CHAPTER 4

EFFECTIVENESS OF ISO 9001:2000 CERTIFICATION IN INDIAN TYRE INDUSTRY: AN EMPIRICAL STUDY

The aim of this chapter is to present the results of the empirical study of the motives for ISO 9001:2000 certification, the extent of current practices of ISO 9001:2000 clauses and their effect on organisational changes in Indian tyre industry.

4.1 MOTIVES FOR ISO 9001:2000 CERTIFICATION

The certified tyre manufacturing firms have implemented ISO 9001:2000 quality management system for different reasons. The motives for certification are often claimed to be key determinants for the overall success of ISO 9000 standards.

<table>
<thead>
<tr>
<th>Motives</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Popularity Rate (%)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Improve company quality image</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>44</td>
<td>72</td>
<td>94.61</td>
<td>3</td>
</tr>
<tr>
<td>2 Upgrade product, service &amp; market share</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td>53</td>
<td>61</td>
<td>96.15</td>
<td>1</td>
</tr>
<tr>
<td>3 Strengthen quality management system</td>
<td>5</td>
<td>1</td>
<td>11</td>
<td>52</td>
<td>61</td>
<td>95.38</td>
<td>2</td>
</tr>
<tr>
<td>4 Integrate ISO 9001:2000 with TQM</td>
<td>4</td>
<td>5</td>
<td>18</td>
<td>48</td>
<td>55</td>
<td>93.07</td>
<td>4</td>
</tr>
</tbody>
</table>
The data collected from respondents regarding motives for ISO 9001:2000 certification are presented in Table 4.1.

The results in Table 4.1 demonstrates that a high proportion, more than half of the respondent sample (seventy two respondents), strongly agree that ISO 9001:2000 certification improves company quality image, as it helps the company to develop and maintain its reputation in the global market.

For an organisation, quality of its products and services is the primary concern. ISO certification alone does not guarantee the quality of products and services, but it signifies the presence of adequate quality management system. Approximately half of the (sixty one) respondents strongly agree that certification upgrades product & services and in turn increases market share.

Company's procedures, processes, rules, regulations and documentations being the key elements of certification, 47 percent (sixty one) of the respondents strongly agree that ISO 9001:2000 certification has strengthened their quality management system. ISO 9001:2000 standards provide the discipline and infrastructure that are necessary to make a major improvement in company’s quality management system. It is a stepping stone for implementation of TQM. It provides an easier transition to adopt TQM. Predominantly, Forty
two percent (fifty five) of the respondents strongly agreed that certification helps to integrate ISO 9001:2000 with total quality management.

Further, the popularity rate of responses for each motive is determined by the ratio of summation of frequencies of “strongly agree, agree and neither agree nor disagree” with the number of respondents. In Table 4.1, four ranks have been distributed among the four motives to ISO 9001:2000 certification. Based on this popularity rate, about 96.15% of the respondents felt that the main motive behind ISO 9001:2000 certification is to upgrade product, service & market share (rank 1). 95.38% of the respondents accept that, certification strengthen quality management system, 94.61% feels it improves company quality image and 93.07% feels certification integrates ISO 9001:2000 with TQM which is ranked 4.

4.2 EXTENT OF CURRENT PRACTICES OF ISO 9001:2000 CLAUSES

The average scores on extent of current practices of ISO 9001:2000 clauses are presented in Table 4.2.

