CHAPTER 2

RESEARCH DESIGN
In the idiom of globalization while moving towards 21st century we are bound to have breath-taking accomplishment because of the change over from the wheel culture to the chip culture with dramatic changes in the mega transformation of global economy. Globalisation is buzzard that is the raw material for innovation. This raw material as the change is a conception in Industry with corporate planning, MbO Information Technology, TQM and Reengineering so on and so forth. In a particular sense the importance of TQM has been acclaimed to be most prominent and significant conception being practiced across the globe by all organizations irrespective of the nature of business.

During the past one and half decade, TQM has also been observantly the most important organizational strategy for achieving competitive advantage by the companies. Improving the quality with which an organization can deliver its products and services is critical for competing in an expanding global market. Subsequently TQM has emerged as the new paradigm for the management of product and service quality. Top-level executives from many organizations have tremendously elevated TQM as an operational philosophy. Global corporations such as Xerox, Texas Instruments, Federal Express and AT&T have implemented aggressive TQM programmes to achieve world leadership positions in their respective businesses (1990). In India also some organizations such as Larsen and Toubro, BHEL, Kirloskar, Crompton Greaves, National Dairy Development Board, Madura Coats, Ultra Tech Company Limited etc., have either improved or excellent. Of
all the above companies the Ultra Tech Limited is the latest and most successful organization.

Quality focused companies are quick to emphasize the important role of TQM in the organizational process. It provides a comprehensive and integrated approach by which an organization can achieve improved quality in the products and services it offers. In developed nations like U.K., Japan, and United States, the organizations have had success with TQM, which empowered employees with greater need for both timely and accurate results. This can be attributed to the successful implementation of TQM programmes in these enterprises. A brief description of the scientific procedures followed in conducting this study is presented under the following headings.

1. Review of literature
2. Significance and Need for the study
3. Objectives of the study
4. Hypothesis
5. Scope of the study
6. Methodology of the study
7. Variables used in the study
8. Limitations of the study
9. Chapterisation

The objective of this section is to review the related literature in respect of the practice of TQM in companies and its impact on the business performance of the companies. The end result of this review will be to identify the research gap and to formulate conceptual framework regarding the selected topic of research.
REVIEW OF LITERATURE ON TQM

The TQM literature regards quality management as a core component of every job and organizational arrangements for quality as integral to the operating systems of enterprises. There are a fairly good number of studies conducted on TQM. The concept has just been introduced the Indian enterprises. Therefore, there are a very few studies conducted on Indian organizations.

In a study Schein (1985) has noted that structures, systems and procedures are important but secondary mechanism of change. The primary tools to embed a culture include leadership and education. Oakland (1989) advocated that the financial incentive should never be used, as this does not form part of the TQM culture and the presence of which would defeat many of the objectives. Evans and Lindsay (1993) and also Schonberger (1992) have, through a study, suggested that TQM should be a critical component of strategic planning and the integration of TQM into the strategic plan can lead to organizational growth; competitive advantage and increased profitability. Mendelowitz (1991) mentioned in his study that finalists for the Malcolm Baldrige National Quality Award increased market share by 13.7%, decreased customer complaints by 11.6%, decreased product defects by 10.3% and increased on-time delivery rates by 4.75% through effective TQM practice. In another study La Barbara. PA and Mazuscky.D (1983) emphasized the importance of TQM in identifying customers, determine the specific needs of customers, integrate all activities of the organizations such as Marketing, Production, Finance, HRM and Information Systems to satisfy the needs of customers and follow up to ensure that the customers have been satisfied.
Among the studies undertaken in India, Upal Chowdury (1996) emphasizes TQM as a conscious attitude of mind. He discusses the role of TQM at National and Organizational levels. Ramesh and Virupaksha Gowda (1992) attempted to analyse various activities, which promoted route to TQM in Kirloskar Electric Co., Ltd., at Peenya in Bangalore.

In his working paper Sarkar (1991), he explains the status of TQM in Indian enterprises. While discussing the problems and prospects, he has described Dr. Deming’s fourteen principles of TQM. Parth Sarathi (1996) studied the ramifications of TQM and the role of HRD function when a company is embarking on TQM. Philip George (1995) outlines the events of TQM in Larsen & Toubro and Crompton Greaves organizations. While emphasizing the need and relevance of TQM in Public Enterprises, David E. Stoddart (1995) explains the scope of TQM, much broader than International Quality Standards, in addition to a note on seven criteria that are followed under TQM. Neelakandhan (1992) and Subramanian (1992) in their empirical studies in an organization and Madura Coats respectively, explain the inter relevance between Training and Development and TQM.

