility in hiring them.

13. Greater autonomy to work in a clearly defined charter.

Very few students choose research as their career. This indicates the deficiency in the policy framework of our technical education which fails to provide research oriented courses and research based environment. There are some institutes in India like IIT, IIM which are involved in research and development activity. India has a low ratio of researcher as compared to other countries. There are only 120 researchers in research and development per million of the population when compared with 633 for China. Therefore, the Indian government spends lots of educational fund on primary and secondary education with the hope that some researchers will do research in their respective fields. Also focuses on their self motivation which will make them to develop new techniques that will help in the growth of the country. In India, more than 80% of the research and development fund is collected from private enterprises. There are around 60 Lakh student graduates in India, but less than 10% amongst those go for post graduate and less than 1% for post doctorate.
Most of the technical institutions within country give less importance to research and development. The figures are as shown in the table given below

### Table 17

**Countries by the Number of Scientific Paper Published in 2014**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Population</th>
<th>GDP (Million USD)</th>
<th>Papers</th>
<th>Papers Per Capita* 1000</th>
<th>GDP/Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Switzerland</td>
<td>7,997,000</td>
<td>631,183</td>
<td>21,372</td>
<td>2.673</td>
<td>29.533</td>
</tr>
<tr>
<td>2</td>
<td>Denmark</td>
<td>5,590,000</td>
<td>314,889</td>
<td>11,787</td>
<td>2.109</td>
<td>26.715</td>
</tr>
<tr>
<td>3</td>
<td>Sweden</td>
<td>9,517,000</td>
<td>523,804</td>
<td>18,645</td>
<td>1.959</td>
<td>28.094</td>
</tr>
<tr>
<td>4</td>
<td>Norway</td>
<td>5,019,000</td>
<td>499,667</td>
<td>9,207</td>
<td>1.834</td>
<td>54.270</td>
</tr>
<tr>
<td>5</td>
<td>Netherlands</td>
<td>16,770,000</td>
<td>770,067</td>
<td>29,296</td>
<td>1.747</td>
<td>26.286</td>
</tr>
<tr>
<td>6</td>
<td>Australia</td>
<td>22,680,000</td>
<td>1,564,419</td>
<td>38,607</td>
<td>1.702</td>
<td>40.522</td>
</tr>
<tr>
<td>7</td>
<td>Finland</td>
<td>5,414,000</td>
<td>247,389</td>
<td>9,207</td>
<td>1.701</td>
<td>26.870</td>
</tr>
<tr>
<td>8</td>
<td>Singapore</td>
<td>5,312,000</td>
<td>276,520</td>
<td>8,768</td>
<td>1.651</td>
<td>31.53</td>
</tr>
<tr>
<td>40</td>
<td>India</td>
<td>1,237,000,000</td>
<td>1,875,213</td>
<td>39,640</td>
<td>0.032</td>
<td>47.306</td>
</tr>
</tbody>
</table>

Source: [https://www.reddit.com](https://www.reddit.com)

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*Note: *Papers Per Capita* is calculated by dividing the number of papers by the population in millions.*
<table>
<thead>
<tr>
<th>Country</th>
<th>Document</th>
<th>Citable Documents</th>
<th>Citations</th>
<th>Self Citations</th>
<th>Citations per Document</th>
<th>H index</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>120373</td>
<td>117959</td>
<td>36354</td>
<td>25968</td>
<td>0.30</td>
<td>334</td>
</tr>
<tr>
<td>United State</td>
<td>66898</td>
<td>64315</td>
<td>28178</td>
<td>13597</td>
<td>0.42</td>
<td>708</td>
</tr>
<tr>
<td>Japan</td>
<td>19843</td>
<td>19266</td>
<td>4990</td>
<td>2008</td>
<td>0.25</td>
<td>319</td>
</tr>
<tr>
<td>Germany</td>
<td>19761</td>
<td>19047</td>
<td>8235</td>
<td>3181</td>
<td>0.42</td>
<td>357</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>18132</td>
<td>17253</td>
<td>8418</td>
<td>3064</td>
<td>0.46</td>
<td>375</td>
</tr>
<tr>
<td>South Korea</td>
<td>17889</td>
<td>17205</td>
<td>6202</td>
<td>2186</td>
<td>0.35</td>
<td>255</td>
</tr>
<tr>
<td>France</td>
<td>14213</td>
<td>13716</td>
<td>5385</td>
<td>1915</td>
<td>0.38</td>
<td>301</td>
</tr>
<tr>
<td>Italy</td>
<td>13606</td>
<td>13039</td>
<td>7078</td>
<td>3223</td>
<td>0.52</td>
<td>268</td>
</tr>
<tr>
<td>Canada</td>
<td>11419</td>
<td>11019</td>
<td>4275</td>
<td>1504</td>
<td>0.37</td>
<td>307</td>
</tr>
<tr>
<td>India</td>
<td>26982</td>
<td>26385</td>
<td>6268</td>
<td>3144</td>
<td>0.23</td>
<td>210</td>
</tr>
</tbody>
</table>

Source: http://www.scimagojr.com
Table 19

**Engineering Out Turns at Different Level**

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors</td>
<td>75000</td>
<td>2000000</td>
</tr>
<tr>
<td></td>
<td>(4% of India)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>37500</td>
<td>75000</td>
</tr>
<tr>
<td></td>
<td>(50% of India)</td>
<td>(4 % of Bachelors)</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>7500 (500% of India)</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.1% of Bachelors)</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Rao, 2013)

Table 20

**Research and Development Personnel Highest per 1000 Population**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>7 per 1000</td>
</tr>
<tr>
<td>USA</td>
<td>4 per 1000</td>
</tr>
<tr>
<td>India</td>
<td>0.35 per 1000</td>
</tr>
</tbody>
</table>

Source: (Rao, 2013)

**Funding Agencies in India**

There are number of funding enterprises including both private and government acknowledged. These enterprises provide sponsorship to enhance importance of research and development in India. In the reforming policy of government to increase and improve both quality and quantity of higher academic institutions Government of India (GOI) proposed 5 new IITs and IIMs in the budget proposed in 2014-2015 and allotted Rs 500 crore for it.
In present technological era, every technical institute must undertake research and development activity which is very essential. In developed countries the research and development starts from college education and university plays the role as innovation hub. So in India every technical institution, university must setup research and development policies with end to end support. Every institution must provide an environment of research so that the faculty and the students with the support of industry/scientific institutes conduct a research for nation development and for the society. The research environment is related to well equipped labs, infrastructure, scientific staffs etc. The main concern for research is insufficient funds. There are various ways through which an institute can raise funds viz. by linking with industry through CSR (Corporate Social Responsibility), by providing labs, equipments, infrastructure to the needy small scale industry, through government funds, by consulting outsource work with the help of faculty and student’s joint venture etc.

f) Governance through Leadership

There are 2,400 technical institutions in India, out of them less than 8% are public or autonomous institutions. There are 85% private technical educational institutions in India (AICTE). So every institution works according
to its own policies. There is a significant change in the demand and supply for the industry in recent years. Most of the engineers are passing out but the employment ratio is very less. So there is a need of setting up unique policies in the governance of technical educational institutions across India to meet the need of industry and society.

Sustaining the link with industry and society helps faculty and student development and research output in technical educational institutions. Establishing effective governance policies will construct long term development for technical education in India.

Governance is "the process of decision-making and the process by which decisions are implemented (or not implemented)” (Wikipedia).

Good Governance includes consensus oriented, participatory, rule of law, effective and efficient, accountable, transparent, responsive, equitable and inclusive.

According to former UN Secretary-General Kofi Annan, “Good governance is ensuring respect for human rights and the rule of law; strengthening democracy; promoting transparency and capacity in public administration”.

Deet says, “The role of the academic leadership has broadened beyond that of the traditional educational leader to one requiring many of the same managerial skills of those of us in the business and commercial sector of society” (DEET, 1993, p. v.).

