Effectiveness of Total Quality Management (TQM) in Indian Software Industries as Inclusive Technology for Sustainability

DANANJAY ANAND PUSHKALA
Research Scholar
Shri Venkateshwara University
Gajrula, UP (India)

Dr.S.SRIDHAR
Director RVCT
R.V.College of Engineering
Bangalore (India)

Abstract: Total Quality Management (TQM) has become latest management mantra in globalised and drastically changing business environments. Recently the organisations are considering the TQM as magic cure for improving organizational performance, creating learning organisation, modification of the behaviour of both the employees and the management. Several researchers have also looked at the concept of Standardization of Quality (ISO 9000 certification) in relations to the implementation of TQM. Both Primary and Secondary data are used in the analysis. The concept of TQM has evolved from a narrow focus on Statistical Quality Control (SQC) to a broad spectrum of socio-cultural, behavioural and technical issues. Many countries have come up with national Quality Award models to encourage continuous improvement in the processes to achieve business excellence in their companies. Simultaneously emphasis is also laid on the international quality certification so that the companies can become world-class. The most popular quality management standard certification is the ISO: 9000 series by the International Organisation for Standardization (ISO). We present our study in this paper.

Keywords: TQM, ISO:9000 series, ISO certification, SQC

I. ISO: 9000 SERIES

There are three major parts within the ISO: 9000 series against which the quality management system of a company can be developed and assessed. The individual standards are as follows:

ISO: 9001 - Specification for design, development, production, installation and servicing.
ISO: 9000 is the most comprehensive of the standards, covers the requirements of ISO: 9002 and the controls required to oversee design activities. The appropriate standard to be applied depends upon the activities of the company.

II. OBJECTIVES AND HYPOTHESIS FORMULATION

This study tries to examine impact of ISO certification on TQM practices compared to those of non ISO certified in Indian Software Industries in general in Bangalore, India in particular as under:

1. To know the effectiveness of Total Quality Management (TQM) in Indian Software Industries.
2. To analyse the differences of TQM practices between ISO certified and ISO non-certified Indian Software Industries.
3. To suggest measures to improve implementation of TQM in Indian Software Industries.

Based on the above objectives, the following hypothesis is formulated.

H0: TQM Practices are not different irrespective of the Indian Software Industries whether ISO Certified or not.

H1. The ISO certification certainly cause significant effectiveness on TQM practices.

Primary Data

The primary data has been collected from the respondents of selected Indian Software Industries situated in and around Bangalore. The survey instrument used here is a questionnaire with multiple choice questions based on Likert’s scale. The data collected is majorly qualitative than numerical. The questionnaire consists of total 46 questions divided into 7 constructs, besides 8 questions on profiles of organisation as well as respondents.

Secondary Data

Indian Software Industries related data has taken from the RBI web sites and other Websites, Library resources, Journals, Magazines etc. for supportive and other information.

III. FRAMEWORK OF STUDY

TQM provides a generic concept for continuous improvement in quality and other performances. TQM is a philosophy that stresses a systematic, integrated, and consistent perspective involving everyone and everything. The Malcolm Baldrige National Quality Award (MBNQA) shows seven dimensions for a framework of quality management. In this study seven
dimensions of TQM as above are used to evaluate the TQM practices in the Indian Software Industries context, namely, Leadership, Quality Culture, Quality Management System, Team-building, Employee’s Participation, and Supplier Customer Relations. In fact, the dimensions of the TQM model of this study have much in common with quality management principles of ISO 9000 (ISO, 2000) because most surveyed Indian Software Industries organizations have attained ISO 9000 certificates.

IV. CONSISTENCY AND RELIABILITY TESTING

An internal consistency analysis was performed separately for the items under each of the criteria. The reliability coefficient (Cronbach’s alpha) was calculated for each construct and ranged between 0.6796 and 0.9047. The overall coefficient of Alpha for 46 items of seven constructs together is that Cronbach’s alpha which is 0.915322. Thus, each construct individually and the whole questionnaire can be construed to be strongly reliable.

V. SELECTION OF SAMPLE POPULATION AND ITS SIZE

Rules of thumb is used to identify the companies based on past experiences of the researcher. Thus, with a small chosen population of organizations with ISO certification and also the situation demands for lots of data from each respondent, the sample size of this survey is determined by the rule of thumb. The sample size is 200. However responses received was only from 120 respondents. The sampling method chosen is Simple Random Sampling Method, keeping the purpose of the study in view and necessity of having related data on TQM practices of Indian Software Industries.

VI. SCOPE OF THE STUDY

Indian Software Industries situated in and around Bangalore. The study has collected the data from respondents from Feb 2014 to June 2015. The sample reflects the facts of these periods only.