The above studies were conducted on a specific and only in one company. They have not touched upon the comparative analyses between or among the organizations either in the same industry or diverse industries. More over, a very few of the above studies cover only a few aspects of TQM through Human Resources. Therefore, it is useful and important to undertake a comparative study of HRD practices for TQM in private and public sector enterprises.

Lascelles and Dale (1990) carried out a study on the quality improvement process in a cross section of U.K. manufacturing industry. The study identified potential barriers to
the quality improvement process – 1. Fear of change; 2. Lack of necessary skills to facilitate improvement; and 3. Lack of information to support the improvement process. The study also revealed the factors for successful quality improvement – 1. Clearly defined and articulated quality improvement policies and objectives. 2. Considering quality improvement as part of a general company wide improvement strategy and not as a stand-alone program 3. Effective leadership from the chief executive.

*Saraph, et al., (1989)* conducted a study wherein they have developed an instrument for measuring the critical factors of quality management. They identified the following eight critical areas of managerial planning and action that must be practiced to achieve effective quality management in a business unit – 1. The role of management leadership and quality policy 2. Role of the quality department 3. Training 4. Product/service design 5. Supplier quality management 6. Process management 7. Quality data and reporting 8. Employee relations.

*Dinesh Kumar (1998)* reported that the top management has an obligation to lead and evolve effective plans for the following activities, which ultimately helps organizations to make significant progress in their journey to become world-class manufacturers – 1. Goal setting 2. Integration of strategic quality plans with overall business plans 3. Defining roles and responsibilities at each level 4. Human resource development 5. Motivation and empowerment of employees 6. Meeting customers and suppliers requirements 7. Identifying key requirements such as new technology, employee education and training 8. Reviewing the status of quality plans and providing timely assistance to units not performing according to plans.
Oliker, L.R (1992) identified 120 prescriptions for effective quality management, which were subsequently grouped into eight categories that are quite similar to the Baldrige Award criteria – 1. The role of management leadership and quality policy 2. The role of quality department 3. Training 4. Product/service design 5. Supplier quality management 6. Process management 7. Quality data and reporting, and 8. Employee relations.

Lawrence Holpp (1990) Specified the following steps to achieve total service quality 1. Creating awareness and a philosophy of constant improvement, 2. Making the vision of the organization a personal vision for every employee 3. Empowering employees to act 4. Surveying customer personally 5. Measuring meaningful information 6. Adopting a performance management system that rewards teamwork, improvement, and new behaviours consistent with interdepartmental co-operation.

Rossi, Evelyn. W (1997) reported that the purpose of the study was to investigate the organizational phenomena involved with the implementation of quality as a philosophy through effective training in award winning total quality management programs. In-depth interviewing, elite interviewing and surveys were the main data collection techniques used.

Results of this study suggested that in effectively implementing total quality training efforts, the professionals responsible for such initiatives should be concerned with the following; securing top management support, reinforcing the skills learned \ developed from the training in the performance appraisal process and including the key supervisory levels in all quality training endeavours.
Bran Maskell (1989) described the following common characteristics used by world-class manufacturing firms to measure their business results - 1. Performance measures are directly related to the manufacturing strategy. 2. Primarily non-financial measures are used 3. The measures change over time as needs change 4. The measures are simple and easy to use 5. The measures provide rapid feedback to operators and managers and 6. The measures are meant to foster improvement instead of only monitoring.


implementation of TQM is not an easy task as it requires a total change in organizational culture, shifting of responsibility to management and continuous participation of all in quality improvement process.


Hongming Hua, et al, (1998) study investigated the current quality management practices in shanghai manufacturing industries, relationship between TQM and business results, between ISO-9000 and TQM and between employee involvement and TQM results. The results of their study revealed that the state of quality management in shanghai manufacturing industries is both positive and negative.