Good governance establishes and supports the vision and mission of the technical institutions. It creates sound and healthy environment within the institutions. Good governance inspects the implementation of strategies and total quality management process.

**Formation of conceptual framework for technical institutions:** The frame
work should be same across the country for government, private and autonomous institutions.

**Common frame work for governance in technical institutions:** Clear delegation of responsibility and relationship with management with respect to common governance policies and standardization of process of keeping document within institutions with effective governing structure in the technical institutions including management, competent authority, academic and administrative staff.

**Strategic Human Resource management practices within technical institutions:**

Effective implementation of total quality management process with coordination of all departments and pre set standards along with formation of institutional policies by considering region, state and country priorities.

**Common quality management policies and standards:** The policies and standards should be internationally bench marked and acceptable by the industry. The common policies should include the frame work for qualification, curriculum and student assessment. There is need to asses and certify the skill of student by industry or competent authority along with their degree. There should common policies for faculty development.

**Common frame work for industry tie up:**

Industry should invest in technical education under CSR project and formed their Research and Development centres within institutions campuses in collaboration with academic-industry tie up.

Technical institutions outsource research project and complete with the help of industrial and academic experts. In this way theoretical cum practical knowledge is utilized in an effective way to accomplish the research project.

The degree given to the student is based on two credit system
**Academic credit:** This is based on academic performance of the student during their course.

**Industrial credit:** This is based on industry based training and research done by student during their course.

**Professional development for faculty, academic leaders and Board of Governors:** Organizing various training programs based on curriculum development, effective quality management process and strategic planning etc.

**Optimum utilization of infrastructure and resource:** Sharing of faculty, labs, classroom, libraries among other institutions and for outsource work. (Cheong, March 2010)

### 2.3.2 Approaches to the Concept of Human Resource Management Practices

Engineering education is a preferred stream for higher studies in India due to future potential employment opportunities. According to the 2011-2012 AICTE Approval handbooks, Indian engineering education system is the largest education system in the world. V.R.K. Prasad noted multiple issues with Indian engineering education system in effective HRM practices, such as less number of quality institutions dispersed in the large number of population, faculty shortage in comparison to the increased number of institutions, sever less number of Ph.D.s in engineering streams, and reluctance among the students to take up teaching as a profession.

**Annual western Carolina University's (WCU) rankings** showed that research is the important component of the higher and professional education, but involvement of Indian researchers and performance remains low. Institutions are aware of these challenges and have taken some actions such as Ph.D. candidate’s enrolments and faculty enrolments have been increased. The TEQIP program of MHRD which is supported by World Bank has started showing results. Technology is used to enhance the experience of students and
teachers, via NPTEL, NMEICT, and National Knowledge Network.

R. Natarajan said that “If science and technology are to contribute national development, then special must be developed in the people. The most important investment any country can make, whatever its stage of economic development is in its human resources – in the education and training of its people.”

Human resources in our country have been usually recognized as value adders and performance enhancers of the organizations. Human resource is an active component of any institute that allows people to take actions relevant to the objectives but unfortunately there is a scarcity of the availability of the existing literature regarding HRM practices in the institutes.

**HRM concepts and models**

A Strategic Human Resource Management (SHRM) model explains an interface among the company strategy, internal and external settings, business unit strategy, Human Resource (HR) strategy, staff separation and law amendable employment, HR functions like recruitment, management of the performance, training, reimbursement and labour relations and HR information systems. When evaluating HRM strategies and policies, some factors/characteristics should be considered: These are

1. It is important that they improve employee’s recognition and regard to their job by which extent does HRM policies draw, maintain, encourage and build up the employee’s abilities, knowledge and competencies required to achieve the organization’s strategic business objectives

2. To what extent do HRM policies reduce personnel-related costs and help eliminate unnecessary work

3. How HRM policies manage to endorse the attainment of goals by the employee along with fulfilling the strategic objectives of the business.
4. To which degree the HRM policies are catering to the adaptability of the organization and employees readiness to change.

5. To what extent HRM policies contribute to the productivity and the performance of the employees.

6. To what extent HRM policies encourage employees to accomplish the set targets and goals.

In educational institutions, besides the good physical infrastructure, offices, hostels, an institution requires a good quality of human and intellectual resources. Institutes should invest in the state of the art laboratories and faculties.

Training and development is a very important part of the technical education. It should focus on creating more technocrats who will contribute to the national development and growth. The concept of holistic development such as judicious mix of theory, practical knowledge, industrial exposure, project-based learning, research training, extra-curricular activities, and soft skills should be adopted by the technical institutes in India.

Soft skills is an important part of management training and includes components like communication personal as well as professional, management of project, time, productivity and quality, cost training. These gaps among the technical institutes need to be addressed and improved. Faculty shortage is one of the key constraints in most of the technical institutes. Faculty contributes to the major part of the excellence and success of any institute. Teaching is not the most favourable career choice opted by the technical graduates. Today’s consumer needs demand low cost of production, service and higher quality (Joseph Rosiczkowski, 1993).

This shift in consumer needs directly impacts the education institutions today because our students are unable to meet the prerequisite standards of the industry. With these concerns in background quality control standards like six
sigma, lean thinking, TQM plays a very important role in maintaining the protocols of the institutions.

Objectives

1. To recognize the students’ needs and find the means to fulfil the requirement.

2. To provide environment for high quality teaching standard and reliability consistently.

3. To keep up with the pace of change, technological as well as cultural and social so as to become useful to industry and nation at large.

2.4.1 Conceptual Framework on Total Quality Management Process in Technical Educational institutions

Defining Quality and Total Quality Management:

Before defining term TQM it is useful to define the term quality which related with the consumer/customer quality is a state of dynamics which is concerned with services, people, products, processes and the surrounding environment which fulfils the customer’s needs/desires/ expectations or exceeds those expectations. TQM centres on services to others (De Jager H. J. and Nieuwenhuis F.J. 2005).

The TQM concept is developed by W. Edwards Deming to improve the quality of goods and services. The TQM concept motivates constant progress and emphases on integrated, regular, persistent, organisation wide views which is inclusive of all. TQM is not a one-time process but a journey that never ends. It is a way to survive and succeed (Charantimath P. M., 2009).

It is important to understand the term quality before we define TQM. Quality has been defined as a dynamic process related with the products, services, processes, people, which meets or exceeds the consumers
desires/expectations (De Jager H. J., Nieuwenhuis F.J., 2005). Thus the concept of TQM centres on others.

Total quality management has been widely recognised across developed countries and a major innovation in management sector. TQM has been frequently quoted by the industry experts for helping achieving excellence (Jabjnon and Sedrani, 2005) and (Lakhe and Mohanty 1994). The objective of TQM is to improve all the aspects within the organisation so as to provide services with quality which matches consumer’s expectations. In higher educational institutions managerial leadership has been found to be the primary reason for success of TQM (Tari 2006). In technical institutions, proxy indicators like classroom space, library, computer facilities, accommodation, and health care related facilities are a reliable measure of the institutions capability to convey services in a proficient manner (Harvey 2003).

Students opinion can provide a benchmark through which through which an overall quality of the institutions can be judged (Owila and Aspinwall, 1998). It has been suggested that bringing TQM in educational institutions in India can help achieve global recognition, with a quality assurance cell in every institutions (Naik 2001).

For technical institutions like engineering, M. S Owlia and E.M Aspinwall in 1996 devised the first framework for recognising the quality dimensions and the specific characteristics aligned to it which comprised of 28 items used to assess staff, service industry worker, students. Further Suresh Chandra Et Al in 2001 developed 12 dimension of TQM.

Quality management tools have been found valuable by many researchers. P.B. Sakthivel et al., (2005) have concluded from the perceptions of students’ that the certified ISO9001:2000 engineering colleges are moving towards the path of TQM offering better quality of service than the non-ISO certified colleges. The role of six sigma in continuous improvement of the students results have been demonstrated by Prabhakar Kaushik and Dinesh

P.B Sakthivel et al., (2005) concluded from their study based on student’s perception that the ISO 9001:2000 are performing well in terms of the service quality and heading towards TQM than those without ISO.

