

ABSTRACT

Keywords: TQM, CSF, QAP, Survey, Instrument, Benchmarking, Correlation analysis, QFD, Pareto analysis, PDSA, TQMII, sustainability.

The purpose of this study is to propose models to identify critical success factors and sustainable development of Total Quality Management (TQM). Even though there has been a large number of studies published related to TQM in the last few decades, only a very few studies focused on documenting the critical success factors of TQM using statistical methods. Identification of vital few critical success factors and quality-related programs is the essential first step in the development of TQM sustainability model. Hence three different models are proposed in this research to identify vital few critical success factors of TQM.

The first model is based on literature review of TQM empirical studies conducted in several countries between 1989 and 2003 and published in various journals. The approach is to investigate and list the critical success factors of TQM by examining the scale development studies and the TQM effect versus performance measurement studies. Rigorous statistical reliability tests and validity tests were conducted as a part of the research during these studies to factorize the critical success factors and hence these studies were chosen for our literature review. Finally, the quality tool 'Pareto analysis' was used to sort and arrange the critical success factors in the order of criticality. An examination of 37 such TQM empirical studies resulted in compilation of 56 critical success factors. The total frequency of occurrences of all the critical success factors is 306. Implementation difficulties exist to operationalize such a large number of critical success factors in organizations. This study analyzed and sorted the critical success factors in descending order according to the frequency of occurrences using Pareto analysis. Vital few critical success factors were identified and reported.

In the next model, a methodology is presented to benchmark the quality-related action programs and critical success factors of TQM for manufacturing industries using quality function deployment (QFD) approach. In this research, 27 organization performance requirements were identified from literature review. The required quality-related action programs to achieve the identified organization performance requirements were obtained by adopting QFD methodology. The QFD matrix was constructed with the organization performance requirements as 'Whats' and the quality-related action programs as 'Hows'. Eleven TQM critical success factors were derived by grouping the similar quality-related action programs. Finally, the critical success factors and the quality-related action programs were benchmarked by their corresponding importance weight factors. A case study was presented to illustrate the methodology.

The third model utilizes the advantages offered by the present developments in the information technology arena. A quality instrument for the current research project was carried out by taking into the advantages of internet and e-mail facilities available in manufacturing Industries. For this empirical study, survey questionnaire based on Visual Basic software has been developed for collecting responses through e-mail and internet. User friendly interactive software was designed to meet respondent's convenience of answering and also for faster response rate. At present most of the companies have web-site, e-mail ID's and hence it was easy to get responses through internet. Three hundred e-mails with survey questionnaire file attached were sent to selected ISO 9001 certified companies in India. The respondents entered their responses by clicking the right button of the computer mouse next to the question in 5 point Likert scale. A total of 82 responses were received through internet, response rate was 27%. Through posts, 22 additional responses were received. The responses, 104 in total were analyzed using the SPSS Version 9.05 statistical package. A quality instrument with 10 critical success factors was developed and validated.

Correlation analysis was performed using the software SPSS 9.05 version to identify the relationship among critical success factors and quality, firm output performances. Quality performance measures were positively (>0.6) related to all the critical success factors except 'training (TR) and lean manufacturing (LM)'. Firm performances were related (>0.6) to all the critical success factors except 'quality data and reporting and lean manufacturing'.

In the next phase, a model for 'sustainable development of TQM' based on Deming's Plan-Do-Study-Act (PDSA) cycle is proposed. The least developed programs of TQM in firms are identified in this proposed model and sorted out in the lowest to highest order of development. The result will help the top management in setting out priorities to achieve sustained growth of TQM implementation process. The PDSA cycle suggested for TQM sustainability consists of four steps: (1) plan for TQM, (2) Implement TQM, (3) study and measure the level of implementation of TQM and (4) take necessary actions to improve the less developed programs of TQM. In this research, the level of implementation of TQM is measured with the help of TQM Implementation Index (TQMII) calculation algorithm.

In order to provide an example of the application of TQMII, possibilities and the benefits of our proposed algorithm, a project developed for a major Indian auto ancillary company is presented. A questionnaire with 85 questions related to TQM programs was circulated to the 9 department heads of the company and assessed TQMII. The suggested methodology is useful to audit how much of TQM the firms have implemented into their organizations. The audit results can be used to steer resources into the right places to gain the most optimum sustainability.

In future, researchers in quality management may develop models to measure the level of implementation of quality management practices in industries. Critical success factors are the essential constructs based on which further statistical analysis can be carried out. The present research will guide the industries and researchers in selecting the reliable set of critical success factors.