Developing A Total Quality Management Model For a Small Medium Indian Manufacturing Industry

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Abstract

TQM is a combined effort of both top level management as well as employees of an organization to formulate effective strategies and policies to deliver high quality products which not only meet but also exceed customer satisfaction. TQM Model is very important for every industry. It improves the production quality and customer satisfaction. The aim of this paper is to understand the current status of the selected organizations and to develop a new TQM Model. This paper has been prepared after reading all TQM Models which are available and also some literature reviews. The methodology used to prepare this paper is with the help of structured questionnaires along with studying of literature and plant visit. For data analysis the software used are the Minitab-17: multivariate-item analysis and Minitab-17: One-way ANOVA and SPSS. The results obtained with a response rate, In which every response was valid and usable and reliable as obtained by the calculation of Cronbach's alpha. Further, one-way ANOVA and two-way ANOVA technique helped to determine the type of hypothesis selected which is the null hypothesis H_0. It is concluded from this result that we can develop a TQM Model for any organization which is suitable for that organization and effective parameters.

Keywords: *Total Quality Management (TQM), Questionnaires, Cronbach's alpha, One-way ANOVA, Two-way ANOVA, SPSS.*

1. Introduction

Competition is getting harder and becoming global. Companies now have to be more responsive, offer a better product and keep improving. TQM increases customer satisfaction by boosting quality. Total Quality Management enables employees to focus on quality than quantity and strive hard to excel in whatever they do. There are many models of total quality management and it is really not necessary that every organization should select and implement the same model. They can develop a model according to their requirements.

Definition of TQM- A core definition of total quality management (TQM), it describes as a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services and the culture in which they work. Before the concepts and ideas of TQM were formalized, much work had taken place over the centuries to reach this stage.

Following are the various models of total quality management:

-Deming Application Prize

-Malcolm Baldrige Criteria for Performance Excellence

-European Foundation for Quality Management, and

-ISO quality management standards

Pillars of TQM Implementation in a manufacturing industry-

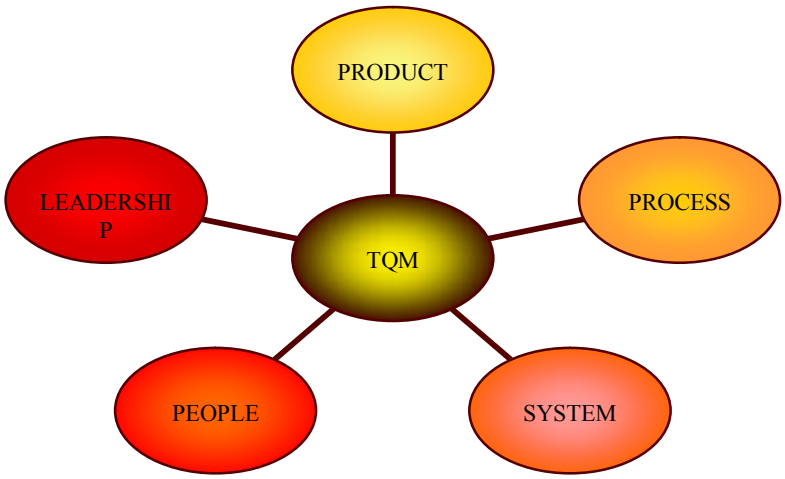

figure-1 (TQM Pillars)

Quality at all stages- Quality of work done by one department affects the quality in another department and hence we have to apply quality considerations in all departments in the company and in all processes carried out in each department. To impose the "TQM" in organizations and for self assessment we studied these following well known models.

1. Malcolm Baldrige National Quality Award (MBNQA)
2. European Quality Award (EQA)
3. Singapore Quality Award (SQA)
4. Australian Quality Award (AQA)
5. Deming Quality Award (DQA)
6. Rajiv Gandhi National Quality Award in India
7. Many others

2. Literature Review

According to literature reviews, TQM Model is necessary for growing company so that the quality of product will be improved. Over the past some decades, a considerable amount of knowledge on TQM and its practices in service sector has been evolved by various researchers. The literature have provided different sets of practices considered essential to the success of TQM implementation but as such no study has identified a common set of practices for successful implementation of TQM. This literature review is focused to the identification for measuring the key practices and parameters. TQM practices that need to be considered and implemented in service sector as well as provides literature on TQM in industry.