The extent of current practices of ISO 9001:2000 clauses varies from 4.11 to 4.27 for a five point scale. The aggregated average score of all the twenty clauses is 4.21.
### Table 4.2: Average Scores on Extent of Current Practices of ISO 9001:2000 Clauses

<table>
<thead>
<tr>
<th>ISO 9001:2000 Clauses</th>
<th>Expected Score (E)</th>
<th>Perceived Score (P)</th>
<th>Gap in the Score (E-P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Management Responsibility</td>
<td>5</td>
<td>4.24</td>
<td>0.76</td>
</tr>
<tr>
<td>2. Quality Management System</td>
<td>5</td>
<td>4.27</td>
<td>0.73</td>
</tr>
<tr>
<td>3. Contract Review</td>
<td>5</td>
<td>4.23</td>
<td>0.77</td>
</tr>
<tr>
<td>4. Design Control</td>
<td>5</td>
<td>4.22</td>
<td>0.78</td>
</tr>
<tr>
<td>5. Document and Data Control</td>
<td>5</td>
<td>4.24</td>
<td>0.76</td>
</tr>
<tr>
<td>6. Purchasing</td>
<td>5</td>
<td>4.14</td>
<td>0.86</td>
</tr>
<tr>
<td>7. Product Identification</td>
<td>5</td>
<td>4.25</td>
<td>0.75</td>
</tr>
<tr>
<td>8. Process Control</td>
<td>5</td>
<td>4.22</td>
<td>0.78</td>
</tr>
<tr>
<td>9. Inspection and Testing</td>
<td>5</td>
<td>4.24</td>
<td>0.76</td>
</tr>
<tr>
<td>10. Control, Inspection, Measuring, Testing Equipment</td>
<td>5</td>
<td>4.26</td>
<td>0.74</td>
</tr>
<tr>
<td>11. Inspection and Testing Records</td>
<td>5</td>
<td>4.22</td>
<td>0.78</td>
</tr>
<tr>
<td>12. Control of Non-Conforming Products</td>
<td>5</td>
<td>4.22</td>
<td>0.78</td>
</tr>
<tr>
<td>13. Corrective and Preventive Action</td>
<td>5</td>
<td>4.13</td>
<td>0.87</td>
</tr>
<tr>
<td>14. Storage, Packaging and Delivery</td>
<td>5</td>
<td>4.18</td>
<td>0.82</td>
</tr>
<tr>
<td>15. Customer-Supply Products</td>
<td>5</td>
<td>4.11</td>
<td>0.89</td>
</tr>
<tr>
<td>16. Internal Quality Audits</td>
<td>5</td>
<td>4.16</td>
<td>0.84</td>
</tr>
<tr>
<td>17. Control of Quality Records</td>
<td>5</td>
<td>4.20</td>
<td>0.80</td>
</tr>
<tr>
<td>18. Training</td>
<td>5</td>
<td>4.20</td>
<td>0.80</td>
</tr>
<tr>
<td>19. Servicing</td>
<td>5</td>
<td>4.21</td>
<td>0.79</td>
</tr>
<tr>
<td>20. Statistical Techniques</td>
<td>5</td>
<td>4.20</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Aggregated Average Score</strong></td>
<td><strong>5</strong></td>
<td><strong>4.21</strong></td>
<td><strong>0.79</strong></td>
</tr>
</tbody>
</table>

The average scores of eight clauses are less than the aggregated average score (4.21). They include purchasing (4.14), corrective & preventive action (4.13), storage, packaging & delivery (4.18), customer-supply products (4.11), internal quality audits (4.16), control of quality records (4.20), training (4.20), and statistical tools (4.20). Obviously, these ISO 9001:2000 clauses will require more attention by the management to strengthen their quality management system. Average score
of the clause servicing (4.21) is equal to the aggregated average score. Average scores of the remaining clauses are more than 4.21.

The gap analysis (E-P) shows that there exists a gap in the extent of current practices among the ISO 9001:2000 clauses. The gap is in the range of 0.73 to 0.89. These evidences show that there is a scope for improvement in current practices of ISO 9001:2000 clauses in Indian tyre industry.

4.3 THE EXTENT OF CURRENT PRACTICES OF ISO 9001:2000 SUB-CLAUSES

To examine the gap further, the extent of current practices of ISO 9001:2000 sub- clauses are presented in Table 4.3.

