This chapter will describe the concepts and definitions used, methodology of collection of data, sample design, analytical frame-work, statistical tools used and the limitations of the method used.

4.1 Research Design

Research design outlines how information is to be gathered for an assessment or evaluation that includes identifying the method of acquisition of the data, the instruments to be used, how these will be administered, and how the information will be organized and analyzed. The following gives an account of the various logical steps adopted by the researcher to finalise the research design.

4.1.1 Concepts and definitions:

The concepts and definitions used in this thesis are as follows:


**Attributes:** The individual elements of the dimensions

**Organisation:** This refers to private, public limited, Government-owned (Kerala state and Central Government) industrial and research establishments.

**Respondents:** The employees who are in permanent service in the organizations surveyed.
Quality: What gets reflected in the output in terms of levels of acceptance, rework and rejection.

Customer: Internal customers, external customers and competitors’ customers.

Management Commitment: Mandatory responsibility of the management to look after the employees and their prospects.

Employee Involvement: Voluntary engagement of the employee for the betterment of the organisation and the individuals.

Innovation: Action taken to better achievements through creative thinking.

Customer complaints: The end result of a gap between what is promised and what is delivered to the customer.

Reprimanding: Punishing the defaulters.

Self Improvement: A conscious improvement through self-effort.

Continual Improvement: Improvement which is everlasting

Establishment of objectives: Firming up of planned actions.


Documentation: Systematic recording of events.

Cause and Effect Analysis: A method to find out reasons for any occurrence.

Shared Vision: Collective thinking.

Cost of Quality: Cost to be borne on account of defects.

4.2. Focus of Quality Management System

The focus of the quality management system in an organisation is the customer. The customers’ need will keep changing and the organization will have to tune to their changing needs. Quality is distributed over the various
stages right from the design, planning, execution, inspection, review and packing and dispatch, in the case of the products. Management commitment encompasses all these areas and ensures that the quality of the output matches with the requirements put down by the customers. Over and above the customer, there is another group called the interested parties, who are also concerned about the quality, profitability and growth of the organization. This includes employees, shareholders, suppliers, banking institutions and the public. Improvement is an absolute necessity for any organization which has adopted quality management practice. This also could be implemented either in steps or in a break-through mode. An effective quality management system will have the touch points as given in Exhibit 4.8

---

**Fig 4.1 Quality Management Framework**

*Source: Clauses 5.2, 5.4, 5.6 & 7.3 of IS/ISO 9001:2000 & 5.1.2, 5.4.2, 5.6 & 7.3 of IS/ISO 9004: 2000) (pp. 5-8) of Indian Standard Quality Management Systems-Guidelines for Performance Improvements (Fifth Revision).*
4.3 Development of Questionnaire

The questionnaire was framed so as to get the necessary inputs from the respondents on the level of quality management practices followed in their respective organizations so that comparison could be drawn between the quality practices of ISO 9001:2000-certified organizations as well as that of organisation without this certification. The questionnaire was developed based on the quality clauses stated in the documents IS/ISO 9001:2000 and IS/ISO 9004: 2000, the works of previous researchers, the pilot study conducted by the research scholar, his experience in implementing ISO 9001: 2000, in a few companies. The questionnaire is appended in Annexure II.

4.4. Overview of the dimensions of quality considered in the study

ISO 9001:2000 is the management approach of an organisation centred on quality, based on the participation of its members and aiming for a long-term success through Customer Satisfaction. It benefits all the employees of the organisation and the society as well. It is an overall strategy which is formulated at the top management level which percolates to the rank and file. Everyone in the organization, right from the Managing Director to the lowest paid employee is involved in this process.

ISO 9001:2000 encompasses not only the external end users and suppliers of the products or services but also the internal customers who work in the other departments. Any task is seen as a process and a process approach will be built into the system. The process of improvement is applicable for
individuals as well as groups. There is a set of principles and concepts, which can be pictorially represented as in exhibit 4.1.

