CHAPTER 1

INTRODUCTION

The global marketplace and domestic and international competition have made organizations around the world realize that their survival depends on high quality. Total Quality management (TQM) has spread its wings in every sphere of the global corporate world and Indian companies are no exception. The use of TQM tools has been high during the 1990s (Lawler et al 1992). Research results that claim that there exists a positive effect on financial performance can be found in (Hendricks and Singhal 1997; Handsfield et al 1998; Samson and Terziovski 1999; Reed et al 2000; Allen and Kilmann 2001; and Tena et al 2001). But there exists a diversity in opinion among researchers regarding the actual benefits of TQM. TQM tools and techniques alone cannot bring in improvement in performance but also certain tacit and behavioural aspects are needed to bring in change (Powell 1995). In this chapter an overview of the research purpose, approach and strategy are first discussed and thereafter the method of data collection, sample selection and the data analysis are provided. Also the quality variables of validity and reliability are given to indicate the scientific value of this study. In the limitations, the demarcations of this study are given.

1.1 OVERVIEW

The developments in the Indian auto component industry can be traced to trade liberalization during the 1990’s that resulted in an influx of multinational Original Equipment Manufacturers (OEMs) like Ford, General
Motors, Hyundai, Mercedes-Benz, Peugeot and Volvo into India. The entry of these foreign auto companies during the early 90’s changed quality standards and impacted the complexity of the parts required by OEMs. Post liberalization and new economic reforms in 1992, Indian auto industries in specific, started to gear up to meet the requirements of their global customers. The firms had to be not only competitive globally, but also reduce their defect rates dramatically and master new technologies. They started practicing TQM philosophy to compete and win. The Confederation of Indian Industries (CII) first set the TQM initiatives in the early 1980s, in its pioneering effort to promote awareness about quality among Indian industries.

Since the early 90s, ISO 9000 has been widely recognized as a quality management tool to develop a system in an organization for delivering consistently reliable quality. In 1994, QS 9000 certification became mandatory for OEM suppliers to the global automotive companies. As a result many Indian auto component manufacturers got certified in QS 9000 or TS 16949 and started adopting TQM tools and techniques.

QS 9000 and TS 16949 are quality assurance certifications that are specific to the automotive industry. Henceforth in this thesis, quality certified means either QS 9000 or TS 16949 certified.

ISO 9001:1994, on which QS-9000 is based, became obsolete on 15th December 2003. ISO/TS16949:2002, the technical specification, was approved and issued in March 2002, as an automotive sector-specific QMS set of requirements which uses ISO 9001:2000 (verbatim) as its base. and is intended to be an alternative to QS-9000:1998 and other national automotive OEM supplier requirements.
However, the QS-9000 Supplier Quality Requirements Task Force (SQRTF) have been granted an extension of 3 years by ISO to continue to use ISO9001:1994 in conjunction with QS-9000, and so QS-9000 will be valid until 14th December 2006.

Hence the certified auto component manufacturers in this study include companies that are either QS 9000 certified or TS 16949 certified.

1.2 **NEED FOR STUDY**

TQM is a widely researched management subject with empirical studies performed on the various aspects of TQM such as impact of TQM on organisational performance (Van Der Wiele et al 2000; Hendricks and Singhal 1997; Handsfield et al 1988) and critical success factors of TQM (Ahire et al 1995; Saraph et al 1989; Black and Porter 1996). The majority of studies on TQM have been conducted in the USA with 98 studies , UK with 44 studies and Australia with 39 studies (Ismail Sila et al 2002) .

Sasmita Palo and Nayantara Padhi (2002) examined the role of training as well as measured its effectiveness for successful implementation of TQM. This was an in-depth case study method, where data was collected from one public sector enterprise manufacturing crude steel in India. Jamshed Siddiqui and Zillur Rahman (2006) conducted a survey based research among information systems professionals of some Indian companies. The focus of the study was to analyse the role of information systems in TQM implementation.

Whereas Das and Rao (2004) studied the growth in average productivity in the Indian auto component industry due to trade liberalization, using a translog cost function and data from the Reserve Bank of India for the period 1977-1999. Karthik Balakrishnan (1999) and others performed a study focused on the auto industry supply chains in India. They focused on the empirical data in the industry and attempted to understand the quality and productivity in thirteen Deming award certified Indian companies.