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Management Responsibility</td>
<td>4.24</td>
<td>0.71</td>
</tr>
<tr>
<td>1.1 Has a well-defined, documented and disseminated customer oriented quality policy.</td>
<td>4.29</td>
<td>0.62</td>
</tr>
<tr>
<td>1.2 Identifies resource requirements and provides adequate resources to implement ISO 9001 quality management systems.</td>
<td>4.23</td>
<td>0.69</td>
</tr>
<tr>
<td>1.3 Appoints senior executive with clearly defined authority and responsibility to implement quality management system.</td>
<td>4.18</td>
<td>0.80</td>
</tr>
<tr>
<td>1.4 Reviews the quality management system at regular intervals to ensure its effectiveness.</td>
<td>4.26</td>
<td>0.74</td>
</tr>
<tr>
<td>2. Quality Management System</td>
<td>4.27</td>
<td>0.65</td>
</tr>
<tr>
<td>2.1 Has a detailed quality manual that establishes documents and maintain quality systems and procedures.</td>
<td>4.32</td>
<td>0.68</td>
</tr>
<tr>
<td>2.2 Quality system procedures are consistent with the requirements of ISO standard and company’s quality policy.</td>
<td>4.32</td>
<td>0.61</td>
</tr>
<tr>
<td>2.3 Defines and document how the requirements for quality will be met through quality plans.</td>
<td>4.23</td>
<td>0.66</td>
</tr>
<tr>
<td>2.4 Defines and document how the needs, requirements for quality will be met through quality control, inspection and testing.</td>
<td>4.22</td>
<td>0.67</td>
</tr>
</tbody>
</table>
3. Contract Review

3.1 Ensures that the requirements are adequately defined and documented before entering into contract. 4.23 0.66
3.2 Defines and documents procedures used to amend contracts and communicate the changes internally. 4.22 0.66
3.3 Maintains and updates records of all contract reviews. 4.23 0.64

4. Design Control

4.1 Establishes and maintains documented procedures to verify the design of product which meets the requirements. 4.21 0.73
4.2 Designs and documents organisational and technical interfaces between groups involved in design process. 4.21 0.62
4.3 Identifies documents and reviews the selection of design input/output requirements for adequacy and validation. 4.26 0.58
4.4 Plans, conducts and records formal reviews of design results at respective stage. 4.20 0.63

5. Document and Data Control

5.1 Establishes and documents procedures to control all documents and data relating to ISO requirements. 4.30 0.57
5.2 Ensures the appropriate documents are available/obsolete through the control system and provides a tracking procedure for revision. 4.23 0.63
5.3 The same functional department reviews the changes which performed the original review for approval. 4.19 0.67

6. Purchasing

6.1 The system ensures a well defined documented procedure to select and control suppliers. 4.14 0.67
6.2 A clear procedure is documented to verify products on the supplier’s premises. 4.15 0.67

7. Product Identification

7.1 Has a documented procedure for identifying the product from receipt through production delivery and installation. 4.25 0.61
7.2 Unique identification of individual products and batches is well documented. 4.25 0.68

8. Process Control

8.1 Identifies the production, installation and servicing processes to ensure documentation of all procedures, compliance with quality standard, monitoring of process parameters. 4.22 0.72
8.2 Plan the production, installation and servicing processes to ensure documentation of all procedures, compliance with quality standard, monitoring of process parameters. 4.22 0.72

9. Inspection and Testing

9.1 Maintain documented procedure to ensure that incoming products conform to specific requirements. 4.30 0.68
9.2 Records the amount of control exercised at supplier’s premises. 4.16 0.79
9.3 Final inspection and testing is carried out in accordance with the quality plan and is documented. 4.27 0.66

10. Control, Inspection, Measuring, Testing Equipment

10.1 Maintain documented procedure to control, calibrate and inspect. 4.29 0.64
10.2 Controlling, calibration and inspection is done at regular intervals and documented. 4.23 0.76

11. Inspection and Testing Records

11.1 Documents all the inspection records 4.23 0.66
11.2 Documents all the test status of all the products 4.21 0.68

12. Control Of Non-Conforming Products

12.1 Documents to ensure the products not conforming to requirements are not used. 4.24 0.70
12.2 Non-conforming products are reviewed, reworked or rejected. 4.19 0.79

13. Corrective and Preventive Action

13.1 Maintains documentation to ensure corrective and preventive actions. 4.21 0.78
13.2 Corrective actions include investigation of the cause of non-conformation. 4.14 0.86
Preventive actions include application of controls to ensure the effective preventive action taken.