Exhibit: 4.1 Flowchart of Quality Management System

Source: “Process approach” under clause 0.2 of Introduction of IS/ISO 9004:2000 (pp. iii - v) under Introduction of Indian Standard Quality Management Systems- Guidelines for Performance Improvements. (Fifth Revision)

The relation between the supplier and the management, the employer and the employee, and the customer and the service provider in a ISO 9001:2000 environment is unique in a quality management system. The International Organisation for Standardisation (ISO 9001:2000) defines quality management system as a management approach for an organisation, centred around quality, based on the participation of all its employees and aims at long-term success through Customer Satisfaction, cost reduction, waste reduction, and increased efficiency of the services. The dimensions and the attributes under each dimension listed below are stated in the requirements of quality management systems of IS/ ISO 9000: 2000 and IS/ ISO 9004: 2000.

4.4.1 Top Management Commitment

The involvement of the top management in all decision-making processes and their implementation helps to reinforce quality. The top management should take the initiative to not only to finalise the business strategy, but also to use quality of the end product as the force to reckon with. Achievers are to be rewarded suitably and in time, lest they should become sluggish, sooner or later. Similarly,
non-performers are advised and helped to come out of the red at the earliest. Providing training to the employees will enhance their overall capability.

The block diagram given in Exhibit 4.2 represents the attributes of top management commitment.

Exhibit: 4.2. Attributes of top management commitment


4.4.2 Employee Involvement

Participation of the employees in all the activities of the organisation helps to create a synergetic effort in building a team. A feeling of ownership and belongingness is created, when participation is ensured from all sections of the employees. This also moots responsibility and accountability.

The attributes of Employee Involvement can be presented schematically as in Exhibit 4.3
Exhibit 4.3. Attributes of employee involvement


4.4.3 Team Working

Belbin (Hubert 2000) has defined different roles for the members in a team, keeping in mind their specific skills and attitudes. Team Working gives instant energy, which is to be maintained through continued efforts. The need for Team Working is stressed in ISO 9001:2000 standards.

When the attributes of Team Working are put together, it will look like what is represented in Exhibit 4.4
4.4.4 Continual Improvement

Continual Improvement is the hallmark of a quality management system. Quality circles, cross-functional teams, suggestion-schemes, brainstorming sessions, and case studies assist the implementation of continual improvement. In order to ensure the future of the organisation and satisfaction of all agencies including the customers, the management creates a culture for improving the performance of processes and products. This will be periodically reviewed in the Management reviews and necessary corrective actions taken. Exhibit 4.5 represents the distribution of the attributes of continual improvement.

Exhibit: 4.5. Attributes of Continual Improvement

4.4.5 Internal Communication

Communication is the gateway for transmission of information and transparency and clarity are essential to avoid grapevine communication. The freedom to communicate will improve cohesion among the employees.

Exhibit 4.6 gives a pictorial representation of the attributes of Internal communication.

Exhibit: 4.6. Attributes of internal communication

Source: “Internal communication” under clause 5.5.3 of IS/ISO 9001:2000 & 5.1.1, 5.5.3 of IS/ISO 9004: 2000 (pp. 5-12) of Indian Standard Quality Management Systems-Guidelines for Performance Improvements (Fifth Revision).

4.4.6 Customer Satisfaction

The growth of an organisation depends on customer loyalty, to a very great extent. Collection of periodical feedbacks from the customers and taking corrective and preventive actions on these will instill more confidence in them.

The attributes of Customer Satisfaction are well described in the Exhibit 4.7.
### 4.5 Sample design

The technique employed for sample design was a two-stage process. The first stage of selecting the organisation was done through convenience sampling and these were selected to represent the population of industries in Kerala, based on their permission to conduct the survey. In the second stage, the selection of employees was also done through convenience sampling depending on their availability and willingness to participate.

#### 4.5.1 Data collection

The method of data collection was through a sample survey of industrial and R & D units identified as explained above. The organisations for the collection of the data were chosen in such a way that a wide spectrum of the research and business activities undertaken in Kerala has been covered. This included aerospace activities of ISRO, glassware, civil and electrical construction, health care, etc. The organisations selected included public limited companies, those run by Govt. of India and Govt. of Kerala, and private limited companies. Out of the twenty-four
organisations, twelve had ISO 9001:2000-certification and the rest were not certified by ISO 9001:2000 standards. The details of the organizations are given in Annexure I. The collection of data was done through a perception survey of a cross section of employees from these organizations. In total, 25 questions were framed to cover all the aspects of quality management practices. While collecting the data, the purpose of the exercise was explained to the willing employees and the questionnaire was administered to a group of twenty employees from both categories of organizations, initially. This was done to pretest the questionnaire. In this process, it was ensured that the employees were able to understand the meaning of the terms used in the questionnaire. Based on the feedback, five questions were modified. The questions were made on a five point-scale and these were explained to the employees, prior to their filling up the questionnaire. The questions were arranged in such a way as to avoid respondent bias.