Dr. S SMahapatra and M S Khan in 2006 analysed and created 20 essential components for the effective implementation of total quality management for any organisation found from 256 journal articles.

Tari (2006), described management Leadership has been found to be a key factor in the success of TQM in higher educational institutions.

Sangeethav Sahney et al (2004) viewed TQM as a perspective to define quality in education and discover the educational quality is becoming essential especially in higher education.

Naik (2001) recommended that the movement in quality brought forth through TQM can result for worldwide recognition of higher education.

R Natarajan in 2000 explained the significance of accreditation in institutions for promoting the quality of technical education and established the indicators for the same.

Zbigniew Mrozek, Osei Adjei, Ali Mansoor in 1997 pointed that efforts need to be maximised in order to utilise the personnel and services in educational institutions for making quality assurance system valuable.

Idris in 2006 explained two ways for implementation of TQM in teaching institutions which are academic and strategic approaches. Bolton in 1995 and Green in 1994 exclaimed that performance measurement is the inevitable feature of TQM. Hence some measurement methods to ensure conformance to customer’s expectations is necessary.

Harris in 1994 stressed on the some general approaches for TQM. First
being student oriented and second one being staff oriented. It is the complicated nature of education that makes managing it challenging. Education is been regarded as network of components interdependent and which work collectively to fulfil the goals of the system (Deming 1993)

Bonser in 1992 credited the initiative of TQM in education to the lacuna of stable leadership. Sahney et al in 2004 concluded in their study on TQM that in education has many sides with a systems approach – technical, social and management. Which includes the quality in inputs (students, staff-faculty and support, infrastructure), processes (learning and teaching), output (capable students passing of the institutions). This multi fact in education makes it difficult to formulate a all-inclusive singular definition.

2.4.2 Approaches to the Concept of Total Quality Management in Technical Education

Some important literature on TQM with reference to educational institutions is summarized in Table 21.

Table 21
Different Views on TQM in Engineering Education

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holmes and McElwee [1995]</td>
<td>Argues that TQM in education institutions like engineering leads to eventual application of HRM policy, practice. This is functionalist. But which hinders the productivity of an individual.</td>
</tr>
<tr>
<td>Crawford and Shutler [1999]</td>
<td>Explained how TQM functions in industries, compared the Crosby and Deming model, adaptability of TQM in educational institutions, deep analysis of application of Crosbys model in institutions, along with concurrent analysis of Deming’s model in education and discusses the primary hindrances in application.</td>
</tr>
<tr>
<td>Harvey [1994]</td>
<td>Harvey argues that the quality has to be seen as a process of transformation and not as a process of perfection. Which literally means the transforming the students life by way of empowering them.</td>
</tr>
<tr>
<td>Kwan [1996]</td>
<td>Reviews the literature which explains the TQM applicability to educational settings, delineates the dissimilarities between the application in educational institutions and those with the industrial settings. It seeks to weight the acceptability of applying TQM in</td>
</tr>
<tr>
<td>Author(s) and Year</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Owlia and Aspinwall [1997]</td>
<td>Initially to strengthen the understanding on TQM, an organization dynamics approach is applied in higher education. To identify the factors related to TQM in higher education a case analysis and survey is carried out followed by development of checklist for executing TQM in US higher education system.</td>
</tr>
<tr>
<td>Sahney, et al. [2004]</td>
<td>In present educational system integrated approach is applied to find the Gaps existing in customer requirements and quality education.</td>
</tr>
<tr>
<td>Sparks [1996]</td>
<td>Postulating goals that are worthwhile of learning and encouraging students to fulfill them.</td>
</tr>
<tr>
<td>Swift [1996]</td>
<td>Recognizes the grey areas for the chosen engineering institutions and informs the benefit of the group project. It recommends steps for enhancing quality in education through quality control and through management.</td>
</tr>
<tr>
<td>Thakkar et al. [2006]</td>
<td>Describes the implementation of six sigma.</td>
</tr>
<tr>
<td>Thakkar et al. [2006]</td>
<td>Explains how QFD can be integrated into TQM.</td>
</tr>
</tbody>
</table>

After Identifying the TQM needs, one can make out various views for promoting the TQM in engineering teaching institutions.

**TQM Perspective 1: Mapping of Deming’s Philosophy**

Deming who is widely acknowledged as the father of TQM movement put forth fourteen points for the quality of business operations which can be used for technical institutions as well. These are:

To establish the drive for development of students and services. To produce students those are capable to establish important positions in society to enhance the system, thereby helping the nation economically. Embrace a new philosophy the institutes must take the challenge and take up leadership position for bringing the required change which will facilitate the constant learning of faculty, active dialogues with the stakeholders like industry, government organization and alumni bodies.
Deemphasize the rating system on people. The learning process rather than the rating must be focused upon. Marks and percentages are temporary means and are judgmental even causing psychological distress and therefore the institutions must give more emphasis and develop the habits of continuous learning and development among the students. Same as above, the institutions must focus on learning that will provide more quality and foster creativity innovation and rather than depending on testing. Courses can be more design oriented. To improve the quality of learning experiences, work with the background of students. Which will minimize the total cost by enhancing the relationship with students and improve their quality? This can be done by partnering / liaising with the schools and other institutions like ITI, diploma, etc. Regularly and continuously improving the system of service and students so as to improve the quality and productivity in personal as well as professional life.

The Plan-Do-Check-Act (PDCA) can be particularly being more beneficial in this respect. Feedbacks from students, alumni, and industry will further aid in this matter.

Take persistent trainings for students, teachers, and all those involved with the technical education. These trainings can be given with incentives like QIP, TQIP by AICTE, mentoring programme and curriculum development workshop.

Inculcate leadership. Leadership should be such that it guides people towards the use of technology like multimedia, web, etc. and resource material for improved performance. Leadership is able to set the pace for innovation and creativity. For effective functioning of the organization it is crucial to drive the fear out. To foster innovation it is important to have an environment that is open to new ideas and take risks to implement them. Team work can be achieved by breaking the barriers in the various departments of the institutions like teaching, research, administration, accounting, etc. Strategies must be devised to increase the cohesiveness in the team. Encouraging interdisciplinary
atmosphere and managing time will facilitate the process.

Disregard pressure on teachers and students for perfect performance and too much productivity. This results in unhealthy atmosphere. The cause of low quality and productivity belong to the system and thus lies beyond the control of teachers and students.

Eliminate work standards (quotas) on teachers and students for instance by raising the results of the college by 10% and decrease the percentage of dropouts by 15%. Substitute leadership, the eternal drive for quality, and joy of learning.

Eliminate barriers to right of dignity and pleasure of work from the teachers, students and management’s life. There should be more emphasis on the qualitative aspect of the management rather than the quantitative. Nurture integrity in order for transformation.

Total quality management requires systemic change. These and other concepts of TQM, have potential application in educational settings are very much applicable in our case.

Matthews [1993] cited the subsequent four critical barriers to the use of TQM in institutions:

- The enormously imprecise and incongruous mission of average institutions
- No common agreement on the importance of excellence and quality within the institutions.
- Identity of key people within institutions.
- The unwillingness of college or university leaders to play a dynamic and innovative part in TQM implementation.

Care must be taken so as to aware all the stakeholders for the above mentioned drawbacks and guide appropriately towards the proper
implementation of the framework (Deshmukh, 2003).

TQM Perspective 2: Award Model

The most instrumental mode in determining the quality improvement or TQM can be through quality framework. This gives a sequence of items under which the most likely projects that can be improvised can be recognized, prioritized and classified. It is for the higher educational institutions to choose the framework for the overall strategy. The quest for an outer award can help the establishment to keep up the quality change however it is essential that the fundamental elements of it are in accordance with the foundations needs. A portion of the known systems are at present received in advanced education, for example, BS5750. The elements of value structure reflected in various aggregate quality honors, for example, The Malcolm Baldride Award in USA and the European Foundation for Quality Management (EFQM) and the NCEA in Ireland. These are going about as quality organizations, which may deal with the outside nature of advanced education.