Statistical Tools Used

This study makes a comparison of TQM practices between Indian Software Industries organizations with and without ISO (QMS) certification to determine which activities of total quality management implemented in organizations with certification were better than those without certification. It is specifically done in terms of the seven TQM dimensions; Leadership, Quality Culture, Quality System Improvement, Teambuilding, Employees Participation, and Supplier Customer Relations as mentioned below. It is expected that the comparison may reflect systematic way of doing activities by the ISO Certified organizations and not so with the others. The t-test is used to verify the statistical significance of the differences between the ISO certified and Non-ISO certified organizations for the TQM practices. The study used various statistical tools like percentiles, averages, standard deviation, t-test, chi-square test, Phi-value and Cramer’s” V” etc., for its analysis. The data analysed with the help of statistical software package.

VII. RESULTS ANALYSIS AND FINDINGS - IMPACT OF ISO CERTIFICATION ON LEADERSHIP

Leadership is an important factor of total quality management. Leaders are persons who establish the visions and goals of the organization. Their commitment is one of the critical determinants of successfully implementing TQM. Leadership practices promote quality and high performance by creating and maintaining the total involvement of both internal (staff or employees) and external (customers and suppliers) people to achieve the goals of an organization. Therefore, the results of leadership activities in the units with ISO (QMS) certification expected to be higher than those of Non-ISO units. The following Table – presents the statistics in variable between the two groups. These results show that there are statistically significant differences for items such as, leadership provides freedom to employees to work and leaders provide required resources and training to employees. The findings (Group Average p-value .041 not < .050) suggests that there is sufficient evidence to confirm the leadership activities in the organizations with ISO certification is better than that of without ISO certification, which may be due to the fact ISO manuals clearly define their roles specifically.

<table>
<thead>
<tr>
<th>Factor</th>
<th>ISO Certified</th>
<th>Without ISO Certification</th>
<th>t-test</th>
<th>p-value (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Average</td>
<td>90</td>
<td>4.38</td>
<td>0.88</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Survey Data  p-values with * markare Significant at .050 level
Impact of ISO Certification on Quality Culture

Quality Culture is the way imbibing the norms, traditions within the organisation with respect to QMS, total quality management by the people. The Quality Culture is more systematised in the units with ISO (QMS). The Non-ISO units may not have the same. The following Table presents the statistics in variable between the two groups. The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .028< .050) to confirm the systematisation of Quality Culture in the organizations with ISO certification is better than, that of without ISO certification.

<table>
<thead>
<tr>
<th>Impact of ISO Certification on Quality Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO Certified</td>
</tr>
<tr>
<td>Factor</td>
</tr>
<tr>
<td>Group Average</td>
</tr>
</tbody>
</table>

Source: Survey Datap-values with * mark are Significant at .050 level

Impact of ISO Certification on Quality Management System

The Quality Management System is more systematised or more scientific in the units with ISO than that of Non-ISO units. The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .000< .050) to confirm the systematisation of Quality Management System Improvement in the organizations with ISO certification is better than that of without ISO certification.(Table below)

<table>
<thead>
<tr>
<th>Impact of ISO Certification on Quality System Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO Certified</td>
</tr>
<tr>
<td>Factor</td>
</tr>
<tr>
<td>Group Average</td>
</tr>
</tbody>
</table>

Source: Survey Datap-values with * mark are Significant at .050 level

Impact of ISO Certification on Team-Building

Team-building is the collective way of discharging organisational responsibilities with the same level of mind-set within the organisation with respect to QMS and TQM by the employees. The Team-building is more systematised or more scientific in the units with ISO (QMS) than that of Non-ISO units. The following Table presents the statistics in variable between the two groups.
Impact of ISO Certification on Team-Building

<table>
<thead>
<tr>
<th>Factor</th>
<th>ISO Certified</th>
<th>Without ISO Certification</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev</td>
<td>N</td>
</tr>
<tr>
<td>Group Average</td>
<td>90</td>
<td>4.34</td>
<td>0.41</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Survey Data p-values with * mark are Significant at .050 level

The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .000< .050) to confirm the systematisation of Team-building in the organizations with ISO certification is better than that of without ISO certification.

Impact of ISO Certification on Employees’ Participation

<table>
<thead>
<tr>
<th>Factor</th>
<th>ISO Certified</th>
<th>Without ISO Certification</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev</td>
<td>N</td>
</tr>
<tr>
<td>Group Average</td>
<td>90</td>
<td>4.38</td>
<td>0.39</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Survey Data p-values with * mark are Significant at .050 level

The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .000< .050) to confirm that the Employees’ Participation in the organizations with ISO certification is better than that of without ISO certification.