Tee Garden, James Williams, (1996) in their study examined a Total Quality Management initiative in which cross-functional quality improvement teams were a key element. Information about the Carter company’s TQM initiative was obtained through interviews with the management group, with the members, of two cross functional quality improvement teams and with groups of employees who had not been members of a cross functional quality improvement team.
The findings indicate that participation on such teams did result in increased levels of trust and understanding between team members from different departments. Other findings of this study include – 1. The TQM initiative was not effectively led 2. The TQM initiative did not adequately address the needs of all the relevant stakeholders 3. The TQM process itself was not appropriate for the carter company.

*The Canada – India institutional co-operation project on total quality control, (1995)* described that effective participation and enrichment of quality of work life of all people in the organization is crucial for survival in the present environment of competitive world.

*Burstein C and Sedlak K, (1988)* identified the major challenges to TQM implementation - Lack of comprehensive quality improvement education, uneven top management support, lack of customer orientation, lack of clarity in measurement systems, scarce resources for required investment.

*N.S.Bisht, (2000)* studied the participative management system in India and pointed out that there is a great deal of misconception and confusion among managers, workers and unions and even among the government officials, with regard to the usefulness of the participative management system and the possibilities of creating an environment for effective participation.

*Revenue and Lakhe (1995)* in their survey revealed that the need to create facilities for training and education for all levels of management and workers and to organize seminars and workshops to provide a platform for exchange of views and opinions.
Lakhe and Tidke, (1991) revealed that the concepts of quality management and its contribution to the growth of industrial economy is not clearly understood and recognized by the industries. Furthermore, most of the companies had no well-defined quality policies. The companies having such a policy had no systematic way of communicating it to the employees. The total absence of quality cost analysis and limited use of the statistical techniques were the key features of failure of these industries in quality area.


While Explaining the Relationship between TQM and Business performance

Pascoe, Larry Bruce, (1992) highlighted that the purpose of the study was to determine the level of importance placed on the key TQM components, the effectiveness of the TQM programs and the degree of correlation between each of the components and the effectiveness of the TQM programs. Senior managers in manufacturing organizations throughout the United States were respondents in this study. The study demonstrated that the TQM programs were instrumental at improving the performance of the firms studied.

Piper, Randy T, (1992) reported that there was a significant and positive relationship between TQM and business results. Further the preferred regression model of firm performance explained 50.97% of the variance. Voss, C (1996) found that TQM practices are highly and positively related to business results. Further, he reported that better
practices lead to improvement in Business results, including higher market share growth, higher profitability and low costs. *Singh, A (1993)* described that the inconsistent track records of companies reported to have implemented TQM have raised lot of debate about the usefulness of TQM program. *Subramaniam, E, (1992)* specified that it is due to the lacuna in the implementation process of TQM rather than the principles of TQM, which are sometimes responsible for such failures.

*Kwansik Cho (1994)* extensively investigated the factors affecting successful implementation of TQM in three different industries- large manufacturing companies, small firms and services organizations. A cross sectional field survey was conducted and multiple methods were utilized to provide a rich basis for interpreting and validity of the findings. The results of the statistical analysis revealed the following important findings:

(a) All hypothesized quality success variables were positively associated with TQM success.

(b) The people - oriented factors are more highly associated with both TQM success and competitive. Advantages than technically- oriented factors.

(c) This research revealed that two variables (information technology and management of process quality) have a multivariate interaction effect with industry type on the dependent variables (TQM success and competitive advantages)

*Roy and Dey (1999)* specified that the primary processes like manufacturing processes if not monitored through the supporting secondary processes, do not meet their primary goals. *Korn, Ellen Jane (1993)* reported that the chief reason for the failure in world-class competition is the failure to tap the workforce’s potential. *Singh, A, (1991)* reports that
about one-half to three-fourths of all organizations that attempt implementation of TQM drop their initiatives within the first two years because firms faced all kinds of new problems on account of poor background preparation for implementing TQM. Thus it is generally accepted that TQM influences the business performance of companies significantly.

SIGNIFICANCE AND NEED FOR THE STUDY

The emphasis on TQM practice and theory has been in the lime light since the inception of the concept. In the theoretical description there has been a consequential notice in the dynamic and post development changes.

Therefore the quality-focused companies are quick to emphasize the important role of TQM in the organizational process. This effort provides a comprehensive and integrated approach by which an organization can achieve improved quality in the products and/or services. In developed nations like USA, United Kingdom etc., the organizations have had success with implementation of TQM, which empowered employees with greater need for both timely and accurate results. This can be attributed to the successful implementation of TQM programmes in the enterprises of these countries.