Procedures of corrective and preventive actions taken are reviewed by the management.

14. **Storage, Packaging and Delivery**

   14.1 Maintain documentation procedure for handling, storage, packaging, preservation and delivery of products.

   14.2 Procedural steps are followed to prevent damage or deterioration during handling, storage and packaging to ensure conformance to specific needs of quality of products.

15. **Customer-Supply Products**

   15.1 Establish a documented procedure for verification, storage and the maintenance of the components as supplied by customers.

   15.2 Maintain documented procedures for verification, storage and the maintenance of the components as supplied by customers.

16. **Internal Quality Audits**

   16.1 Establish and maintain documented procedures for planning and implementation of internal quality audits.

   16.2 Internal quality audits are scheduled on the basis of status and importance of the activity.

   16.3 Results of the audits are recorded, reviewed by the management and corrective actions are taken.

17. **Control of Quality Records**

   17.1 Establish documented procedures for identification, collection, indexing and filing of quality records.

   17.2 Quality records are maintained to demonstrate conformance to specified needs and the effective operation of quality system.

18. **Training**

   18.1 Establish a documented procedure for identifying the trainers and training needs.

   18.2 Maintain documented procedure for identifying the trainers and training needs.

19. **Servicing**

   19.1 Establish a documented procedure for performing, evaluating and reviewing of service requirements.

   19.2 Maintain documented procedures for performing, evaluating and reviewing of service requirements.

20. **Statistical Techniques**

   20.1 Identify and use statistical techniques to establish, control, and verify process capability and product characteristics.

   20.2 Establish and maintain documented procedures for implementing and controlling the application of the techniques.

The extent of current practices of ISO 9001:2000 sub-clauses varies from 4.07 to 4.32 for a five point scale. The discussion is presented in the following section.

1. **Management Responsibility**

   The study shows that, ISO 9001:2000 certified companies in the Indian tyre industry have a well
defined, documented and disseminated customer oriented quality policy (mean score 4.29). The quality management system has been reviewed at regular intervals to ensure its effectiveness (mean score 4.26). However, to strengthen the implementation of ISO 9001:2000, certified companies should provide adequate resources (mean score 4.23) and assign clearly defined authority and responsibility to senior executives for implementing ISO 9001:2000 quality management system.

2. Quality Management System

The study reveals that, the certified companies have a detailed quality manual that establishes, documents and maintains quality system and procedures (mean score 4.32). Such procedures are consistent with the requirements of ISO standards and company’s quality policy (mean score 4.32). However, the quality management system should emphasise more on defining & documenting the requirements for quality that will be met through quality plans (mean score 4.23), and defining & documenting the needs and requirements for quality will be met through quality control, inspection and testing (mean score 4.22).
3. **CONTRACT REVIEW**

The purpose of the contract review is to ensure that there can be no misunderstandings between customer and supplier on what will be supplied in a stipulated time, and it also requires the supplier to ensure the means to supply what is required and when. The results of the study shows that contract review of respondent companies ensured that the requirements have been adequately defined and documented before entering into contract (mean score 4.23) and maintained the updated records of all contract reviews (mean score 4.23). However, the companies have to give more importance in defining and documenting the procedures used to amend contracts and communicate the changes internally (mean score 4.22).

4. **DESIGN CONTROL**

Design control means “controlling the process through which new or modified designs are produced so that the resultant design is one that truly reflects the customer needs”.

