Chapter 4
4.1 Present Study:

As discussed in Chapter–1, customers’ expectations for quality products are increasing in the competitive business world. A paradigm shift is taking place in the thought: process of customers and the management of an organisation. Since, the beginning of 1990s, the term ISO 9000 is being discussed for quality and reliability. In Indian business environment, the ISO 9000 series of standards are becoming an important part of the business through its overwhelming acceptance and usage and many Indian companies have gone for ISO certification. It was, therefore, decided to study the effect of the ISO 9000 standards on the Indian industrial scenario. The present study is an endeavour to concentrate on the different facets of the ISO 9000 standards and their impacts on Quality Management aspects of the Indian industries.

Since, this study aims to focus on quality management in Indian companies through ISO 9000, it was necessary to concentrate on the companies, which had obtained ISO 9000 certification in India. How did they feel the need for the certification? How did they obtain certification, and what aspects did they consider important? Who was the decision maker? There are many such dimensions of ISO 9000 that possibly need elaboration. This study concentrates on companies’ perceptions for obtaining ISO 9000 certification. The population for the
study, thus, is all the companies in India that have obtained ISO 9000 certification.

All ISO 9000 certified companies in India could mainly be divided into two major segments viz. manufacturing and service companies. The present study mainly focuses on the manufacturing organisations.

4.2 Objectives of the Study:

The objectives of the study are:

1. To review and examine the ISO 9000 series standards, and the procedure for obtaining ISO 9000 certification.
2. To study the expectations of the organisations in acquiring the ISO 9000 certification and to know as to how far they have been met.
3. To identify the difficulties faced by them in obtaining ISO certification.
4. To find out the tangible benefits achieved by the companies in terms of consistency in the quality of the product, increase in exports, or turnover or profits or the reputation of the organisation etc and also intangible benefits.
5. To assess the general state of ISO 9000 certification in India.
6. To find out the benefits if any to the customers.
7. To study the feasibility of developing a systematic procedure (may be a heuristic procedure) to evaluate on a continuous basis the performance of ISO 9000 certification.
4.3 Hypotheses of the study:

Attempt is also made to test the following hypotheses:

1. ISO Certification increases customer satisfaction.
2. ISO Certification increases exports.
3. ISO Certification is a must to compete in the international market particularly in European Countries.
4. ISO Certification improves the quality of the products.

4.4 Research Design:

In the beginning of the research, an exploratory work was carried out to identify major industries that have obtained ISO 9000 certification. For this purpose, secondary data were collected with the help of available books, business magazines, journals, newspapers, annual reports and newsletters of different companies, web sites, internet etc. Almost all the major ISO 9000 certifying agencies in India were contacted to find the exact numbers of ISO 9000 certified companies in the country and their industry-wise break up. Unfortunately, the response from these agencies was quite poor. Also the validity of the information obtained from the various sources was questionable. Hence, it was decided to depend upon the data provided in the various ‘cycles of survey of ISO 9000 and ISO 14000 certificates’ by the International Organization for Standardization (ISO). From the figures obtained from the varied sources, it was observed that three industries viz. engineering (manufacturing), pharmaceuticals, and chemicals formed a majority of the proportion of the ISO 9000 certified companies in India.
4.4.1 The Universe:

For this research, the universe was identified as all the companies in the world that have obtained ISO 9000 certification. Authentic data of the ISO 9000 certified companies were collected from the 11th cycle of ‘survey of ISO 9000 and ISO 14000 certificates’ issued by the International Organization for Standardization. As per this cycle, the total number of ISO 9000 certified companies in the world, as on 31st December 2001 was 5,10,616.

4.4.2 The Population:

Since, the study was related to the Indian companies, all the ISO 9000 certified companies in India were considered as a population. From the Universe of total ISO 9000 certified companies in the world, the number of ISO 9000 certified companies in India, as per the 11th cycle of ‘survey of ISO 9000 and ISO 14000 certificates’ by the International Organization for Standardization (ISO), was 5,554 as on 31st December 2001. So, the population of ISO 9000 certified companies in India was considered as 5,554.

4.4.3 Sampling Unit:

From the above population of 5,554 companies, every ISO 9000 certified company in India was defined as sampling unit for the purpose of the study. The total sampling units, therefore, were 5,554.
4.4.4 Size of the Sample:

When the proposal for the Ph. D. was submitted, it was decided to get the response from 50 companies. However, at the time of sending the questionnaires, it was thought to put in all the efforts and get as much response as possible, but not less than 50. The total number of responses (filled-in questionnaires) received was 144, which was much more than the earlier thought number of 50 on account of strenuous and sustained efforts.

4.4.5 Sampling Design:

All ISO 9000 certified companies have some heterogeneity in different aspects. But, they have some homogeneity among them in terms of certification process, expectations from the standards, benefits from the standards, and other such aspects. To study the ISO 9000 certified companies, a selection of these aspects, in research terms popularly known as variables, is quite necessary. Therefore different variables pertaining to the standards were selected.