The Quality and Price are fundamental in the ever-changing competitive markets for goods and services. Major corporations include quality in their strategic planning. Quality has been the major factor in the success of Japanese products particularly in automotive and electronic and infrastructure market. High quality does not necessarily mean high price always. Many quality improvements actually reduce unnecessary cost involved in the output. In the service industry also the superior quality is a winning
corporate strategy. Leading service enterprises use high quality maintenance as their core competence that differentiates from their competitors. This phenomenon can be understood through increased productivity to earned customer loyalty, price, competition etc.

The second major area for understanding significant need of TQM is a continuous focused on performance, improvement, involvement, leadership change etc., of internal employees. There has been paradigm shift on the competence-based performance for employees for the success of Total Quality Management. Hence the views expressed by Dr. Deming (1986), through principles of TQM totally accord with people orientation to the significance of Total Quality. The understanding can be logically made through different perspectives also. Firstly, Top management is the main driver of TQM. Secondly, quality occurs in two places. Thirdly, the management innovation, which is exclusively managerial task. The majority quality problems are due to systems controlled by managers rather than workers. Fourthly, the regards and systematic techniques of identification and problem solving which every employee must achieve with the help of skill knowledge and competence. Therefore there is great need to train every employee in the areas concerned.

It is understood that the presence and practice of TQM can be significantly enhanced through two broad approaches namely production oriented and human resources oriented. This has already been achieved in production with help of sophisticated technology while the human resources contribution – for Total Quality Management achieved is far below the expected level. These observations make significance to undertake this study.
OBJECTIVES OF THE STUDY

The present study is aimed to understand the process and practice of TQM in one of the most pioneering and fast growing industries of India i.e., Cement Industry. Within the industry M/s. Ultra Tech Company Limited has been chosen as a sample organization for the purposes of the case study. Evidently this company, which was renamed after it, was taken over by the Aditya Birla group from Larsen and Toubro Limited is being regarded high in the industry due to innovative management practices and high intensive technology used in the manufacturing and other processes. Therefore, the case study is directed towards identifying the problems and practice of TQM in Ultra Tech Company Limited. Another important aim of this study is application of different components of TQM such as mentioned in Chart 2.1. In addition to above, the case study attempts to suggest suitable measures in TQM implementation in the organization for better results.

The following are the specific objectives of the study.

1. To understand the philosophy and policies of Ultra Tech Company Limited with regard to Total Quality Management.
2. To elicit opinions and perceptions of both managerial and employee respondents regarding practice of different components of TQM.
3. To evolve specific models and methods for enhancing the effectiveness of TQM implementation in the company.
4. To identify different adjunct areas of TQM for further research activity.
5. To study the impact of different factors such as age, qualification, experience etc., of respondents with regard to their perception and opinion on TQM in Ultra Tech Co., Ltd.
HYPOTHESIS

Based on the objectives of the study, the following hypothesis were formulated for testing:

**H₀**: The quality practice of selected components has not improved after implementation of TQM as compared to the practice before implementing TQM.

**H₁**: The quality practice of selected components has significantly improved after implementation of TQM as compared to the practice before implementing TQM.

SCOPE OF THE STUDY

In the recent past in India there has been tremendous growth in manufacturing sector as a major industrial sector. The manufacturing industry has enormous potential for earning domestic income and also Foreign Exchange with in the manufacturing sector. The Cement Industry in India has dominated the other industries because of high rate of increase in the demand for the product. This enhanced demand is slowly becoming global demand wherein number of multinational enterprises compete with domestic companies and dominate through high quality services. Therefore the current levels of productivity and quality in domestic companies are continuously pressurized for their survival. The current levels of productivity, quality goods are not sufficient for sustaining international advantage. If one has look at one would find the inefficient quality management is major cause of for concern. These above symptoms significantly been recognized by Indian organization. The companies operating both in India and abroad have developed this consciousness in the recent past and the putting all efforts in implementing various interventions for gaining quality improvement. Thus it is very much need for any company to implement TQM practices in the present corporate world. Ultra Tech Cement Private Limited is not exemption to this.
To have systematic approach to TQM, it is necessary to develop a conceptual model. The TQMEX model advocates an integrated approach for managing quality in order to support the transition in organisations. This is an ongoing process of continuous improvement that begins when the company commits itself to managing by quality. The UltraTech Co. Ltd., is not an exception. Under the TQMEX model Quality Control Circles (QCCs) come first and the same was developed and refined as Quality Management system (QMS). The scope of QMS further increased to accommodate a few more dimensions to quality and christened as Total Productive Maintenance (TPM). The quality practice in UltraTech Co. Ltd., is termed under TPM. However the company has gone beyond TPM in the practice of quality. This enhanced effort can comfortably be termed under Total Quality Management (TQM). Hence, in the present study TQM is considered relevant than TPM considering the high level quality practice.