The following stride is likely to present evaluation as a major aspect of a genuine quality affirmation process. We have not touched base at that progression yet, since it would ask for a superior development of staff on quality administration and of the employees of establishments also. Much work has been done in some European establishments, for example, the European Establishment for Quality Administration. It may not be anything but difficult to depend on ISO 9001 principles, as they are to some degree hard to adjust to advanced education, however to take as a source of perspective the EFQM model, which gives an arrangement of key focuses, and gives a method for nonstop self-appraisal.

The appraisal model must be talked about inside any establishment who might envision utilizing the TQM model. This model must be adjusted to every circumstance, and in addition the relative weights. Once different partners have gone to an understanding about the diverse things, their substance and their
relative weights, regardless they need to envision the estimation instruments required by each of them to quantify the execution of the organization.

One certainty that, however unmistakably evident from an investigation of the TQM writing is that it is unrealistic to influence change without setting out an estimation criteria. What is not clear is the points, strategies and qualities of estimation. By the by it ought to be conceivable to outline different components which could be subject of estimation. The format of recompense model gives a helpful instrument.

One will concur that this procedure can be long and difficult, however we should not belittle the advantages which can be pulled back from such a model, which allows the self-appraisal the same number of times as important, and can be utilized as an aide on the event of an associate audit. This model will likewise be valuable to AICTE and subsidizing offices. It is cheering to note that, as of late, Uttar Pradesh Specialized College (UPTU) has constituted scholarly brilliance cereward. The Structure of UPTU Academic excellence Model is appeared in Table 22

Table 22  

**UPTU Academic Excellence Model**

<table>
<thead>
<tr>
<th>Enablers</th>
<th>Item</th>
<th>Weight age (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Management’s commitment to Quality and Academic Leadership</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Faculty Resources Development and Management</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Quality Policy and Strategy</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Academic Resources</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Academic Processes</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>Faculty and Staff satisfaction</td>
<td>10</td>
</tr>
</tbody>
</table>
It is normal that usage of this model will help in surveying different building establishments and consequently actualizing the reasoning of TQM. In this setting, it is additionally fascinating to note different prerequisites and suggestions for specialized establishments. Like judicious relying on the significance positioning of attributes, quality change steps can be started and a deliberate survey and review framework can be set up for their opportune usage and long haul survival. In a more engaged manner ramifications of proposed methodology for different partners, for example, personnel, understudies, graduated class, budgetary bodies, All India Council for Technical Education (AICTE) and so on are highlighted in Table 23.

Table 23
Consequence of TQM Application by Various Organizations

<table>
<thead>
<tr>
<th>Agencies</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>At first it might impel some risk in the routine outlook of workforce yet in long-run it will make and give learning environment and chances to persistent upgrades in showing measures and in addition at an attitudinal level. It helps the employees to learn and go all the more closer to the understudies and industry by comprehension their desires and contrasting the current measures and set benchmarks. Learning environment helps employee in enhancing the nature of their examination by cross practical endeavors through better cooperation with various branch of same or other</td>
</tr>
</tbody>
</table>

(Source: www.uptu.com)
| **Students** | It gives the confidence, fulfillment and certainty to extreme clients that they are prepared under the all around characterized aggressive models and finishing obviously will help them to become professionally in requesting market.

TQM will help in growing better association among different partners and aides in making self inspired learning environment. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alumni</strong></td>
<td>Creates confidence and more subsidies and backing can be normal from graduated class.</td>
</tr>
</tbody>
</table>
| **Financial bodies** | Fulfilled graduated class will improve advertising for an organization.

It will build their trust and more subsidies can be made accessible for the supportable advancement

Deliberate idea enhances the picture of establishment and notoriety of their understudies will show signs of improvement need in benefiting money related aides for the higher capability in home-hold and in addition outside mainland. |
| **All India Council for Technical Education (AICTE)** | Layouts such Award model will give a solid stage to surveying and looking at the up and coming and built up organizations

Money related help and backing can be given on the legitimate appraisal and level of making consistent enhancements in different perspectives like foundation, showing measures, staff improvement, and motivation for exploration and so forth.

The different levels of development stages for a specialized establishment can be characterized for positioning and setting the rules for nonstop change inside which every organization gets the adaptability to set, characterize and move the methods for accomplishing endorsed measures and benchmarks by AICTE. |

(Source: Deshmukh (2006))

Particularly the created structure will help more to the up and coming specialized foundations by giving orderly and intelligent benchmarking bearings for constant change. It is normal that the QFD point of view will give
taking after advantages to specialized organizations: It will sharpen the establishments about understudy necessities, expected administrations and nature of training in the present constantly changing innovative environment and will likewise help the foundations in comprehension the specialized attributes of the designing instruction and their associations with the understudies' prerequisites. The award model can be utilized either for benchmarking or for assessment of self.

Various TQM standards, for example, Initiative, Nonstop change, Client center, and Collaboration are firmly identified with each other. Persistent change is required to accomplish higher consumer loyalty, and it is best when driven by client needs. The constant change rise above progressive, useful and authoritative limits, along these lines, collaboration is crucial. In this way, TQM is an arrangement of commonly strengthening standards, which are at last taking into account satisfying client's needs.

The TQM theory is worked around three fundamental thoughts, which are: to wind up client driven as opposed to acting naturally engaged, to focus on the procedure instead of being engrossed with results; and to utilize representative's reasoning capacity.

The Deming's logic helps in sharpening the instructive foundations. The quantitative structure of Honor model recognizes a portion of the key prerequisites and qualities of the specialized establishments. It is normal that they got connections and organized attributes through this will form valuable bits of knowledge into the general advancement and streamline the procedures.

The six-sigma approach helps in advancing mistake free procedures inside the range of different exercises of these establishments. It will likewise help in giving a quantitative viewpoint towards different procedures in DMAIC position. It must be noticed that in the rising aggressive situation where the execution of a foundation is nearly viewed by an assortment of partners, it is basic that specialized organizations begin actualizing the ideas of TQM.
The one urgent element in TQM is general underwriting, specifically at the top. In the event that administration is not totally sold on TQM, it is impossible that a usage exertion will be fruitful. Underwriting TQM speaks to a principal change in the way one works together. Not as much as full backing by anybody in the chain of power basically sentences the push to disappointment.

Total quality movement was started after Second World War, but on larger scale it is started in 1980s (Akhtar, 2000; Besterfield, Michna, BesterfieldandSarce, 2004). Afterwards this concept shifted to other fields like education.

Total quality management (TQM) developed by William Deming, a management consultant whose work had great impact on Japanese manufacturing is a proven concept which is practiced in industry to establish standards to ensure the quality of products and services reach the end user. TQM is continuous improvement in quality and is recommended to be led by the management and followed by entire institutions to create learning ability, immovability and sustainability campuses (Gulbarga et al 2012).

Deming was a pioneer of the TQM movement. He illustrated the following fourteen points.

- Generate reliability of functions for perfection of merchandise and service.
- Implement innovative ideas.
- Stop dependence on mass inspection.
- End grading practice.
- Develop persistent and everlasting system of production and service.
- Institute training.
- Develop leadership.
- Drive out fear.
- Maximize the efforts of team work.
- Remove slogans and catchphrases.
• Eradicate numerical quotas for staff.
• Eliminate barriers to satisfaction and pleasure of workmanship.
• Encourage education and self-improvement for everyone.
• Accomplish the change.

The institutions administration should be ready with comprehensive plan of action for quality tasks. The emphasis is on teamwork, collaboration, and using everyone’s respective expertise, which makes transformation possible. Implementation of the quality policy will be based on a sound infrastructure.

Dr. S S Mahapatra and M S Khan (2006) identified and analyzed the critical factors for the successful implementation of Total Quality Management and they considered 256 articles from journals and identified 20 critical factors for successful implementation of TQM in any organization. It was found that the Management Leadership is a key factor in the success of TQM in higher education institutions (Tari, 2006).