4.4.6 Sources of Data:

The study draws information from two sources i.e. primary data and secondary data.

4.4.6.1 Primary Data:

To collect primary data, a questionnaire was prepared. More than 400 ISO 9000 certified units were approached and from those 144 responses
were received. Out of those 144 responses, 16 incomplete and inaccurate responses were ignored because the answers were not dependable due to incomplete data. Hence, total 128 responses of the companies from India are taken as the sample for the purpose of the study.

4.4.6.2 Secondary Data:

The published material from Books, Journals, Magazines, Reports, News Papers, Websites; and unpublished research work on business, management, quality management and ISO 9000 are used as secondary data sources. These references taken in form of secondary data are used in other chapters.

4.4.7 Instruments for Data Collection:

Two instruments for data collection were used: One personal discussion with the Managing Director / Management representative, and the other through structured questionnaire.

4.4.7.1 Discussions with the Managing Directors / Management Representative:

Before preparing questionnaire, detailed discussions were carried out with the Managing Director of three small-scale units and with Management Representative of one large organisation. The main reasons of this discussion were (i) to understand the actual procedure followed by them to obtain ISO certification, and (ii) to understand the finer issues related with the ISO certification so that the same can be included in the questionnaire. These discussions not only enabled for the
comprehensive approach to the whole issue, but also helped in preparation of a better questionnaire. In addition, it provided some more insight into the maintenance of ISO certification.

4.4.7.2 The Instrument [Questionnaire]:

Primary data was collected through structured questionnaire having close-ended as well as a few open-ended questions/statements. The Questionnaire is given as Annexure – IX. The questionnaire is divided into three parts. This questionnaire dealt with:

(I) Details of ISO Certification:

In this part, questions pertaining to the following issues were asked:

(1) Which certification the company has got. ISO 9001, 9002, or 9003,
(2) Months and years of initiation and receipt of certification,
(3) Registrar or certifying agency, and
(4) Whether help of any outside agency or consultant was taken to obtain ISO certification.

Analysis and interpretation of responses to these questions are discussed in Chapter – 5 under paragraph 5.3.

(II) Rationale and Benefits of Certification:

This part was the most important in the questionnaire. In this part following information was sought:

(1) Who initiated the certification?
(2) Ranking of reasons for obtaining ISO certification.
(3) Opinion of the respondent about the 27 statements related to ISO. Here five point Likert Scale was used.
(4) An open-ended question about the difficulties faced by the organisation.

(5) Dichotomous questions with reference to the cost for acquiring ISO, financial help from government, problems faced in sustaining the certification, plan to go for TQM, announcement about the receipt of certification, and change in share prices due to the receipt of certification.

Analysis and interpretation of responses to these questions are discussed in Chapter – 5 under paragraph 5.4.

(III) Organisational Details:

In addition to the organisational details, an open ended question regarding anticipated problems in getting renewal under ISO 9000:2000 was asked here. Also, a question pertaining to the perception of the management – about the change due to certification – was asked.

Analysis and interpretation of responses to these questions are discussed in Chapter – 5 under paragraph 5.2.

4.4.7.3 Method of Data Collection:

As mentioned earlier, experts on the subject were also consulted, to ensure that the questions were properly phrased, and the suitability of the questionnaire was tested with a small sample of firms. In this way, the first revision of the questionnaire (pre-test) was done with four persons (three managing directors of small firms and one management representative of a large company) to ensure a suitable coverage of the domain of each construct. In the second stage, the questionnaire was
sent to five firms on the basis of convenient sampling. After studying their written response, some variables were modified. After such pilot survey, which enabled to modify and add, and/or eliminate a few variables, final questionnaire was designed.

The final questionnaire was posted initially to 300 companies throughout the country on the basis of convenient sampling. However, care was taken to send the questionnaires to the companies in all the major states so that stratified response could be received. Out of these 300 companies; 120 were engineering companies, 95 were pharmaceutical companies, and 85 were chemical organisations. To receive better response, personal visits were made to Mumbai, Pune, Nashik, Jalgaon, Udaipur, Jaipur, Ajmer, Ahmedabad, Vadodara, Ankleshwar, Anand, and Vallabh Vidyanagar. Quality management personnel of approximately one hundred ISO 9000 certified companies in these cities were contacted. Questionnaires were handed over to them personally and a request was made to fill in the questionnaire at the earliest. Response from these companies was quite encouraging. Total 112 responses were received from 300 organisations (to whom the questionnaires were posted) and 100 companies (who were contacted personally) aggregating to overall 400 organisations. However, to widen the scope of study, ISO 9000 certified companies located at Bhavnagar, Rajkot, and other industrial towns were contacted through personal efforts of friends and additional 32 filled in questionnaires were obtained. Total 144 responses, therefore, were received. All of these questionnaires were sent to, and filled in by, the person(s) responsible for the certification in the companies, usually the managing director, management representative, or quality manager.
Out of these 144 responses, 16 responses were ignored because of the insufficiency of data. Hence, total 128 responses of the companies from India were taken as the sample for the purpose of the study. Table 4.1 given below depict the break up of all the 128 respondent organisations. This break up has been done on three bases: (1) ISO number wise, (2) according to type of industry, and (3) scale of the company.