In this study an effort has been made to study the process and practice of TQM and its impact on business performance of Ultra Tech Limited. Some specific suggestions are also made for improving the implementation and success of in the TQM companies as regard. The scope of the study has been directed process and practice of components of TQM have been taken in to consideration purpose of the study. Further it is also aimed towards testing impact of TQM on business performance of Ultra Tech Limited. It is also presumed that the results of the present of the study will be of grate value to the company under the study in implementing and practicing TQM. The study will give scope for understanding the relative contribution of each components as listed in Chart 2.1 on TQM to the company's business performance. The scope of the study has been designed on two different conditions such as pre-implementation and past-implementation of TQM.
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<tr>
<th>S.No.</th>
<th>Components</th>
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<tr>
<td>1</td>
<td>Leadership style</td>
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<td>2</td>
<td>Training and development system</td>
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<td>3</td>
<td>Human Resource Planning and Management</td>
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<td>4</td>
<td>Quality of work life programmes</td>
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<td>5</td>
<td>Employee involvement and development scheme</td>
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<td>6</td>
<td>Social responsibility</td>
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<td>7</td>
<td>Supplier alignment</td>
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<td>8</td>
<td>Information and communication</td>
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<td>9</td>
<td>Resource management</td>
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<td>10</td>
<td>Strategic quality planning</td>
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<td>11</td>
<td>Quality assurance</td>
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<td>12</td>
<td>Process management</td>
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<td>13</td>
<td>5S concept and work place management</td>
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<td>14</td>
<td>Customer orientation</td>
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<td>15</td>
<td>Business Performance</td>
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The scope of the study is further extended to understand the performances under observation of managers and non-managers on the implementation of TQM in Ultra Tech Limited.

Operational Definition of Concepts

Management experts have defined and described Total Quality Management in different ways in different contexts. There is no unanimity in their opinions and research findings. Taking into consideration the views expressed by these researchers, the term quality and Total Quality Management can be operationally defined as follows:

*Quality:* "Meeting the customer requirements, stated or implied at a given time and over a period of time at a price that the customer can afford and is willing to pay".

*Total Quality Management:* TQM means involvement of everyone at all levels and across all functions in the organization and stimulating and training them to improve the quality of the product/service/processes on a continuous basis by using statistical quality control methods in order to delight the customers and benefit all the stakeholders of the company.

- **Components of TQM:** Several studies have revealed different components constituting Total Quality Management. For the present study, fifteen components have been selected. These fifteen components are those, which have been selected after a careful understanding of the theory and based certain criteria such as relevance, effectiveness, efficiency and applicability. The components are mentioned in chart 2.1 already.
Leadership Style: Leadership style is defined as personal involvement, commitment and visibility in developing and maintaining a customer focus and an environment for quality excellence.

Training and development system: For the purpose of the present study, employee training and development system shall include objectives, programs and methods, resources needed, identification of necessary internal support, evaluation in terms of enhanced competence of people, measurement of the effectiveness and the impact on the organization.

Human Resource Planning and Management: Human resource planning and management is operationally defined as the company’s over all human resource management plans and practices that support its quality and operational performance.

Quality of work life programs: For the purpose of the present study, quality of work life is defined as the programs that are favourable to the well-being and growth of employees.

Employee involvement and development scheme: Employee involvement and development is defined as a scheme that promotes team spirit, creativity, improved quality and increased productivity.

Social responsibility: Social responsibility is defined as the integration of company’s responsibility to the society, for health, safety, environmental protection and ethical business practices in its quality policies and improvement activities.
Supplier alignment: Supplier alignment is defined as interdependence and a mutually beneficial relationship between a company and its suppliers.