Initially, 1120 respondents from both categories of organisations were contacted for the survey, out of which only 1012 responded. From the data obtained from this group, some were incomplete and some not useful. Such of those were discarded and finally the useful data worked out to 877 in number. Out of these 444 observations was from ISO 9001:2000-certified organizations and the rest 433 from the other category.

4.6. Analytical Framework

As explained earlier, the responses of the employees are recorded on a five-point Likert scale with the codes, strongly agree, weakly agree, undecided, weakly disagree and strongly disagree. The responses are given codes 5 to 1, in order to assess the levels of agreement or disagreement, as the case may be.
4.7 Reliability and Validity

The instruments are validated by:


- Consulting experts and knowledgeable persons in the field.

The collected data were tested to check the reliability of the tool using Cronbach’s alpha test, for the variables in the respective groups of dimensions and the values are as follows:

- Top Management Commitment 0.71
- Employee Involvement 0.74
- Team Working 0.77
- Continual Improvement 0.79
- Internal Communication 0.81
- Customer Satisfaction 0.71

4.8 Analysis of data

The analysis starts with the comparison of the patterns of the responses of the employees of the two types of organizations. To find out whether the patterns are different or not, chi square test was carried out. The levels of agreement or disagreement for each of the questions were assessed from the mean of the responses. Each question represents a variable, which is an indicator of the respective attribute of the dimension tested. To check whether there was significant difference or not for the means, between the two categories, an independent sample
t-test was conducted. The level of significance was assumed to be 5%. The difference between the means of the two categories of responses, as seen from the test would decide whether the difference was significant between the two categories or not, as far as this mean is concerned. In order to find out whether any association existed between the variables in the group a correlation analysis was conducted. Whenever the values of correlation coefficient were less than ± .300, it could be assumed that the strength of relation between the two variables was low. However, the significance of the relation between the attributes or variables was decided by the p-value. Whenever the absolute value of the correlation was .300 or above, factor analysis was conducted to find out the underlying factors. After initial extraction of scores, factor rotation analysis was resorted to, for closely identifying the factors which were independent of one another. Each hypothesis is related to a specific dimension. The overall index of each dimension was evaluated as the average of the values of the various attributes of the respective dimension. Based on the testing of the hypothesis, conclusions could be drawn on the relative level of existence quality management processes in both types of organisations. This would help to decide whether the hypothesis could be accepted. Based on its value in comparison to the table value at 5% level of significance, it would be concluded whether the hypothesis can be accepted.

4.9. Statistical tools used for Analysis

The questionnaire was framed so as to get the perception of the respondents to the six quality dimensions or constructs, namely top management commitment, employee involvement, team working, continual improvement, internal communication and Customer Satisfaction. The questions which related to each quality dimension were grouped later and the responses analysed with the help of version 16 of SPSS software. The statistical tools used for the study were
Chi square test, Cronbach’s alpha test, independent sample t-test, correlation analysis, and factor analysis, the details of which are explained in Chapter V.

4.10 Summary

The organizations were selected based on the following considerations:

- Familiarity of the researcher with the top management of the institutions through working with them or having association as a trainer.
- Willingness of these establishments to grant permission for conducting a survey.
- Anticipated co-operation from the employees to participate in the survey.

The survey was conducted during the period, April 08 to June 08.

Out of the total of 877 samples, 444 numbers were from ISO 9001:2000-certified organizations and the rest 433 from those without ISO 9001:2000 certification. The researcher collected the information from CII Kochi in person, on the number of organisations in Kerala as on 31 March 2007, and those who had been certified for ISO 9001:2000 till then to the same scale. The figures were 13,000 and 400 respectively and these represented the universe and the sample size.