Sangeetha Sahney et al (2004) defined quality in education from TQM perspective and explores that the quality of education is becoming important, particularly so in higher education (3).

Naik (2001) has strongly suggested that bringing quality movement through application of TQM in Indian higher education will result in global recognition.

R Natarajan (2000) explains the importance of institutions accreditation in promoting the Quality Assurance of Technical education and demonstrated the indicators of student, faculty and institutional quality.

Zbigniew Mrozek, OseiAdjei, Ali Mansoor (1997) stated that the philosophy of Quality Assurance and Total Quality Management are derived from the industrial and commercial practice and opined that maximum effort needs to be utilized from all the personnel and services involved in the process of the educational institutions to make the Quality Assurance system
Idrus (1996) described two approaches in implementing TQM in educational institutions viz, academic approach and strategic approach.

Bolton (1995) and Green (1994) thinks that “the measurement of performance is an inescapable feature of TQM”. Hence some measurement methods to ensure conformance to customer’s expectations are necessary.

Harris (1994) emphasized generic approaches to TQM. The first: student focus, Second: Staff Focus. Thus the reason why quality is difficult to manage in higher education is due to the complicated nature of the educational product. Education has been viewed as a system or a network of interdependent components that work together to try to accomplish the aim of the system (Deming, 1993).

Bonser (1992) attributed the move towards TQM in higher education to the lack of consistent leadership style.

Farooz M.S. et al., in 2007 stated that Total Quality Management is based on the assumption that people want to do their best and it is management’s job to provide environment through continuous improvement of the system. Total Quality Management is a skill of organization to achieve excellence. It is enhancement of the conventional way of business. There are set of guidelines and regulations for ongoing improvements for the services and the products offered to the customers. Human resources and quality methods are utilized to improve all the processes to satisfy the needs of the clients. This is an integrated and fundamental technique. There is a collaboration of members of organization, and focusing on long range profitability through customer’s contentment, including benefits to society. This is an integration of all functions and processes within an organization in order to achieve regular improvement of the quality of good services (Akhtar, 2000; Besterfield, Michna, Besterfieldand Sarce, 2004; Fitzgerald, 2004). TQM affects the values...
and culture within the organization by providing technological modifications (Boje and Winsor 2005).

The concept of quality according to Sallis (1997) is considered in two ways. First is Procedural concept of quality and second is Transformational concept of quality. Procedural concept is mostly concerned with measuring up and ensuring conformity to a predetermined specification. Transformational concept of quality focuses on more intangible aspects of quality. It has less to do with systems and procedures and more to do with continuous improvement and organization transformation. These concepts are care, services, and social assistance being provided. This type of quality will be achieved through leadership. This is approach is about improving the system. This concept of quality aims for excellence and is satisfied with fitness for purpose.

Juran (1988) gave the concept of quality trilogy – Quality planning, quality improvement and quality control.

**Quality planning** – for quality planning the management has to identify the customers. Their needs should be properly determined and addressed accordingly. The product should be able to respond and fulfil the needs of the customers. Optimize the product features so as to meet everyone’s need.

**Quality improvement** – there should be a process which is able to produce product. Optimization of this process is very essential for the improvement of quality of goods or services.

**Quality control** – for the purpose of quality control, it is needed to develop a process that can produce the product under operating conditions. All the process for quality control should be operative.

Crosby (1992) is another master in TQM. He said that quality is free. It means that there is no need to prevent the waste and inefficiencies in the system because it costs more or less equal. He also mentioned that quality is of zero defects. It means that, errors, failures, waste, and delay all the inequality
things can be totally eliminated if the institutions have the will.

Farooz M.S. et al., in 2007 conducted a research to analyze the thoughts of the modern management paradigm “Total Quality Management” (TQM), and its application in the field of education. Researchers reported that application of Total Quality Management in education will give better results in all fields of the process of education as a good technique of management used and proved giving excellent results in other industrial and business organizations (Akhtar, 2000). TQM philosophy encourages the students, teachers, and the employees for extraordinary performance. TQM is a potential paradigm; we can get benefits of TQM in educational institutions in both public and private as Schmoker and Wilson (1993);

**Fitzgerald (2004) thinks:** TQM can helps school or college providing better services to its primary customers; students and employers. The continuous improvement focus of TQM is a fundamental way of fulfilling the accountability requirements common to educational reform.

**Gupta M. P. (2011)** stated that higher technical education is very important for the socio-economic growth of the country. Higher technical education system of India is currently facing major challenges such as access, quality, and faculty shortage. Government found it difficult to share the responsibilities alone, private institutes were encouraged and at present their share in higher technical education is more than 90 percent. This resulted in unethical practices, regional imbalances, and commercialization. Harmony amongst the trustees, faculty, and students and satisfaction of these three constituencies lead to quality in a self-financed private technical institution. There has been debate about how to maintain quality within higher education and as a result, the measurement and management of quality has created a number of challenges. This has led to adoption of variety of quality management practices. Although, past studies on Total Quality Management (TQM) have undertaken the identification and implementation of TQM
practices successfully. There is a linkage between TQM practices and organizational performance. In technical education, the quality notion runs into problems. In India, higher technical education institutional performance is not evaluated on the basis of generally agreed definition of quality. It is mostly limited to the international comparison or inter-institutional. There are gaps between quality standards and the actual prevailing reality in the technical institutes is borne out when general complaints from industry employers reveal that several engineering graduates do not possess the requisite engineering knowledge, skills, and attitude to fulfil the industry expectation. Managing input, process, output, and satisfaction of internal constituencies can be a good approach for quality achievement in private institutions. Inputs refer to human resources, financial resources, and infrastructure; process refers to governance, teaching-learning and supplementary process; output refers to satisfaction of internal constituencies which are: the students, faculty, and trustees. Their harmonious efforts towards standards result into quality and fulfilment of their entitlements lead to their satisfaction. Considering the above findings; Quality is very important aspect in all institutions especially technical education, since it bears a direct impact on the improvement of the education process. Therefore it is important to study TQM which relies more on processes than on products and is based on strong assumption that a product which come out of a good process is always good.

According to the study conducted by Gulbarga et al (2005), majority of the respondents are of the opinion that the TQM practices in technical education institutions in India are at average level or just above average level (Gulbarga et al 2012). Quality is a very dynamic concept and it is perplexing to define and difficult to measure. Idea of quality differs from person to person and no two experts ever come to conclusion what makes an excellent educational institution. There are many parameters, on which quality can be measured, such as outstanding teachers, moral values, resources, excellent examination results, application of latest technology, support from staff and
parents, strong leadership, caring of pupils, and well-balanced and challenging curriculum. So IBM defined “Quality equals customer satisfaction” so unless institutions puts students and teachers in the first priority, it will be very difficult for them to achieve quality.

Figure 21

Quality Standards

<table>
<thead>
<tr>
<th>PRODUCT and SERVICE STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformance to specification</td>
</tr>
<tr>
<td>Fitness for purpose or use</td>
</tr>
<tr>
<td>Zero defects</td>
</tr>
<tr>
<td>Right first tie, every time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CUSTOMER STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Satisfaction</td>
</tr>
<tr>
<td>Exceeding customer exceptions</td>
</tr>
<tr>
<td>Delighting the customer</td>
</tr>
</tbody>
</table>

Source: (Sallis, 2002)

Total Quality Management is philosophy and methodology as well. It can help institutions to create and manage change. Quality will assist institutions to set own agenda to deal with external pressure. Experts suggest that Total Quality Management is a set of tools which can be employed in the educational institute management.

Four Quality imperatives show the complex environment in which educational institutions works. These quality imperatives are not only drivers but also motivating forces.

- **Moral Imperative**: Moral imperative is the high moral ground in education which recommends that every customer and clients of education (students, parents, and community) deserves the best quality of education. Teachers and administrators should deliver quality education to everyone.