Information and Communication: Information and communication is operationally defined as the key methods used by the company to evaluate and improve the scope and quality of information and communication to drive quality excellence and improve competitive performance.

Resource management: Resource management is defined as the ability of the company to manage its financial resources and other assets such as materials, buildings, equipments and technology efficiently.

Strategic Quality Planning: Strategic quality planning means company’s efforts in formulating, deploying, reviewing and converting its strategic quality planning into actions.

Quality Assurance: quality assurance means company’s efforts in evaluating the results and deciding a course of action for improving a system’s performance and keep the organization on track.

Process Management: Process management refers to company’s ability in identifying, managing, reviewing and improving its processes regularly.
5s Concept and Work Place Management: Defined as a systematic approach to good house keeping for cleanliness, better and safer work place, which is fundamental to productivity and quality.

Customer Orientation: Customer orientation means the company’s relationship with customers, its knowledge of customer requirements in order to determine the level of customer satisfaction.

Business Performance: Business performances mean company’s achievement levels and improvement trends in financial and operational performance.

METHODOLOGY OF THE STUDY
Towards achieving the above objectives this case study is directed to identify various sources of data and information in a systematic and scientific way. The data and information so collected are processed further by using certain statistical techniques to bring out reasonable and logical interpretation and conclusions.

a) Sources of Data: Generally two types of data sources are available for any kind of research. Utilisation of either or both the sources is decided based on the nature of the study. With an objective of taking advantage from both the sources have been extensively used in the study. The primary sources of data are the ones, which are collected afresh and for the first time to retain originality and significance in the study. The proposed case study depends heavily on this source. However certain crucial inputs are also taken from the secondary sources of data that have already been collected and documented by the company and the industry in general.
For collection of review of literature and secondary published data and information the libraries of Institute of Public Enterprises, Hyderabad, Osmania University, Hyderabad, Administrative Staff College of India, Hyderabad, Sri Krishnadevaraya University, Anantapur, Indian Institute of Management, Bangalore, Bangalore University and other host of research institutions dealing with studies on cement and management were visited. This was in addition to reading various related journals, newsletters, circulars, manuals and other documents published by the Ultra Tech Co Ltd.

b) **Collection of Data**: With regard to primary data collection the sources are both managerial and employee respondents. Predetermined structured questionnaires having various statements and different components of TQM have been administered. The questionnaires also contain a uniformly maintained 5-point Likert scale with options ranging from ‘strongly agree’ to ‘strongly disagree’ has been applied for each statement in ensure accuracy and preciseness of responses. In addition the questionnaires contain statements on other crucial aspects of total quality management practice.

c) **Data Analysis**: The collected responses are in the form of quantitative data. These data are processed further with the help selected statistical techniques such percentiles, averages, weighted averages, Z Test etc., to bring out rational interpretations and conclusions. In the first stage, explained under chapter 4, the responses collected from the employee respondents on the statements mentioned, were processed by using percentiles and averages. In the second stage the responses collected from the management and employee respondents were on
their views on the practice of various fifteen components of TQM and their impact before and after implementation of TQM in Ultra Tech Co Ltd. The respondents were asked to give their opinion on a five point Likert Scale to various statements ranging from “Strongly Agree” to “Strongly Disagree” for both before and after implementation of TQM situations in the organisation. The quantitative responses were further processed by using weighted averages and Z test.

The study is also directed towards understanding the impact of each of the 15 dimensions or parameters on the organization and its results. Under each parameter there are certain statements. The impact of TQM can be assessed by understanding the organizational performance both prior and post introduction of TQM. Hence, in the present study on the impact of TQM practice in the Ultra Tech Company Ltd., is administered among the sample respondents in the category of both Employees and Managers. The perceptions of both categories of respondents were presented in separate tables for all the 15 parameters that constitute TQM in the sample organization.

The tables also contain statistical techniques such as weighted averages for all responses on the 5-point scale. To arrive at weighted averages for responses to each of the statements were calculated by assigning 2 points for Strongly Agree, 1 point for Agree, 0 for Neither Agree Nor Disagree, -1 for Disagree, -2 for Strongly Disagree. The cumulative total of scores was divided by the sample number. Further with help of data ‘Z’ value the totals were calculated to find the difference of improvement before and after implementation of TQM in Ultra Tech Limited. Application of ‘Z’ test is the appropriate test as the sample size was 75.
The 'Z' value was calculated by using the formula mentioned in the related chapter.

