CHAPTER: 5

RESEARCH METHODOLOGY AND
PROFILE OF RESEARCH UNITS

5.1 INTRODUCTION

This chapter describes the research methodology for this study and profile of research units.

5.2 RESEARCH METHODOLOGY

5.2.1 RESEARCH GAP


5.2.2 RESEARCH PROBLEM

The study makes an attempt to know the TQM practices and its effect on performance in various areas of the firm. Accordingly this study is embodied as “Study of TQM practices and performances in selected ISO 9001 certified manufacturing facilities in Gujarat”.

5.2.3 RESEARCH OBJECTIVES

The objectives of the study are:
1) to identify the TQM practices and performances in manufacturing firm, to develope the framework of the study,

2) to empirically examine TQM practices in selected ISO 9001 certified manufacturing facilities in Gujarat,

3) to empirically examine the relationship between TQM practices and quality performance in selected ISO 9001 certified manufacturing facilities in Gujarat,

4) to empirically examine the relationship between TQM practices and business performance in selected ISO 9001 certified manufacturing facilities in Gujarat and

5) to empirically examine the relationship between TQM practices and organizational performance in selected ISO 9001 certified manufacturing facilities in Gujarat.

5.2.4 HYPOTHESES OF THE STUDY

As discussed in chapter 3, the following hypotheses developed for the study:

**Hypothesis 1:**

To understand how the quality performance of Indian manufacturing firms is related to the TQM practices, this study proposes main hypothesis taking all quality performance together and six sub hypotheses to check the relationship between individual quality performance indicators and TQM practices.

**Main hypothesis:**

H1\(_0\): TQM Practices have no positive impact on quality performance of the organization.

H1\(_1\): TQM Practices have positive impact on quality performance of the organization.

**Sub hypotheses:**

H1a\(_0\): TQM Practices have no positive impact on defect rate.

H1a\(_1\): TQM Practices have positive impact on defect rate.

H1b\(_0\): TQM Practices have no positive impact on rework.

H1b\(_1\): TQM Practices have positive impact on rework.

H1c\(_0\): TQM Practices have no positive impact on cost per product.
H1c₁: TQM Practices have positive impact on cost per product.

H1d₀: TQM Practices have no positive impact on customer complaints.
H1d₁: TQM Practices have positive impact on customer complaints.

H1e₀: TQM Practices have no positive impact on cycle time.
H1e₁: TQM Practices have positive impact on cycle time.

H1f₀: TQM Practices have no positive impact on delivery time.
H1f₁: TQM Practices have positive impact on delivery time.

**Hypothesis 2:**

To understand how the business performance of Indian manufacturing firms is related to the TQM practices, this study proposes main hypothesis taking all business performance together and four sub hypotheses to check the relationship between individual business performance indicators and TQM practices.

**Main hypothesis:**

H2₀: TQM Practices have no positive impact on business performance of the organization.
H2₁: TQM Practices have positive impact on business performance of the organization.

**Sub hypotheses:**

H2a₀: TQM Practices have no positive impact on market share.
H2a₁: TQM Practices have positive impact on market share.

H2b₀: TQM Practices have no positive impact on total sales.
H2b₁: TQM Practices have positive impact on total sales.

H2c₀: TQM Practices have no positive impact on net profits.
H2c₁: TQM Practices have positive impact on net profits.

H2d₀: TQM Practices have no positive impact on production costs.
H2d₁: TQM Practices have positive impact on production costs.
**Hypothesis 3:**

To understand how the organizational performance of Indian manufacturing firms is related to the TQM practices, this study proposes main hypothesis taking all organizational performance together and sixteen sub hypotheses to check the relationship between individual organizational performance indicators and TQM practices.

**Main hypothesis:**

H₃₀: TQM Practices have no positive impact on organizational performance.
H₃₁: TQM Practices have positive impact on organizational performance.

**Sub hypotheses:**

H₃ₐ₀: TQM Practices have no positive impact on absenteeism rate.
H₃ₐ₁: TQM Practices have positive impact on absenteeism rate.

H₃₉₀: TQM Practices have no positive impact on tardiness rate.
H₃₉₁: TQM Practices have positive impact on tardiness rate.

H₃₉₀: TQM Practices have no positive impact on employee turnover.
H₃₉₁: TQM Practices have positive impact on employee turnover.

H₃₉₀: TQM Practices have no positive impact on suggestions from employees.
H₃₉₁: TQM Practices have positive impact on suggestions from employees.

H₃₉₀: TQM Practices have no positive impact on skills levels of employees.
H₃₉₁: TQM Practices have positive impact on skills levels of employees.