The certified companies identified, documented and reviewed the selection of design input/output requirements for adequacy and validation (mean score 4.26). However, the certified companies need to establish and maintain documented procedures to verify the design
of product which meets the requirements (mean score 4.21) and strengthen organisational and technical interfaces between groups involved in design processes (mean score 4.21). Formal reviews of design results should be planned properly and conducted accurately (mean score 4.20).

5. **DOCUMENT AND DATA CONTROL**

   The principle behind ISO 9000 standard is “do what you document and document what you do”. ISO 9000 requires management to ensure appropriate documentation, their availability and revival within the organisation. The respondent tyre manufacturing companies have well established and documented procedures to control all documents and data relating to ISO requirements (mean score 4.30). The study indicates that there is a shortcoming in ensuring the availability of documents (mean score 4.23) and in providing a tracking procedure for revision and revival of any changes by same functional department which had reviewed earlier (mean score 4.19).

6. **PURCHASING**

   The purpose of this clause is to ensure proper selection and development of suppliers and procedures for inspection at supplier’s premises. The survey results
show that the quality management system in respondent companies provided a clear procedure for verifying the products at the supplier premises (mean score 4.15) to reduce the burden of in-coming inspection at plants. But, they lack in ensuring a well documented procedure for selection and development of suppliers (mean score 4.14).

It is analysed that the system should ensure well established criteria for selection, evaluation, and development of suppliers. The system should emphasise for flow of the information which describes the product to be purchased and also ensures that the product meets specific quality requirements. Supplier selection should be made on the basis of their sound quality assurance system, any deviations shall be recommended for remedial actions for further verification and acceptance. The supplied products and services shall be evaluated based on the prior evaluation, from the past history, test reports, on-site evaluation and through third-party certification.

7. **PRODUCT IDENTIFICATION**

Product identification plays a major role in preventing inadvertent effects. The survey shows a significant result in having a well documented procedure for identifying the product from receipt to production,
delivery, installation and unique identification of individual products and batches.

8. **PROCESS CONTROL**

   This clause provides explicit procedures that ensure process will be carried out under controlled conditions. The study shows that ISO 9001:2000 certified companies in tyre industry have a well defined plans and procedures for identifying the production, installation and servicing processes and ensure compliance with quality standards & monitoring of process parameters (mean score 4.22).

9. **INSPECTION AND TESTING**

   This clause lays great emphasis on inspection and testing and requires that, all the planned tests have been completed before product is released. Indian tyre companies have achieved a greater excellence in maintaining documented procedure, inspection and testing within their own premises, but they have failed in exercising their managerial excellence at the supplier’s premises (mean score 4.16).
10. **Control, Inspection, Measuring, and Testing Equipment**

The study reveals that the respondent companies have a well maintained and documented procedure to control, calibrate and inspect equipment with high score of 4.29 to that of the average mean score (mean score 4.26). On contrary the ISO requires the management to establish control, calibrate and maintain equipment at regular intervals which is used to demonstrate conformance to the requirements and documentation of controlling, calibration and inspection at regular intervals (mean score 4.23).

11. **Inspection and Testing Records**

The study shows that the certified companies in the tyre industry have a well defined & documented inspection records and test reports of all the products, which is enunciated by the mean scores of each individual sub-clauses. This suffices that, the certified companies have significantly a strong hold in implementing this clause. It is felt that the companies are practicing this clause to a satisfactory level.

12. **Control of Non-Conforming Products**

The mean score in the Table 4.3 portrays a systematic documentation which ensures in preventing the
usage of non-confirming products and thereby achieving better quality of products, but the companies lack in adopting better practices in reviewing, reworking and rejecting the non-conforming products.

13. CORRECTIVE AND PREVENTIVE ACTION

This is one of the most important clauses in ISO 9001:2000, where more attention has been given for documentation of corrective and preventive actions. Mere documentation doesn’t serve the purpose as in clause 12, but it should be followed by the corrective and preventive actions.