3. Methodology

The methodology used in this paper is the study of an extensive literature and plant visit and thereafter with the help of survey, in which questionnaires were prepared, which were then distributed among the departments which are active participants in the organization in charge of all the big and small variations that were observed in manufacturing industry. The departments are:

QC department, Workshop, Production, Safety, HR, Planning, Design, Stores, Marketing and Production Department. Although every department is important for an organization to function, the above stated departments are the heart of this organization.

3.1 Selection of Parameters-

To develop a TQM model for a Manufacturing Industry, there is a need to find the accurate weightage of each parameters. First of all, We select these parameters for a manufacturing industry to develop a good TQM Model. They are as following-

Table. 2

Enabler Parameter	Outcome Parameter
Leadership	Employee satisfaction
Policy & strategy	Customer satisfaction
Resource	Impact on society
Process	Business Result
People management	

A structured survey was conducted and questionnaires were prepared keeping the pillars of TQM in mind and were distributed to the respective departments. Around about 300 employees were among the different departments which were noticed and informed by the respective managers of these departments and therefore a total of 300 questionnaires were distributed among the departments out of which 280 responses came back which were all useful and valid. A valid response was obtained. In general, a lower response rate is also acceptable world-wide even in developed Nations.

The questionnaire prepared was a 5 points Likert-scale questionnaire with 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree, for 46 questions or 46 items for 8 parameters which are as follows:

4. Analysis and Results

This section is divided into 2 sections. Firstly, it was checked if the obtained responses from the respondents did have internal consistency or reliability to them or not and secondly using ANOVA (Minitab-17) it was checked if it satisfies the null hypothesis or satisfies alternative hypothesis and SPSS. a mean rank of 280 data reflects as 28 data during analysis. First of all, It is checked all the data and its reliability with the help of ANOVA and SPSS. So after test, it is found that all the data are reliable and acceptable So proceeded further to develop a TQM model with the help of these data.

4.1 Hypothesis Selection:

ANOVA (One way) method is used to determine if the departments have some significant difference of means in between them or not, 2 hypotheses are stated:

- Null hypothesis H_0: $\mu_{production} = \mu_{Mechanical} = \mu_{Electrical} = \mu_{Quality\ Control}$, i.e., the means of the 8 different parameters are all equal for the respective departments.
- Alternative Hypothesis H_a: At least one of the means is significantly different from others.

The mean values of all the different parameters obtained from the structured questionnaires are shown in table 1:

Table 1. Mean Values

	Outcome parameter				
Enabler parameter	Employee satisfaction	Customer satisfaction	Impact on society	Business result	Mean enabler parameter
Leadership	3.85	2.95	1.56	4.50	3.21
Policy & strategy	4.10	3.90	1.85	3.75	3.40
People management	2.35	3.87	2.60	3.95	3.19
Resource	1.55	4.85	1.75	4.77	3.23
Process	3.85	4.85	3.95	4.15	4.20
Mean of outcome parameter	3.14	4.08	2.34	4.22	Grand mean= 3.445

With a confidence level of 95% and a level of significance of 0.05 and 4 departments being 4 number of population the data obtained from one-way ANOVA (using Minitab-17) are as show in table 4:

Table 2. Analysis of Variance

Variation	**D.O.F**	**Mean Square**	**F**
Between E. Parameter $V_r = 3.126$	4	$S_r = 1.279$	1.682
Between O. Parameter $V_c = 11.55$	3	$S_c = 3.85$	5.06
Residual V_e=9.124	12	$S_e = 0.760$	
Total V=23.80	19		

At the 0.05 level of significance with 4, 12 degree of freedom $F_{0.95}$= 3.26 then since 1.682<3.26, we can accept the hypothesis that the Enabler parameter are equal and conclude that at the 0.05 level. There is no significant difference in enabler parameter.

And at 0.05 level of significance with 3, 12 degree of freedom $F_{0.95}$= 3.49 then since 5.06>3.49, we can reject the hypothesis that the Outcome parameter are equal and conclude that at the 0.05 level. There is no significant difference in Outcome parameter.

From the actual data following are the percentage distribution for enabler as well as outcome parameter & the percentage impact of each individual enabler parameter on outcome parameter.