H₃₉₀: TQM Practices have no positive impact on occurrence of accidents.
H₃₉₁: TQM Practices have positive impact on occurrence of accidents.

H₃₉₀: TQM Practices have no positive impact on teamwork and cooperation among employees within a team or department.
H₃₉₁: TQM Practices have positive impact on teamwork and cooperation among employees within a team or department.
H3h₀: TQM Practices have no positive impact on teamwork and cooperation among employees belonging to different work teams or departments.
H3h₁: TQM Practices have positive impact on teamwork and cooperation among employees belonging to different work teams or departments.

H3i₀: TQM Practices have no positive impact on communication between management and rank and file.
H3i₁: TQM Practices have positive impact on communication between management and rank and file.

H3j₀: TQM Practices have no positive impact on communication between departments.
H3j₁: TQM Practices have positive impact on communication between departments.

H3k₀: TQM Practices have no positive impact on employees’ attitude towards quality.
H3k₁: TQM Practices have positive impact on employees’ attitude towards quality.

H3l₀: TQM Practices have no positive impact on employee’s pride in one’s work.
H3l₁: TQM Practices have positive impact on employee’s pride in one’s work.

H3m₀: TQM Practices have no positive impact on flow of information among departments.
H3m₁: TQM Practices have positive impact on flow of information among departments.

H3n₀: TQM Practices have no positive impact on quality of product / service provided by one department to another department.
H3n₁: TQM Practices have positive impact on quality of product / service provided by one department to another department.

H3o₀: TQM Practices have no positive impact on quality of product / service provided by our employees to our customer.
H3o₁: TQM Practices have positive impact on quality of product / service provided by our employees to our customer.

H3p₀: TQM Practices have no positive impact on quality of product / service provided to us by our suppliers.
H3p₁: TQM Practices have positive impact on quality of product / service provided to us by our suppliers.
5.2.5 SAMPLE OF THE STUDY

Primary data are collected from 57 ISO 9001 certified facilities belonging to medium and large scale limited Indian companies in manufacturing sector. All 57 facilities are related in Gujarat.

5.2.6 METHOD OF DATA COLLECTION

Primary data are obtained through survey questionnaires, which have been sent through mail to be responded by any of the production and quality staff of the respected manufacturing facilities. The study adopted a single-respondent approach in this study. The survey instrument adapted is pre – tested questionnaire that has been used in similar earlier studies (Gloria Talavera, 2005; Thuy Quynh, 2006; Fusi Abusa, 2011). This study has included two types of variables (1) independent variables and (2) dependent variables. These variables have been measured by number of items on 5 point or 7 point Likert scale (Questionnaire given in Appendix 1).

5.2.7 MEASUREMENT INSTRUMENT

5.2.7.1 INDEPENDENT VARIABLES

In this study, 69 variables related to TQM practices are defined as independent variables. These variables have been measured by using primary data collection techniques with questionnaire survey on 5 point Likert Scale (5= Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree). These variables are mentioned in Table 5.01 with the detail of measurement item of independent variable adapted from previous studies.
Table 5.01

TQM measurement item and studies adapted from

<table>
<thead>
<tr>
<th>TQM practices</th>
<th>Number of variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Management Commitment</td>
<td>7</td>
<td>Gloria Talavera, 2005; Fusi Abusa, 2011</td>
</tr>
<tr>
<td>Education and Training</td>
<td>5</td>
<td>Fusi Abusa, 2011; Thuy Quynh, 2006</td>
</tr>
<tr>
<td>Customer Focus/Orientation</td>
<td>7</td>
<td>Gloria Talavera, 2005; Fusi Abusa, 2011</td>
</tr>
<tr>
<td>Employee Empowerment/Involvement</td>
<td>8</td>
<td>Gloria Talavera, 2005; Fusi Abusa, 2011</td>
</tr>
<tr>
<td>Supplier Quality Management</td>
<td>8</td>
<td>Fusi Abusa, 2011; Thuy Quynh, 2006</td>
</tr>
<tr>
<td>Continuous Improvement</td>
<td>5</td>
<td>Gloria Talavera, 2005</td>
</tr>
<tr>
<td>Process Flow Management</td>
<td>7</td>
<td>Gloria Talavera, 2005; Fusi Abusa, 2011; Thuy Quynh, 2006</td>
</tr>
<tr>
<td>Fact-based Management</td>
<td>14</td>
<td>Gloria Talavera, 2005</td>
</tr>
<tr>
<td>Incentive and Recognition process</td>
<td>4</td>
<td>Gloria Talavera, 2005</td>
</tr>
<tr>
<td>Process Monitoring and Control</td>
<td>4</td>
<td>Gloria Talavera, 2005</td>
</tr>
</tbody>
</table>

69 variables have been taken as measurement indicators of 10 TQM practices as given in framework of the study.