With specific reference to TQM CSFs in the Indian automotive industry, there are two studies. Khanna and others (2002) developed a system dynamics model for TQM in the Indian automobile sector. They tried to understand the interrelationship between the enablers and results of Malcolm Baldrige Award criterion in the context of the Indian auto industry. The model has been developed based on Delphi technique with TQM experts. Karuppusami and Gandhinathan compiled a list of TQM CSFs in various empirical research in the period 1989 to 2003. Pareto analysis was used to sort and arrange the CSFs according to their criticality.

Though there have been studies on TQM in Indian auto industry, there is lack of empirical evidence on specifically QS 9000 certified auto component manufacturers. Though Khanna et al (2002) have conducted a
study on relationship between enablers and results, it is based on only experts opinion. Whereas, the present study adopts a survey based among certified auto component manufacturers. Also this study draws a comparison of TQM CSFs between certified and non-certified auto component manufacturers.

This is a study to ascertain if QS 9000 certification is perceived as a TQM initiative by organizations. If so, what is the perceived level of TQM implementation in certified auto component manufacturers in India? Also this study envisages to ascertain the level of TQM implementation in companies, which are not certified. This is a study to understand the extent to which TQM principles have been adopted in QS 9000 or TS 16949 auto component manufacturing companies versus those auto component manufacturers who are not certified.

This study is an attempt to establish the causal relationship between the critical success factors and outcomes of TQM implementation. The purpose of this study is to examine in-depth the linkages between the CSFs and the outcomes of TQM and to determine the basis of future research. Despite the fact that the causal relationship between the CSFs and the outcomes constitute the power of TQM model, (Naylor 1999), there is little evidence to support this proposition (Ghobadian and Woo 1996), (Eskildsen and Dahlgaard 2000). Specifically this study adds to the growing body of literature on the causal structure of TQM, wherein the relationship of all its elements is taken into account.

This aim can be expressed through the following research questions: Is there a significant relationship between the CSFs and the outcomes? How do the CSFs of TQM influence each other? What approach should organisations adopt to develop CSFs?
The answers to these research questions would facilitate the understanding of what are the most relevant criterion that could improve the outcomes. This would give some idea about the areas where the organisations should concentrate their efforts in the management of TQM systems, thus allowing a better implementation of TQM. As a result this research complements the existing evidence on TQM as they have been done in different industries and in different contexts.

This study is focussed on the auto component industry in Tamilnadu. Hence a detailed study of the existing scenario in Tamilnadu auto component industry in general and Chennai in particular was conducted to gain an insight that would guide the study.

1.3 RESEARCH QUESTIONS

In order to conduct a focused study on the level of TQM critical success factors in Indian auto component industry, the following research questions were formulated to satisfy the need for study:

1) Which are the critical success factors and outcomes of TQM perceived to be most important in certified companies and non-certified companies?

2) How do the critical success factors and outcomes of TQM influence each other?

3) Does QS 9000 / TS 16949 help auto component manufacturing companies in their TQM journey?

4) How does the perceived level of TQM implementation differ between certified and non-certified auto component manufacturing companies?
5) How do the critical success factors influence the outcomes?
6) What is the association of the demographics with the perceived level of TQM implementation?
7) How is Tamilnadu performing as a major auto cluster in India and what is contributing to its success?

1.4 OBJECTIVES OF THE STUDY

To find an answer to these research questions, clear objectives were framed, which involved collection and analysis of both primary and secondary data. The objectives of this study were:

1. To understand the growth of Indian auto component industry with specific reference to Tamilnadu and analyse key performance indicators.
2. To empirically investigate the relationship between TQM CSFs and its outcomes in Indian auto component industry.
3. To analyse the impact of quality certification on perceived level of TQM implementation.
4. To understand the differences in perceived level of TQM implementation between certified and Non – certified companies.
5. To understand the level of TQM critical success factors in Indian auto component industry.
6. To analyse the relationship between the critical success factors of TQM implementation.
1.5 RESEARCH METHODOLOGY

The choice of the research approach should be based on the type of research problems that the researcher sets to solve (Holme and Solvang, 1991; Yin, 1994; Merriam, 1998). As this study on TQM implementation in the Indian auto component industry deals with existing theories and knowledge to answer the research question, it is explanatory in nature (Davidson et al, 2003). This research study is based on theories of different variables, which have been tested and validated by previous researchers. The aim thus is to approve or disapprove the relationship between the interacting variables existing in the TQM Framework of this study. The research approach chosen for this study was qualitative in nature as it involved collection of responses to qualitative statements that reflected the variables to be measured.

1.5.1 Data Source

The required data for the current research was basically collected from two sources viz., secondary and primary.