Enabler Parameters-

1.	Leadership	L	3.21/31.01=10.36%
2.	Policy & Strategy	P & S	3.40/31.01=10.96%
3.	People management	P.M.	3.19/30.01=10.28%
4.	Resource	R	3.23/30.01=10.43%
5.	Process	P	4.20/31.01=13.54%
		Total	55.57%
		Total E.P.%	56%

Outcome Parameters-

1.	Employee satisfaction	E.S.	3.14/31.01=10.13%
2.	Customer satisfaction	C.S.	4.08/31.01=13.16%
3.	Impact on society	I.O.S.	2.34/30.01=7.54%
4.	Business result	B.R.	4.22/30.01=13.60%
		Total	44.43%
		Total E.P.%	44%

Result -

The TQM model that emerges from the analysis of data is given under figure 1. The various parameters that are practiced in an organization have an impact on overall performance of the organization and it has come out that in the present model, Enabler Parameter contributes 56% while the Outcome Parameter contributes 44%. Further distribution of these percentages is shown in the model.

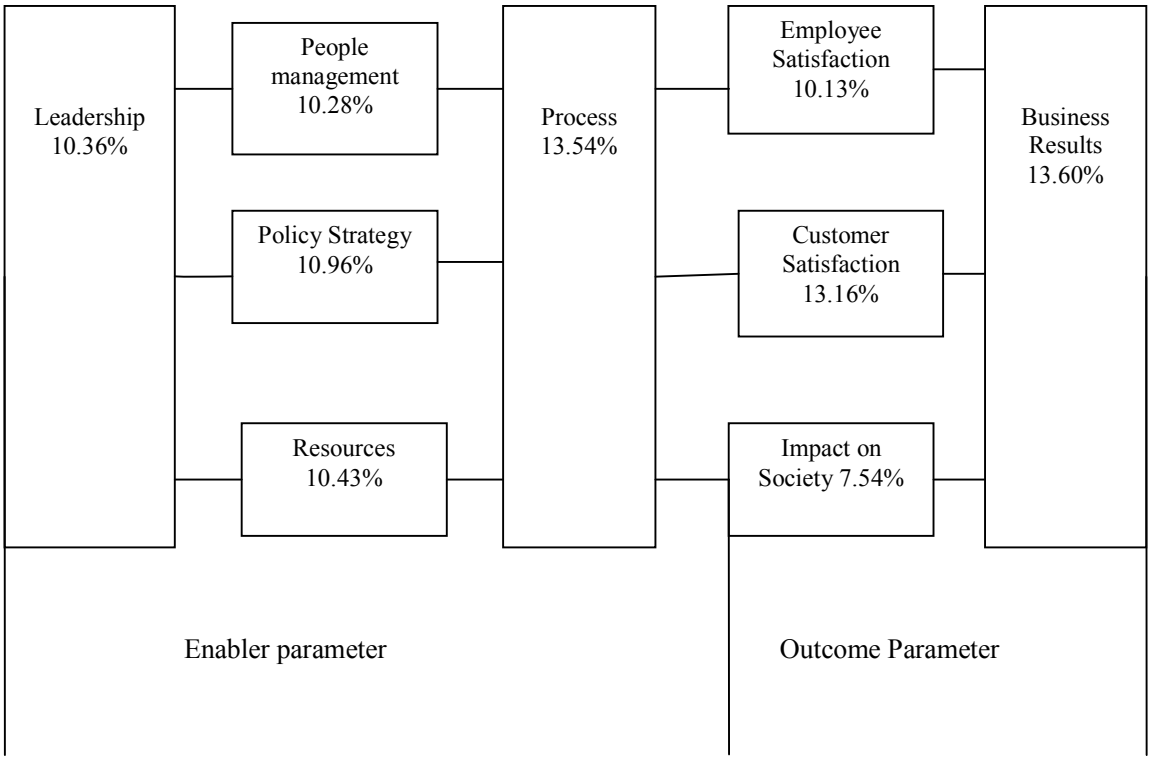

figure- 1 (DEVELOPED TQM Model)

Overall Conclusion-

From this analysis, it emerges that Process and Business Result are two factors that outclass remaining seven other factors as far as their relative contributions to organizational performance is concerned and hence the organizations must give first priority in setting them right. Similarly, focusing on critical process and its effective management and financial measures shall lead to better organizational performance in general. However, Priorities and hence necessary actions on the part of particular organization may differ considerably. This model is similar to the EQA (European quality model award).

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