5.2.7.2 DEPENDENT VARIABLES

In this study quality performance, business performance and organizational performance are defined as dependent variables. These variables have also been measured by using primary data collection techniques with questionnaire survey method. These all measurement indicators have been adopted from the similar earlier study of Gloria Talavera (2005).

Quality performance has been measured by using 6 performance measurement indicators (defect rate; rework; cost per product; customer complaints; cycle time and delivery time). This scale is measured on 7 point Likert Scale (7=Decline>20%; 6=Decline 10-20%;
5=Decline 1-10%; 4=No Change; 3=Increase 1-10%; 2=Increase 10-20% and 1= Increase >20%). For the simplicity of analytical purpose, each variable of performance measures has been coded as QP1, QP22..., and BP1, BP2 and so on (see Appendix 1).

Business performance has been measured by using 4 performance measurement indicators (Market share; Total sales; Net profits and Production costs). The market share and total sales are measured on 5 point Likert Scale (5= Significantly Increased; 4= Slightly increased; 3=No change; 2= Slightly decreased and 1= Significantly decreased) while Net profit and Production costs measured on 5 point Likert Scale (5= Significantly decreased; 4= Slightly decreased; 3=No change; 2= Slightly Increased and 1= Significantly increased).

Organizational performance has been measured by using 16 performance measurement indicators (absenteeism rate, tardiness rate, employee turnover, skills level of employees, suggestion from employees, and occurrence of accidents; teamwork and cooperation among employees within a team/department and among different work teams or departments, communication between management and rank and file and between departments, employees’ attitude towards quality and employee’s pride in one’s work, flow of information among departments, quality of product/service provided by one department to another department, and quality of product/service provided by our employees to our customer and provided to us by our suppliers). The absenteeism rate, tardiness rate, employee turnover, occurrence of accidents are measured on 5 point Likert Scale (5= Significantly decreased; 4= Slightly decreased; 3=No change; 2= Slightly Increased and 1= Significantly increased) while skills level of employees, suggestion from employees, teamwork and cooperation among employees within a team/department and among different work teams or departments, communication between management and rank and file and between departments, employees’ attitude towards quality and employee’s pride in one’s work, flow of information among departments, quality of product/service provided by one department to another department, and quality of product/service provided by our employees to our customer and provided to us by our suppliers measured on 5 point Likert Scale (5= Significantly Increased; 4= Slightly increased; 3=No change; 2= Slightly decreased and 1= Significantly decreased).
5.2.8 DATA ANALYSIS TOOLS AND TECHNIQUES

Statistical techniques such as descriptive statistics, factor analysis, reliability and validity analysis, correlation, multiple regression analysis are used to analyze data by using SPSS (Statistical Package for Social Science) Software version 17.0. Interpreted data have been presented in the form of tables, charts and figures. Main concepts and parameters of these all techniques are discussed below:

**Descriptive Analysis** is used to find out Mean, Frequencies and Standard Deviation of variables.

**Reliability Analysis** is used to measure the consistency of the scales used in the study.

**Correlation Analysis** is used to measure the relationship between TQM practices and Quality Performance; Business Performance and Organizational Performance of firms.

**Exploratory Factor Analysis** is used to extract maximum variance from the data set of TQM practices and to reduce a large number of variables down to a smaller number of components.

**Regression Analysis** is used to explore the relationship between TQM practices and firm’s quality, business and organizational performance by using the factor score as explanatory variables which are extracted from factor analysis.

5.3 PROFILE OF RESEARCH UNITS

In order to achieve the objective of the study, total 120 ISO 9001 certified facilities belonging to large and medium scale companies have been selected. These companies carried out their activities in surrounding area of Surat, Ahmedabad, Jamnagar, Vadodara city in the state of Gujarat. Questionnaire has been sent through mail to be responded by the production and quality staff of the respected manufacturing facilities. Total 60 questionnaires were received; hence response rate of the study is recorded as 50%. Out of 60 questionnaires 3 questionnaires were rejected due to incomplete answers. Finally 57 useable questionnaires have been used for the study. These research units are varied in industry type such as petrochemical, pharmaceutical, fertilizer, textile etc. demographic profile of research units have been discussed in chapter 6. the list of 57 facilities is given in Appendix 2.
5.4 CHAPTER CONCLUDING NOTE

This chapter discussed the research methodology for the study. The next chapter gives the finding of the study.