The certified companies maintained documents to ensure timely corrective and preventive actions (mean score 4.21). But, corrective and preventive actions for removal of non-conformities have been inadequate. The reason could be due to the difficulty in corrective and prevention action caused by failures in fulfilling the design control requirements. The certified companies should investigate cause of non-conformance and take action to prevent them from reoccurring in future and review the quality management system at regular intervals.
14. **Storage, Packaging and Delivery**

The specific requirement of this clause is to reduce waste by damage to product during the processes. The survey depicts that the system allows to maintain documented procedure for handling, storage, packaging, preservation and delivery of products (mean score 4.21). But respondents felt that the procedural steps followed to prevent damage or deterioration during handling, storage and packaging to ensure conformance to specific needs of quality of products (mean score 4.15) was inadequate. The certified companies must establish a proper procedure at all stages to verify that the specific requirements are met.

15. **Customer-Supply Products**

The survey results shows that ISO 9001:2000 certified companies in tyre industry have a well established documented procedure for verification, storage and the maintenance of the components supplied by customers and in maintaining of documents which is depicted by the individual mean score 4.11 in Table 4.3. The tyre manufacturers have processes and systems for storage and maintenance of all customer-supplied products/materials.
16. **Internal Quality Audits**

The purpose of quality audits is to establish unbiased factual information on quality performance. Quality audits are the measurement component of the quality system (David Hoyle 2001). The average mean score shows that the system lacks in implementing the internal quality audits. The certified companies must establish and maintain a system of internal quality audits to verify compliance of its activities with the requirements and provides a feedback to the top management about its effectiveness.

17. **Control of Quality Records**

More or less there is congruence with quality management system in establishing documented procedures for identification, collection, indexing and filing of quality records. The respondent companies have maintained quality records to demonstrate conformance to specified needs and the effective operation of quality system.

18. **Training**

Training, pervasive in nature, is intended to be an integral part in implementing ISO 9001:2000. The mean score in the survey result shows that, the certified companies must establish and maintain documented
procedures and identify training needs, provide training for all employees performing the activities that affect overall quality management system. ISO 9000 requires the company to ensure that people are trained to undertake the tasks to which they are assigned.

19. **Servicing**

    Indian tyre companies have clearly defined the service objectives and targets. The study decisively depicts that the procedures developed to ensure the service are being performed in true spirit as required by the customer (mean score 4.22).

20. **Statistical Techniques**

    Statistical techniques are useful to evaluate the degree of conformance in meeting the specifications. Organisations attempt to design quality into their processes which continually relies on monitoring of the inputs and outputs in producing goods and services. It is felt from the overall average mean score 4.20 is equal to the score of individual sub-clauses and less than the mean score 4.21. This shows that the system should identify statistical techniques which can be used to control processes, products and services.
The management must establish procedures, train the personnel concerned and identify the use statistical techniques to establish, control, and verify process capability and product characteristics.

4.4 Effectiveness of ISO 9001:2000 Certification

Effectiveness of ISO 9001:2000 certification on organisational changes is examined in this section.

The results of descriptive statistics of organisational changes associated with the certification (effects) are presented in Table 4.4.

**Table 4.4: Effects of ISO 9001:2000 Certification**

<table>
<thead>
<tr>
<th>Effects</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Popularity Rate (n=130) (%)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Clearly defined responsibilities &amp; obligations</td>
<td>1</td>
<td>5</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
The popularity rate of responses for each effect is determined by the ratio of summation of frequencies of “agree, strongly agree and neither agree nor disagree” with the number of respondents. In Table 4.4, three ranks have been distributed among the five effects based on tied ranking method. 96.92% of the respondents felt ISO 9001:2000 certification has led to better relationship with suppliers (ranked 1) followed by clearly defined responsibilities and obligations, better relationship with existing and potential customers and a better system of training and education with a popularity rate of 95.38% (ranked 2). 94.61% felt there is an increase in
confidence of organisations quality management system which is ranked 3.