The interpretation of 'Z' values for each of the statements of every parameter was done with the help of hypothesis testing. $H_0$ and $H_1$ hypothesis were considered for the purpose of interpretation, which is discussed, in the following pages under each of the parameters of Total Quality Management.

d) **Sampling Design**: The study was conducted in a cement industry in Ultra Tech Co. Ltd., as a case study. The study considers the general information about the company for three consecutive years. For the purpose of primary data the time period has been fixed as before and after implementation of TQM in the organization. Owing to general constraints in covering entire population a thoughtful stratified random sampling and two stage-sampling methods were applied in the study by putting maximum efforts to reduce negative effects in the meaning and interpretation of the study. With regard to management respondents, the sample size was fixed as 75. This number constitutes 58% of managers working in the organization during the period of study. The respondents were exposed to the comprehensive questionnaire on various components of TQM to ascertain their views and perceptions on the practice of components before and after implementation of TQM presented at the end of the thesis under annexure.

With regard to employee respondents, out of 150 sample respondents selected primarily under the first stage were exposed to questionnaire containing statements to determine their general awareness on the existence of TQM in Ultra
Tech Company Ltd. This exercise was done because generally in the employee segment many of them are not well aware of conceptually compared to management personnel, with the practice of TQM. With this belief and understanding preliminary screening was done in the first stage of sampling with 150 respondents and only those who were found to be aware of the existence of TQM were taken to the next stage of the study. In the second stage of the study, which concentrates on the perceptions of employee respondents on the practice and impact of various components, mentioned earlier, of TQM, the views of those respondents identified under first stage were included. This was done in case of employee respondents to enhance accuracy in responses and to compare with the views of management respondents.

Therefore, in the second stage of the study the sample size for employees was arrived based on the results of first stage and considering other factors. In summary, 150 employee respondents in the first stage on awareness and 75 in the second stage on implementation of components of TQM were considered that constitutes 33% of total employee population in the respondent organisation, Ultra Tech Co Ltd.

**VARIABLES USED IN THE STUDY**

Keeping the objectives of the study in view, business performance was considered as the dependent variable, fourteen independent variables were included in the present study based on review of literature and discussion with the management consultants.
DEVELOPMENT OF SCALE.

The responses from both the sample management and employee respondents were collected on the various statements with regard to TQM awareness and implementation. The responses were spread across 5 levels or points ranging from *Strongly Agree to Strongly Disagree* through Agree, Neither Agree Nor Disagree, and Disagree. The response scale was developed on the basis of the model developed by Rensis Likert.

Identification of Various statements of TQM

Based on the review of literature on TQM and detailed discussion with management consultants, a questionnaire has been prepared. Initially 230 statements, consisting of fourteen independent variables and one dependent variable (business performance) were included in the questionnaire, which reflected the various dimensions of TQM.

LIMITATIONS OF THE STUDY

The present study has the normal limitations of time, funds and other difficulties commonly inevitable for any study of this nature. Further the selection of different statements under each of the components is inconclusive. The study is also limited to one unit of Ultra Tech Company Limited and only certain important aspects of TQM implementation in the Company. The study is also limited as it is a case study.
CHAPTERISATION

The outcome of the present study is presented in the form of a thesis, which is divided into the following chapters.

Chapter.1: Introduction: This Chapter provides a general description of TQM, its meaning and significance. This apart it also deals with role, methods and techniques of in Human Resources as they are practiced in Indian organizations today.

Chapter.2: Research Design: Under this chapter the lay out of the research plan is mentioned which includes review of literature, scope of the study, objectives of the study, different components of the study, sources of data, sampling design, data collection, statistical tools used etc., are discussed in detail.

Chapter.3: Company Profile: This chapter discusses the genesis, growth and development of the selected organization in all dimensions. This chapter also includes the imitation of philosophy, the concept developments, implementation and evaluation of TQM by the organization.

Chapter.4: Awareness on TQM: This chapter deals with the general understanding level among managers and employees with regard to TQM.

Chapter.5: Evaluation of TQM Practice: This chapter covers the level of understanding of TQM concept by the managers and employees under 15 broadly selected components.

Chapter.6: Summary of findings, conclusions and suggestions: The major findings of the study along with specific suggestions for implementing are presented in the study.
REFERENCES

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