- **Professional Imperative**: Professional imperative is closed related to Moral imperative. Professional imperative implies a commitment to the
needs of the students and an obligation to meet their needs. This will improve the quality of education. This in return will cause a burden on teachers and administrators to ensure that classroom practices and management will be of highest standards.

- **Competitive Imperative:** In the world education, competition is the reality. Failing enrolments can lead to problems in retaining staff and ultimately puts institutions in jeopardizing situation. Educationalists can only get over challenge of competition by working over quality. So TQM is important factor as it is customer driven, focusing on the needs of the clients and provides mechanisms to respond to their needs.

- **Accountability Imperative:** Schools and colleges are the part of the communities and it should be only fair that they are accountable and publicly demonstrate the high quality standards. It is very important for the institutions to show that they are capable of delivering what they were supposed to deliver.

Concept of the quality was derived with the advent of the industrialization. Earlier, craftsmen have their own standards which were sufficient to keep their names and earn livelihood. With the industrialization, no single individual was responsible for the entire product. A strict division of labour was employed and quality control and inspection processes were applied which ensured product quality which was predetermined and specified. However, in last few decades, quality control and inspection was speculated to be wasteful and uneconomic as these processes cannot ensure that workforce care about the quality.

Originally W. Edward Deming originated the concept of the Quality assurance in 1930s and 1940s. Along with Shewhart and Juran, he is considered one of the pioneers of the Quality Assurance. In United States, ideas of quality assurance were largely ignored for a longer period of time. In 1980, nationwide NBC documentary was published called "*If Japan can, why can’t we?*"
The movement for Total Quality in education is very recent. Some of the literature suggested that there is a little proof of quality in education in 1980s in Britain and United State of America but more of the interest from both countries were shown in 1990 onwards. Many of the TQM ideas now completely developed and employed by the educational institutions such as schools and colleges. Despite of the need for the quality in education, some of the schools would like to embrace the ideas of industrial management methodologies and language.

“Quality control is the oldest term. It refers to the detection and elimination of components or final products that are not up to standard.”

“Quality assurance is before and during the event process. Quality assurance is about designing quality into the process to attempt to ensure that product is produced to a predetermined specification.”

“Total Quality Management incorporates quality assurance, and extends and develops it. TQM is about creating a quality culture, and where the aim to every member of staff is to delight their customers, and where the structure of their organization allows them to do so.”

Figure 22

Hierarchy of quality concept

Source: (Sallis, 2002)
To understand the quality, one needs to understand the two fundamental questions as what is the product and who are the customers? To understand quality in education is very difficult. In education, we often refer as learners as output, with reference to the institutions’ perceived performance over discipline and behaviour of the students.

Education is defined a provider of services.

Services such as advice, tuition, assessment, and guidance to pupils and their parents are included. If quality is about identifying and meeting the needs of the customers, then it is very important to be clear whose needs and wants we should be satisfying. Some educationalist says “Customer” is distinctly commercial word and not applicable in education.

Figure 23

Customers of Education

<table>
<thead>
<tr>
<th>Education (Value added to learners)</th>
<th>=</th>
<th>the Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Learner (Student)</td>
<td>=</td>
<td>Primary external customer or client</td>
</tr>
<tr>
<td>Governors/Employers</td>
<td>=</td>
<td>Secondary external Customer</td>
</tr>
<tr>
<td>Government/Society</td>
<td>=</td>
<td>Tertiary external Customer</td>
</tr>
<tr>
<td>Faculty/Support Staff</td>
<td>=</td>
<td>Internal Customers</td>
</tr>
</tbody>
</table>

Source: (Sallis, 2002)
Figure 24
Hierarchical Institutions and the Upside – Down Institutions in Education

Source: (Sallis, 2002)

The successful TQM culture is an effective internal – external, customer – supplier relationship. It can be better explained by above chart. The upside – down organizational focus does not affect the structure of authority in any educational institutions. Education is a learners experience and if quality has to be measured in education, and then it needs to address the quality of learner’s experience.

Educational institutions should make learners aware about the various methods of learning and allow learners to choose between various methods. Establishing a strong feedback process also plays a vital role in assessing any
institutions’ quality. It is advised to the institutions to use the feedback to establish validity of their programmes and formal monitoring is very essential for this.

Table 24

The difference between Quality Institutions and Ordinary Institutions

<table>
<thead>
<tr>
<th>Quality institutions</th>
<th>Ordinary institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Focused</td>
<td>Focus on internal needs</td>
</tr>
<tr>
<td>Focus on preventing problems</td>
<td>Focus on detecting problems</td>
</tr>
<tr>
<td>Invest in people</td>
<td>Is not systematic in approach to staff development</td>
</tr>
<tr>
<td>Has a strategy for quality</td>
<td>lacks a strategic quality vision</td>
</tr>
<tr>
<td>Treats complaints as an opportunity to learn</td>
<td>Treats complaints as an nuisance</td>
</tr>
<tr>
<td>Has define the quality characteristics for all areas of the organization</td>
<td>Is vague about quality standards</td>
</tr>
<tr>
<td>Has a quality policy and plan</td>
<td>Has no quality plan</td>
</tr>
<tr>
<td>Senior management is leading quality</td>
<td>The management role is seen as one of control</td>
</tr>
<tr>
<td>The improvement process involves everybody</td>
<td>Only the management team is involved</td>
</tr>
<tr>
<td>A quality facilitator leads the improvement process</td>
<td>There is no quality facilitator</td>
</tr>
<tr>
<td>People are seen to create quality. Creativity is encouraged.</td>
<td>Procedures and rules are all important</td>
</tr>
<tr>
<td>Is clears about roles and responsibilities</td>
<td>Is vague about roles and responsibilities</td>
</tr>
<tr>
<td>Has clear evolution strategies</td>
<td>Has no systematic evaluation strategies</td>
</tr>
<tr>
<td>Sees quality as a means to improve customer satisfaction</td>
<td>Sees quality as means to cut costs</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Plans long term</td>
<td>Plans short term</td>
</tr>
<tr>
<td>Quality is seen as part of the culture</td>
<td>Quality is seen as another and troublesome initiative</td>
</tr>
<tr>
<td>Is developing quality in line with its own strategic imperatives</td>
<td>Is examining quality to meet the demands of the external agencies</td>
</tr>
<tr>
<td>Has distinctive mission</td>
<td>Has no distinctive mission</td>
</tr>
</tbody>
</table>

Source: (Sallis, 2002)

To build effective TQM culture in any institutions one needs extensive and effective teamwork. It should penetrate and permeate through the institutions. Quality improvements take place when series of small teams works on incremental projects.

As we have already discussed that quality improvement is important in current competitive world. Benchmarking has to be effective. In education, benchmarking focuses on best practices and organizational focus. Comparing one institution with the other one in terms of performance is a very effective way of benchmarking. Certain steps such as planning, identifying potential partners, analyse the processes and practices of the benchmark partner, adapt your own practices to become best, and review the success of the activity can be useful for benchmarking.

Performance measurement and quality monitoring are crucial themes in TQM in educational institutions. There has to be value added performance measurement as follow.

- Difference between student’s performance before and after the entry and competition of the course
- Is a measure of distance travelled, not outcome,
- Rewards institutions,
Can be used as a tutorial tool and as a means of student target setting

Value added league tables give different rankings.

It is very important for an institution to have very clear statement on policy of quality. Next is the quality plan. Quality plan makes quality policy into action. The Quality plan should detail the improvement projects that the institution intends to carry out. This document can turn projects into practicable and manageable. Quality cost is about measuring the benefits of quality improvements. TQM should bring measurable benefits to the institutions. Good ideas have to be measured.

Figure 25

Quality Framework Model

Source: (Sallis, 2002)
The Quality framework must concern itself with teaching and learning. To devise a quality framework, institutions should define its own standards for the principle attributes of quality, and setting up arrangements to achieve them.

In India, there is a need to develop a strong education linkages and good understanding of India’s education system. Our country is rapidly growing and soon it is becoming hub for international education linkages. The International Education Agenda (2007) recognised that internationalising Indian domestic education system will be very vital for various countries. Indian Quality assurance system has gone through the reforms and improving quality became the part of central government’s drive to upgrade tertiary education.