**TESTING OF HYPOTHESIS**

To examine the effectiveness of ISO 9001:2000 certification on organisational changes associated with the certification, the following null and research hypotheses are formulated.

**THE NULL HYPOTHESIS**

\[ H_0: \text{There is no relation between the extent of the current practices of ISO 9001:2000 clauses and the organisational changes associated with certification.} \]

**THE RESEARCH HYPOTHESIS**

\[ H_1: \text{Greater the extent of the current practices of ISO 9001:2000 clauses, better are the organisational changes associated with certification.} \]

The results of regression analysis between the mean score of independent variable consists of fifty two items of ISO 9001:2000 clauses and mean scores of five dependent variables are shown in Table 4.5.

**Table 4.5: Results of Regression Analysis**

| Dependent Variables | \( \beta \) | t-value | Significance | \( R^2 \) |
The regression coefficients of ISO 9001:2000 clauses (independent variable) are positively and significantly related with clearly defined responsibilities & obligations; increased confidence in organisation’s quality management system; training & education; relationship with existing and potential customers; and relationship with suppliers (dependent variables). The positive regression coefficients show that greater the extent of current practices of ISO 9001:2000 clauses, better the organisational changes associated with clearly defined responsibilities & obligations, confidence in quality management systems, training & education, customer relationship, and suppliers’ relationship.

In as much as p-values associated with the observed values of $\beta$ are $<0.001$, the decision is to reject the null hypothesis ($H_0$) in favour of the alternative hypothesis ($H_1$). The study accepts the research hypothesis i.e. “Greater the extent of the current practices of ISO 9001:2000 clauses, better are the organisational changes associated with certification”.

<table>
<thead>
<tr>
<th></th>
<th>Clearly defined responsibilities &amp; obligations</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>.612</td>
<td>8.747</td>
<td>.000</td>
<td>.374</td>
</tr>
<tr>
<td>2.</td>
<td>Increased confidence in organisation's quality management system</td>
<td>.658</td>
<td>9.881</td>
<td>.000</td>
</tr>
<tr>
<td>3.</td>
<td>Better system of training &amp; education</td>
<td>.677</td>
<td>10.418</td>
<td>.000</td>
</tr>
<tr>
<td>4.</td>
<td>Better relationship with existing and potential customers</td>
<td>.725</td>
<td>11.916</td>
<td>.000</td>
</tr>
<tr>
<td>5.</td>
<td>Better relationship with suppliers</td>
<td>.691</td>
<td>10.802</td>
<td>.000</td>
</tr>
</tbody>
</table>

$p < 0.001$
\( R^2 \) in Table 4.5 gives the proportion of variance shared by the two variables or percentage of variance in the dependent variable that is accounted for by the independent variable. The results show that the \( R^2 \) varies from 37.4% to 52.6%. Assuming the relatively high \( R^2 \) and \( t \)-value for \( \beta \), it is concluded that there exists statistically significant relationship between the ISO 9001:2000 clauses (independent variable) and organisational changes associated with certification (dependent variables).

4.5 Summary

This chapter has presented the empirical results of the motives for ISO 9001:2000 certification, the extent of current practices of ISO 9001:2000 clauses and their effect on organisational changes in Indian tyre industry. Though generalisations can be made tentatively, the study has reviewed the following findings:

- The main motives behind ISO 9001:2000 certification are to upgrade products & services, market share and to strengthen quality management system. They are followed by motives to improve company quality image and integrate ISO 9001:2000 with TQM.
- The extent of current practices of ISO 9001:2000 clauses is found to be high in Indian tyre industry.
• The impact of ISO 9001:2000 certification has resulted in better relationship with suppliers, clearly defined responsibility and obligations, better system of training and education, increase in confidence of organisation’s quality management system and better relationship with existing and potential customers.

• There is a scope for continuous improvement in current practices of ISO 9001:2000 clauses in Indian tyre industry, as there exists a small gap in the extent of current practices of ISO 9001:2000 clauses.