Table 4.1 Break up of respondent organisations

<table>
<thead>
<tr>
<th>ISO NO.</th>
<th>INDUSTRY</th>
<th>SCALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Small</td>
<td>Medium</td>
</tr>
<tr>
<td>9001</td>
<td>Engineering</td>
<td>08</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Pharmaceutical</td>
<td>02</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td>Chemical</td>
<td>01</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>02</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>9002</td>
<td>Engineering</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Pharmaceutical</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Chemical</td>
<td>04</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>00</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>31</td>
<td>59</td>
</tr>
</tbody>
</table>

Since, the above table does not give the total number of companies on the basis of the industry, another table is constructed to give the details of all the 128 organisations on the basis of the type of industry and the certification number. These details are reproduced below in Table No. 4.2:
Table 4.2 Break up of respondent organisations (Industry-wise)

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>INDUSTRY</th>
<th>ISO 9001</th>
<th>ISO 9002</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering</td>
<td>36</td>
<td>43</td>
<td>79</td>
</tr>
<tr>
<td>2</td>
<td>Pharmaceutical</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Chemical</td>
<td>12</td>
<td>15</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>Other</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>66</strong></td>
<td><strong>128</strong></td>
</tr>
</tbody>
</table>

4.5 Data Analysis Techniques:

Raw data contained in the questionnaire needs to be converted into a suitable form so that suitable statistical analysis can be carried out. For this purpose, data are to be coded and transferred from questionnaires to the computers. Any mistake in this process can seriously hamper the statistical results and the interpretations. Once the data are transferred properly, data analysis can be initiated. The data obtained against various questions from 128 valid respondents were properly coded and transcribed into computers.

Different data analysis techniques were used to get the meaningful outcome from the data obtained against different questions of the questionnaires and transferred to the computer. Decisions as which of the statistical techniques should be used were made on the basis of the various criteria like (a) the scales and other characteristics of data, (b) objectives of the study, (c) Characteristics of the research design etc. Following paragraphs provide a bird’s eye view of various data analysis techniques, which have been used for the overall analysis. Detailing of these techniques has been done in Chapter – 5 at appropriate places for better understanding.
4.5.1 Univariate Techniques:

Univariate techniques are appropriate when there is a single measurement of each element in the sample, or there are several measurements of each element but each variable is analysed in isolation. Univariate techniques can be classified based on whether the data are metric or non-metric. Metric data are measured on an interval or ratio scale. Non-metric data are measured on a nominal or ordinal scale.

4.5.1.1 Frequency Distribution (Non-metric data):

For certain questions where one variable was to be considered at a time, frequency distribution was carried out, to obtain a count of number of responses. Bar charts, pie charts, clustered column charts; percentages etc. were used for further analysis of such questions. Other statistics (associated with frequency distribution) like mean, mode, variance, and standard derivations were also used to find the central tendency and the variance of the data.

4.5.1.2 One-sample ‘t’ test, Two-group ‘t’ test, and one way ANOVA (Metric data):

For hypothesis testing, one sample ‘t’ test was carried out at 95% confidence level. To carry out further analysis of data of different industries or different scales of respondents, two-group ‘t’ test, one-way AVONA, and Least significant Difference (LSD) multiple comparisons test were carried out. This helped two ways (a) in accepting/rejecting hypotheses and (b) making pair-wise comparisons.
4.5.2 Multivariate Techniques:

Multivariate techniques are suitable for analysing data when there are two or more measurements of each element and where the variables are analysed simultaneously.

4.5.2.1 Dependence Techniques:

(a) In order to obtain relationships between different parameters like types of industries, scales of industries, number of standard of organisations (ISO 9001 or ISO 9002) etc., cross tabulations were used. This helped in merging of frequency distributions of two or more in to a single table and then getting meaningful inference from the same.

(b) Multiple Discriminant Analysis was carried out on the 27 statements to develop discriminate functions (or independent variables), which could best discriminate between the types of industries. This helped in segregating predictor variables to examine the significant differences between the industries.

4.5.2.2 Interdependence Techniques (Variable interdependence):

To find the interdependent relationship if any, between the 27 statements, factor analysis was carried out. Factor analysis helped in data reduction and summarisation in seven factors. However, number of statements was only one in case of two out of seven factors. Number of factors therefore, was reduced to five. Factors help in explaining the correlations amongst a set of variables.