National Assurance and Accreditation Council (NAAC) and University Grant Commission (UGC) have put new quality assurance process in place from 2007. It aimed to improve quality of educational institutions. To achieve similar effect, All India Council for Technical Education (AICTE) was amended in 1987. All India Council for Technical Education was formed in 1954 to conduct surveys of technical educational facilities and to promote development of the technical education across the country in very co-ordinated manner. It oversees technical educational programmes including training and research in engineering, technology, architecture, town planning, management, pharmacy, applied arts and crafts.

**Quality** – is high grade or high status (as in quality performance) in higher education, for quality evaluation purpose.

**Assurance** – Assurance of quality in higher education uses a process to establish a confidence among the various partners involved that provision (input, process, and outcome) which fulfils the expectations.

Government of India (GOI) has implemented a programme for Technical Education Quality Improvement Programme (TEQIP) in India in 2002. Under this programme quality assurance was planned to be extended to
technical education system at institutional, state and National level.

**At institutional Level:**
- Regularity of an academic sessions and conduct of programmes.
- Attendance during lecture, tutorial, and laboratory sessions.
- Class tests and assignments.
- Fair and transparent student evaluation methods.
- Curriculum being properly planned and implemented.
- Student’s involvement in research and innovative activities.
- Opportunities at national and state level.
- Training on problem solving.
- Harmonious interaction between faculty and students.

**At State Level**
- External monitoring of educational processes in all the technical education institutes.
- Coordinating teacher development programme for all institutions.
- Up gradation of infrastructure.
- Incentives for organizations to achieve quality.
- Assessing impact of technical education on society.
- Taking corrective actions on basis of review of reports.
- Independent quality grading of institutions.

**At National level:**
- Setting benchmarks for output quality parameters at all levels.
- Specifying outputs like knowledge, skills, and attitudes.
- Accrediting institutions and courses of study.
- National grading of institutions.
- Periodic review of institutions.
- Adapting technological advances worldwide.

M. S. Farooq et al. in 2007 conducted a review to analyse thoughts of
the modern management paradigm “Total Quality Management” and its application in the field of Education. Authors concluded that TQM in education will give best results in all fields of the process of education as a good technique if it is used by management. It has given better results in Industrial and business sectors. TQM believes on never ending improvements through the collaborative efforts of educational organizations. TQM encourages students, teachers, and other staffs of the institutions to perform well. TQM can help private and public institutions to provide better services to its customers.

**Required TQM characteristics**

**RC1.** Complete commitment from management and controlling bodies like AICTE, members from faculty, etc. for students as well as employee satisfaction.

**RC2.** Appropriate mode way of communication languages used for collaborating with various industries, organisations, institutions, departments etc.

**RC3.** Willingness to change on the part of administration through commitment, technological change and social change

**RC4.** Enabling environment – freedom to work (for example research, industry consultancy, innovation in teaching etc.), educate education and training of faculties, modern leadership with futuristic vision, job satisfaction

**RC5.** Selection and use of an appropriate scientific TQM tool like Award model, Assessment, Brain storming, Six-Sigma,

**Outcome**

**OC1:** Achievement and maintenance of quality Engineering Education

**OC2:** Quality engineering education accomplishment and maintenance

**OC2:** Facilitates the change process smoothly
OC3: Elimination of fear and developing pride, motivation, sense of ownership and courage among faculty/staff and students

OC4: Enhanced participation of all at all levels

OC5: Enhanced student /society satisfaction

OC6: Elimination of non-value adding activities

OC7: Enhanced transparency and accountability in the system

2.4.3 Total Quality Management in Technical Education: Global Perspective

A.M.N. Gounden in 1967 suggested that investing in education is not attractive as much as investing in physical capital. Within the education system, primary education is mostly preferred education over collegiate and non-professional education. This study shows that there is a diversion of resources mostly in favour of physical capital. During that time economic development on rise and that caused a toll on limited resources in India. Educational expenditure was causing a considerable drain on economy. Education commission suggested that educational facilities should be provided at post – primary stage and should be broadly related to manpower needs.

M. R. Kaynes, in 1962 said that Technical education has achieved a major facet of the educational enterprise. Since the technical education was defined by Harrington in the first report on research appeared, there are 2 major changes have taken place such as programmes are broadened to prepare technicians and semi-professional personnel in many fields than those who are in engineering field, and increase in acceptance of the view that technical education belongs at the post high school level. Technical education should be considered as integral phase of higher education. There is a need to develop programmes which prepares larger number of technicians and semi-professional people to supplement the number of professionals. Changes in American education system suggested that they have taken steps to address this
need.

Report issued by the United States Department of Labour (1960) provided an overview of the entire manpower demand as projected for the 1960s. Among the projections reported which have important implications for technical education are as follows: 1) While the labour force will increase by 20 percent, there will be demand for highly educated professionals and this will be increased as fast as 42 percent. 2) Among the highly educated people, there will be heavy demand for scientists, engineers, and technicians.

A study which was conducted by the U.S department of the Labour, Bureau of Labour Statistics (1961) for the National Science Foundation provided the demand of scientific and technical personnel. Large number of students suggested that there should be effective utilization of the manpower and it is dependent upon the services. This report suggests that preparing students is a huge educational task.

There is a scarcity of the research conducted in the field of technical education and its relationship with the economic growth. Johns and McLure presented report in 1961 about economic growth and technical education and Groves in 1961 also summarized studies related to this relationship.

M. R. Kaynes, in 1962 reported that one of the major problems in technical education is the construction of courses and curriculums. Technical Education News reported that once the more organized occupational curriculum offered, enrolment of the students were increased.

Henninger in 1959 conducted a study in which data was collected from 121 of the 144 institutions identified in the United States offering engineering programmes. Only 44 of the 121 institutes studied were separate technical institutes. Of these, 20 were privately owned; 16 privately endowed and 8 were publicly supported. Remaining were, private colleges and universities.

Henninger reported data regarding curriculum, the student body, the
faculty, the administrative patterns, financial structures but conclusions were not clearly drawn in the study. There was bias in favour of the curriculums approved by the Engineering Council for Professional Development was apparent but still study was important. It had revealed the wide variations in the programmes, different point of views, differences in the range of curriculum, the types of institutions offering technical education and so on.

D. G. Lux, in 1964 suggested that Mechanization and Industrialization were coming to India and speed of this penetration will be depending on availability of the necessary workforce. He also said that industry will only expand with the help of skilled workers such as engineers and technicians. This increasing demand for professionals should be satisfied given the expanding needs of the Indian Industrial growth. Author said that Technical Education Programs in the Third Five- year Plan Stress the need for increasing the number of trained personnel at all levels. There should be increased number of teachers, provision of scholarships, fellowships for talented students, part time and short time corresponding courses, development of special courses in certain fields are necessary. In 1962, there were 42,000 enrolments in 166 industrial training institutes. In addition to development of the I.T.I.s there was planning to develop instructors as well. These instructors were trained for nine months for practical training and workshops.

2.4.4 Total Quality Management in Technical Education: Indian Perspective

The All India Council for Technical Education was appointed in 1946 to advise the central government on every aspect of technical education. The Council has identified needs, stimulated the development and improvement of the programmes. Most of the engineering colleges were operated by Central or State governments. Indian Institute of Kharagpur, was the first higher technological institute to be established and it started functioning in 1951. The Polytechnics are designed to train people for three years. These workers will
eventually occupy supervisory roles in the industry. There was a need to develop cooperative plans with the selected industries in which one year was added to the original 3 years of education. This additional study gave students adequate industrial experience. The history of high school technical education in India showed that there is a persistent concern and lack of implementation of the system, long back in 1854. It was reported that there should be an attention given to the practical knowledge as it is very useful and suited to every stage of life but it is mostly neglected.