1.5.1.1 Secondary Data

The relevant secondary data have been collected from many published sources such as newspapers, magazines, journals, standard reference textbooks, government reports and research reports of consultancy bureaus. The newspapers that were referred to include Business Line, The Hindu and Business Standard. The illustrative list of magazines referred to is India Today, Business Today and Business Outlook. Online databases that were used to identify the articles published in business related journals include Emerald Database and ABI Inform Global (ProQuest Direct). In addition to the online database, leading management journals such as The
TQM Magazine, International Journal of Quality and Reliability, Management Decision were also referred. The reports that were referred to include Auto Component Manufacturers Association (ACMA) Annual report, McKinsey report and CII reports for the period 2000 to 2006.

The secondary sources of data have been given in detail in the references.

1.5.1.2 Primary Data

Primary data were collected from both certified and non-certified auto component-manufacturing units in and around Chennai, Tamilnadu. The respondents were middle level quality managers and executives who were working for more than five years in the company.

The sampling approach followed in this study is the traditional approach (because of its accuracy) in which sampling without replacement method has been adopted. In the current research data has been collected from each respondent only once. In this study the opinion of the TQM experts was considered for choosing the certified and the non-certified companies. TQM experts include academicians, Quality consultants and industry experts in quality. The list of respondents was prepared based on the consultation and the feedback received from 12 academicians, 7 TQM consultants and 4 top-level management executives.

Based on the deliberations, a sampling frame was identified and a list of QS 9000 / TS 19649 certified companies in and around Chennai was prepared. The master list of certified companies was obtained from quality certifications bodies Bureau Veritas Quality International (BVQI) and Det Norse Veritas (DNV). Companies with more than two year of certification
were only chosen for the study as they would be able to assess any impact of the quality certification on TQM in their organizations. Totally 295 companies were identified for this study. Non-certified companies were chosen from the supplier list of two automotive original equipment manufacturers based at Chennai, with a track record of more than three years. Quality Certified companies and non-certified companies formed the two mutually exclusive groups for the study. 412 companies were identified.

Questionnaires were mailed to the 383 certified companies and 412 non-certified companies. Responses were collected through personal-contact approach used followed by periodic follow-ups over telephone and personal visits. Among the certified companies, 153 replies were received, yielding a response rate of about 40%. Eighteen responses were rejected as data was incomplete and could not be processed. Among the non-certified companies, 127 replies were received, yielding a response rate of 32%. There were 30 responses that were rejected, as they were incomplete. Ninety-seven valid responses were considered fit for processing.

Fieldwork basically refers to primary data collection period; and was started on 5th of January 2005 and ended on 14th May 2005.

1.5.2 Chennai as the area of study

There are three major auto component clusters in India namely, Pune, Gurgaon and Chennai. Chennai occupies a formidable position, contributing 35 per cent of India’s auto component production in 2006. Chennai has a concentrated auto industrial belt, which leading international major auto players have made their base. Tamilnadu current annual output in the automotive sector is estimated to be $3-3.5 billion with an estimated share of 25 per cent in the Indian automotive industry. Its contribution to the State's
Gross Domestic Product is 7-8 percent (Tamilnadu Industrial Development Corporation (TIDCO) report 2005-06).

Among the 13 Indian Deming award winning companies, eight companies are based in Chennai (Table 3.4) thus driving a TQM culture in the Tamilnadu automotive industry. It has the largest number of ISO/QS Certified Companies in India, with 50% ISO Certified and 26% QS / TS 19649 certified. Hence this study focused on auto component manufacturing companies in and around Chennai.

1.5.3 Research Instrument

A structured questionnaire with 10 constructs as critical success factors and four constructs as the outcomes of TQM was designed (Appendix 1). A pilot study was conducted by giving the questionnaire to the identified TQM experts to make sure that the measures were valid, reliable, and user-friendly. A revised questionnaire with the suggested changes for comprehensibility and accuracy was prepared. It was then administered to the respondents and data was obtained.

1.5.3.1 Assumptions made in administering questionnaire

These assumptions pertain to the respondents of this study on TQM implementation among Indian auto component manufacturers.

(1) Organizations are aware of the importance of the TQM philosophy in enhancing competitiveness.
(2) Total quality, essentially, is a way of business that values intellectual capital and satisfaction of customers through the involvement and empowerment of people.

(3) Organizations are aware that TQM has contributed significantly to business excellence in countries like Japan, the USA, Australia and European nations.

(4) Organizations are aware that customer satisfaction, people (employee) satisfaction and impact on society are achieved through leadership driving policy and strategy, people management, resources and processes leading ultimately to excellence in business results.