Impact of ISO Certification on Recognition And Rewards

Participation of employees is very complex activity that the factors like management style and the working environments do influence. TQM promotes the recognition of best and dedicated performance; the whole-hearted participation of employees etc. and are rewarded. The following table ( Table 4.18) presents the statistics in variable between the two groups.
Impact of ISO Certification on Recognition Reward System

<table>
<thead>
<tr>
<th>Factor</th>
<th>ISO Certified</th>
<th>Without ISO Certification</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean</td>
<td>Std. Dev</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Group Average</td>
<td>90</td>
<td>4.18</td>
<td>30</td>
<td>3.88</td>
</tr>
</tbody>
</table>

Source: Survey Data  
*p-values with * mark are Significant at .050 level

The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .013< .050) to confirm that the Recognition and Reward System in the organizations with ISO certification is better than that without ISO certification.

Impact of ISO Certification on Supplier / Customer Focus

The concept of Customer and Supplier Focus is, one of TQM practices, which emphasise that the linkage of both the supplier and customer is a must. TQM promotes the whole-hearted Customer and Supplier Focus to the organisational quality objectives. Following table presents the statistics in variable between the two groups.

Impact of ISO Certification on Suppliers/Customer Focus

<table>
<thead>
<tr>
<th>Factor</th>
<th>ISO Certified</th>
<th>Without ISO Certification</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean</td>
<td>Std. Dev</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Group Average</td>
<td>90</td>
<td>4.63</td>
<td>30</td>
<td>4.34</td>
</tr>
</tbody>
</table>

Source: Survey Data  
*p-values with * mark are Significant at .050 level

The results show that there are statistically significant differences for items with * marks. The findings suggest that the evidence is significant (Group Average p-value .003< .050) to confirm that the Customer and Supplier Focus in the organizations with ISO certification is better than that of without ISO certification.

Impact of ISO Certification on TQM Practices

TQM promotes the Holistic approach. It never depends heavily on any one of TQM tools. TQM also called as Company Wide Quality Management (CWQM) stressing the importance of the performance improvement as a whole. The following table presents the relevance of various TQM variables in terms of respondents opinions between two groups expressed in different statistical parameters.
Impact of ISO Certification on TQM

<table>
<thead>
<tr>
<th>TQM Attributes</th>
<th>Whether ISO Certified</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>08</td>
<td>14</td>
</tr>
<tr>
<td>Disagree</td>
<td>21</td>
<td>04</td>
</tr>
<tr>
<td>Undecided</td>
<td>20</td>
<td>04</td>
</tr>
<tr>
<td>Agree</td>
<td>21</td>
<td>06</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>20</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>30</td>
</tr>
</tbody>
</table>

Tests

<table>
<thead>
<tr>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phi</td>
<td>.434</td>
<td>-.000</td>
</tr>
<tr>
<td>Cramer’s V</td>
<td>.434</td>
<td>-.000</td>
</tr>
</tbody>
</table>

Source: Survey Data

All TQM Constructs are collectively analysed between ISO Certified and ISO Non-Certified Respondent units to verify any difference on account of TQM practices. The above Table shows that there is significant association between two attributes as Pearson Chi-Square test’s alpha is .000<.0500. The strength of association between the variables is also generated which Phi-Value and Cramer’s V (.434) are found at considerable level. Hence, it is observed that the ISO Certification might have helped the Indian Software Industries to perform better. Systematic performance in ISO Certified Indian Software Industries is different and superior from that of ISO non-certified Indian Software Industries.

VIII. SUMMARY OF RESULTS

The final concluding results are tabulated as per the 8 constructs, which prove that ISO certified companies fair better than that without ISO certification and the effectiveness of the TQM is high with regard to ISO certified companies fair better than that without ISO certification.

Effectiveness of ISO Certification on TQM Practices.

4. Impact of ISO Certification on Team-building Significant,
5. Impact of ISO Certification on Employee participation Significant,
6. Impact of ISO Certification on Recognition rewarding system Significant,
7. Impact of ISO Certification on Supplier customer focus Significant,

IX. TESTING OF HYPOTHESIS

Null Hypothesis (H0) is rejected since in all TQM constructs it had been found significant with t-test comparison of means and with Chi-square test. Hence the Alternative Hypothesis is accepted i.e. the ISO (Quality) Certification actually cause significant impact on TQM practices

X. CONCLUSIONS

The results of the study of the impact of ISO certifications on TQM practices in terms of the seven TQM Constructs; Leadership, Quality Culture, Quality System Improvement, Team-building, Employee’s Participation, and Supplier Customer Relations are showing that there is strong relation between the ISO certification and TQM implementation. This study also observes that the TQM implemented in organizations with ISO certification were better than those of without ISO certification. Thus the study concludes that Indian Software Industries are doing systematic way of activities due to compliance of ISO guidelines which are certainly helpful for successful
implementation of TQM thereby enhancing the effectiveness of the organisation. The following suggestions are given based on the study to improve efficiency of the Indian Software Industries in implementing the TQM. It is suggested that all the Indian Software Industries should implement TQM in a phased manner to achieve success and enhance effectiveness of the organisation in the micro level and in the macro level (in the global market), would eventually increase the Balance of Trade and Balance of Payments.

XI. REFERENCES