The Hunter Commission of 1882 recommended that there should be 2 different avenues in the particular class of high school. One should lead to the entrance examination of the university and the other should lead to more practical nature which will influence youngsters to take commercial, vocational activities as jobs.

The Sapru Committee of Uttar Pradesh in 1934 concluded that education which is commonly prevalent and administered will last only for the exams and not for life time. There should be a provision of diversified courses of study. There is a considerable change in the high school pattern since 1953 and 2000 schools have designated as multipurpose but only 200 out of those included provisions for technical education because there were no teacher training programme. Technical education in India lacked support and public acceptance. Technical education was not available for masses. Author concluded that need for the technical education was recognized but there is a lack of variety of programmes and adequate coordination.

Anthony King in 1969 conducted a review to attempt to bridge gap: to examine a problems posed by the relationship between social science, engineering education, and socio – economic development, particularly with reference to the state of higher technical education in Britain, West Germany, and India. U.N.E.S.C.O. surveys plays vital role for any comparative studies. Author concluded that engineering curriculum in all nine countries surveyed
seem to be particularly applicable to the British conditions. Sir Peter Venables pointed out some accurate descriptions of these programs such as human aspects of industrial administration. In this developing area, there was focus on industrial sociology.

In British Engineering departments social sciences courses are currently established. Committee on Manpower Resources for Science and Technology in 1968 have recommended the inclusion of social science teaching into degree courses in Science, Technology and Engineering. There is a need of training engineering and science graduates for the assignments in developments in Germany.

The need of technical manpower was already recognised in India in 1946 at all level. In 1946 there were 30 engineering colleges admitting approximately 3000 students. There were institutions were established and with their foreign collaborators, resources in the form of equipments, visiting faculty, enhance arrangements, and library supports were used. These institutes were completely residential. Overall staff: student ratio was 1:8, compared to 1:30 in other higher universities.

Researchers suggested that in India, the status of Engineer is very high comparative to those in Britain. In Britain there is problem of attracting the best brains from pure science background to take up engineering as a profession, whereas in India, large number of pupils will take up engineering once they finish high school.

There are so many advances in the scientific and technological changes, that one out of five or six science or technological graduates will be out of date within few years of graduation. So there is a need of development of the societies where specialization in skills should be reached at every level. Built in flexibility is essential for an engineer in the developing world and to develop this flexibility, educational planning is required. This planning with inculcate the values, attitudes, behaviour patterns and general skills rather than focusing
in highest paid jobs. In Indian scenario faculties concerned with social and humanistic studies would need research and teaching programmes, relevant to current situations. There should be integration of inter-disciplinary programmes. There is a scope of research to focus on problems of industrialization and social change, project formulation and evaluation, relationship between urbanization and economic growth. Curriculum which combines the pure science, humanistic studies, social science and the major technology has a distinct advantage. In a situation where at least three languages (English, Hindi, and Marathi) are likely to be engaged while teaching there is an urgent need for research into linguistic problems.

There is a need of study which will examine the language behaviour, or on the relationship between linguistic proficiency and academic attainment. Author concludes that if educational strategies and perspective planning in both developed and developing countries are to be served the needs of tomorrow, then issues of higher technical education should be resolved as soon as possible.

Maj. – Gen. C. Lloyd in 1953 suggested that technical education will never remain static. He said that in the past 200 years there have been major shifts in the educational philosophy and techniques. Knowledge is available for use and people of every age group can be educated in the new knowledge rapidly. The fourteenth and fifteenth centuries craft guilds with their responsibilities for the admission and training were in demand. The eighteenth century the Industrial Revolution brought a new set of working conditions and increased demand for technical education. Technology should be taught to the highest level required in the industry and technical expertise should not be considered in isolation but also that we need to remember that industry also requires leaders.

Delwin A. Roy and William Ireland in 1992 reported that to achieve the quality of education then there should be decentralization of the administration,
practical linkages between the educational system and the demands of adult life, provision of practical training, vocational counselling and guidance along with self education.

D.P.Nayar in 1970 categorised problems of technical education in three categories as preparation of technical education, technical education itself, and succeeding practical training. The ground for technical education has to be prepared through knowledge of humanities and basic sciences and skills. Next category is technical education itself. It is very important to focus on the students those who want to take up technical education. Usually, people want to go for higher technical education so that they can get high paying sophisticated jobs. Best students opt for engineering colleges, second best for polytechnic and third best for craftsmanship courses. There should be quantitative measure like how many students should be admitted at different levels and in different specialities. Need of the assessment of the economy should be done so as to understand what are the employment opportunities for these graduates once they finish their education. Nayar reported many problems such as salary distinction between diploma and degree holder. Promising source for recruitment should be identified and established. Author reported another problem as insufficient involvement of the syllabus with the results where products do not match the industry requirements. Lack of flexibility of the curriculum also poses different problems. Teachers should be involved in syllabus making so that they will be able to choose the contents for the courses. This will bring coordination between teachers and examiners. Author pointed out that there is too much spoon feeding in the method of teaching. There should be encouragement to use library and innovative techniques. There is scarcity of the industrial and engineering research and due to maximum demand in the service industry, entering into research does not attract pupils.

J.V. Deshpande, in 2000 suggested that teaching is the least priority. In most of the states of India, educational year starts at the mid of June and the admission process goes on for long time due to various administrative issues.
B. K. Jha in 2004 assessed the technical education in Uttar Pradesh. He stated that there is a rapid growth in number of private sector technical institutions and rampant commercialisation has seriously compromised their quality of skills development.

Significance of technical education cannot be overlooked in context of the globalization and intact technical education will promote the industrial development which will in return help our GDP. In India, basic technical education begins at the Industrial Training Institute (ITI) level (one year certificate course), followed by polytechnic (2-3 years diploma) and then bachelor’s and master’s degrees. For setting up technical institutions, approval should be taken from the All – India Council for Technical Education (AICTE) and the UP Technical University, Lucknow. As per AICTE guidelines, there should one teacher for 12 students; institutions running one branch should have minimum 2 professors, four readers, and eight lecturers. On the contrary, there is a shortage of staff, and only about 20 percent institutions have minimum required infrastructure. Current paper reported major issues regarding technical institutions. There should be focus on skill development in these institutions but despite the increased intake of the institutes, large number of seats are laying vacant. Quality is compromised due to commercialization because profit has become the sole aim of these institutions and skill development took back seat. For meritorious but poor students, GTIs are only hope due to subsidised fees. However government has withdrawn this support by converting 50 percent of the seats into paid category and the remaining as open seats from 2002. There is substantial hike in the fees from Rs. 9,000 to 60,000

C. J. Fuller and H. Narasimhan in 2006 reported a review regarding engineering colleges and professionals from Tamil Nadu. In Tamil Nadu, Supreme Court recently passed judgement on reservations in private colleges. It has caused controversy in Tamil Nadu, especially in relation to engineering colleges. There is a rapid growth in Engineering colleges due to enormous size of IT industry but many students do not get employed by the multinational
companies due to lack of communication skills.

2.5 Gaps found in Literature Review

1. HRM practice is largely missing from the technical institutions.

2. There is no proper recommendation found which will give strengthening in the governance process of self finance technical institutions.

3. Total Quality Management has not been implemented in the technical institutions at ground level.

4. The impact of Total Quality Management on the quality of technical institutions is yet to be assessed.

5. There is a dearth of research in TQM and HRM practices in technical education in India with respect to perception of prime stakeholders (Staff and Students).

2.6 Summary

The chapter cover-ups the conceptual framework on human resource management practices and total quality management in technical educational institutions in global, national, and regional scenario. Engineering education, being the anchor of the technical education in India, an in-depth analysis of growth and development of technical education in regional context is brought to the forefront. However, the impetuous growth of private technical institutions in India has let down its quality. Some parameters discussed as workplace environment, infrastructure, compensation and appraisal strategies, training and development, research and development etc. Hence to improve the quality of technical institutions and effective human resource management practices and total quality management is analysed in the perception of faculty and student. Some recommendation given by various committees formed by Government of India (GOI) was discussed.