(5) ISO 9000, QS-9000 and ISO 14001 certification is a journey towards TQM but not an end in itself.

Part I of the questionnaire contained questions about the CSFs, Part II about the outcomes of TQM and part III was intended to collect all general information such as the components manufactured, number of employees, period of certification and so on. For each construct, there are 03-16 questions/items.

Likert scale is widely used in instruments measuring opinions, beliefs and attitudes. (De Vellis 1991). When a Likert scale is used, the item is presented as a declarative sentence, followed by response items that indicate varying degree of agreement with or endorsement of the statement. The scaling items were ‘very low’, low, moderate, high and very high. The scaling items were given weights of 1,2,3,4,5 respectively, higher the rating, higher the agreement towards the statement. The consolidated mean score for each construct is calculated by averaging all the mean scores of individual statements falling in that particular construct. Any value higher than 4.0 was
considered as strong influencing factor, a value of 3.0 to 4.0 was considered as having a moderate effect, 2.0 to 3.0 as low effect and below 2.0 as very low effect.

1.5.3.2 Validity of the Instrument

Validity of an instrument is defined to which any instrument measures what it is intended to measure (Carmines and Zeller 1990). The content validity, construct validity and criterion-related validity of the instrument were established.

1.5.3.3 Reliability of the Instrument

Reliability relates to the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials (Carmines and Zeller 1979). Reliability of the instrument in this study was established using Cronbach's α (alpha) as a measure of the reliability of a psychometric instrument.

1.5.3.4 Research Techniques

Primary data collected for the purpose of analysis was checked, coded, classified, tabulated, by following the statistical procedures. Analysis and interpretation of primary data was based on the tabulated data. Analysis and interpretation of primary data was done with the help of following techniques:

- Mean score analysis to rank the attributes.
- Confirmatory factor analysis on the variables to confirm the critical success factors of TQM implementation.
• Paired sample tests to find the differences between perceived level of TQM CSFs before and after certification in certified companies.
• Correlation analysis to understand the relationship between critical success factors of TQM implementation.
• One-Way ANOVA to find relationship between the demographic variables and the perceived level of critical success factors of TQM implementation.

For the statistical analysis, the multivariate software packages used were:

(i) EQS - Structural Equation Modelling Software
(ii) Statistical Package for Social Sciences (SPSS) Package (ver. 13.0)

1.6 LIMITATIONS OF THE STUDY

Despite all the possible efforts to make the analysis more comprehensive and analytical, the study of this nature has certain limitations, common to survey research. For instance, the data were obtained through mail and third person coordination and relied on the perceptions of the respondents. In addition, no causality has been established among the ten factors. One of the basic requirements of establishing causality is temporal ordering (i.e. a cause must be shown to unambiguously precede an effect) (Bullock et al 1994). Temporal ordering can only be established by conducting longitudinal studies. However, like most of the studies conducted in this area, this study also used cross-sectional data, which is not sufficient to establish temporal ordering. The study represented the opinions of quality
managers and executives of auto Component-manufacturing companies in Chennai only. Hence a comparative study between the clusters was not possible. The study was conducted only on a limited number of companies.

1.7 STRUCTURE AND CONTENT OF THE THESIS

The detail structure and content of the thesis is illustrated in Figure 1.1. The first chapter of the thesis begins with the introduction of context and development of the research, which has had significant influence on implementation and objectives of this research. This introduction leads into specific research questions and objectives. The research design for the study, which includes statement of the research problem and objective of the study, formulation of hypothesis, research methodology, data analysis plan and limitations of the study is also discussed in depth.

The second chapter provides introduction to the concepts, historical developments and contemporary models of Total Quality Management. The main focus is on the review and analysis of existing research literature. This analysis leads into the selection of Critical success factors as enablers of TQM.
The Third Chapter presents the origin, growth, development, present status and future prospects of Indian auto component industry. Also the various industry barometers such as exports, structure, tierisation and range of auto components manufactured are discussed. A detailed SWOT analysis and Five Force Analysis is also performed.
The Fourth Chapter provides an illustration as to how the proposed theoretical framework on TQM is applied to Indian auto component industry. The analysis brings forth possible answers to the research questions that were formulated. It discusses on the insights brought forward in this research, which could be used to analyse practical quality management approaches leading into the development of the TQM discipline.

The fifth chapter presents the summary of findings of the study, implications of the study and directions for future research. The limitations of this study are also highlighted to make way for research in future.

References and annexure are given at the end of the thesis.