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Studies on TQM practice in Small and Medium scale Enterprises

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Abstract:-- **Manufacturing firms are greatly relying on the principle of total quality management (TQM) to compete the challenges of current market trends in the era of globalization and privatization. Particularly, the small and medium scale enterprises (SME's) plays a vital role in providing employment and boosting the economy of the developing country like India. However, the quality of product is an important factor for the products are being manufactured to fulfill the customer satisfaction in SME's. The study on product quality improvement shows that meeting customer satisfaction, profit increase and minimizing losses to a lower level can be attained through the application of advanced quality philosophies and principles such as TQM. The objective of the study is to identify the critical success factors that contribute to the performance of quality management practices in SME's s and as well to establish a guideline that the management can take care off to improvise their firm's productivity. The present study includes a questionnaire survey in order to implement TQM practices in the structure of governance in SME's.The critical factors are arranged according to the priority after the data is collected. Three hypothesis are formulated based on employee satisfaction, customer satisfaction and operational effectiveness. At the end, statistical test is carried out for each hypothesis using T-test. It is summarized that the hypothesis stating TQM SME's are more effective in operation and fulfilling employees, and customers is proposed..**

Keywords: Total quality management(TQM), Small and Medium scale Enterprises (SME's), Quality, T-test.

INTRODUCTION

The sustainability of a product depends on various internal and external factors in the present market scenario. Optimum quality level of the product is one of the factor plays a vital role in survival of the product. Though the quality have been defined specifically, according to American National Standards Institute (ANSI) and American Society of Quality (ASQ) it is the ability of a set of inherent characteristics of a product, system or process to fulfill the requirements of customers and other interested parties. Many practices have been carried out and still on to bring changes in the structure and prices of a product in Indian industries due to better quality and competitive prices of foreign products after globalization in India.Among current practices, the implementation of Total Quality Management is one of the sector plays a significant role for increasing productivity in an Indian manufacturing in order to compete with foreign industries. Recent, the TQM has been gained importance to ensure the competitive advantage and accepted as one of the decision making tool in continuous improvement in order to improve customer satisfaction and service quality. Many researchers have been carried out different exercises using various approaches to improve the quality of product being manufactured in manufacturing industries. Salaheldin (2009) and Jamali et al. (2010) discussed the critical success factors like bench marking, commitment of top management, strategic quality planning, continuous improvement and customer focus for the implementation of TQM and their impact on performance of SME's. Mallur and Hiregouder (2010) indicated crucial issues like leadership, quality vision, supplier selection, recognition and evaluation of customer satisfaction to be considered in the survey of TQM practices in north Karnataka manufacturing SME's. Phan et al. (2011) emphasized the factors such as leadership, vision process, communication and information to be shared in order to gain high competitive advantage in industries to increase the productivity. Agus and Hassan (2011) discussed the strategies for enhancing product performance through total quality management focusing on customer related issues. Leong et al. (2012) discussed the practical and non-practical approaches to enhance the product quality using quality management maintenance. Zehira et al.(2012) emphasized the effects of leadership styles and organizational culture on the performance of multi-national companies (MNC) in Istanbul using TQM activities. Dana (2012) has been carried out SWOT analysis considering the various factors like customer satisfaction, continuous improvement of their services, company compliance requirements to improve utility management. Arshida and Agil (2013) have suggested critical success factors like Leadership, Training, Supplier quality, Vision, Employee Involvement, Quality Recognition and Reward and Customer Focus for successful and effective implementation of TQM in

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Libyan Iron & Steel Company. From the literature survey, it is understood that there is a scope to implement the quality management principles in small and medium scale industries in order to attain the best quality product. This paper outlines the critical factors associated with the performance of quality management practices in SME's to improve the productivity. Statistical tests are being conducted to disseminate the factors to be considered in the implementation of total quality management with respect to employee, customer satisfaction and effective operation in SME's.

II. METHODS/ APPROACH

The performance of total quality management in industry carried out comprises three activities namely method of data collection, population and sample size, and method of data analysis.

A. DATA COLLECTION, POPULATION AND SAMPLE SIZE

A pilot study is conducted to detect potential problems that will arise due to difficulty in understanding the questions by respondents in all industries.The questionnaire is planned mainly not to harm the sentiments of the respondents apart the other various considerations.The final questionnaire is developed after few iterative reconsiderations, with reformatting and successive improvisation in the questionnaire. A separate questionnaire about industry, employee and customer satisfaction, quality practices effectiveness and interviews were conducted to collect the data through survey. A scale of 1 to 5 is chosen for the questionnaire associated to employee and customer satisfaction. Considering all possible factors influencing total quality management, the survey is conducted in all small and medium scale industries across the different parts of Bellary city. Around 25 small and medium scale industries have come forward to give their valuable opinion by participating in survey in order to implement the concept of TQM among the visited industries. Survey is conducted covering steel, agro food, cotton, garments, MRF tyres and treads in and around Bellary city. The questionnaire is mainly divided into two sections namely one is personnel and organizational details of the respondents and the other is factors affecting quality management practices in small and medium scale industries. The personnel, organizational and other influencing factors considered in the preparation of questionnaire is tabulated in Table 1.1

B. FORMULATION OF HYPOSTHESIS

The questionnaire is The detailed analysis of the data collected through questionnaire has been analyzed using the different test such as Hypothesis test, Significance test and Statistical descriptive statistics. Hypothesis test has been carried out using SPSS software in order to verify the differences in the means of the two categories of SME's. To start, the three major hypothesis is formulated and tested to know how the selected sample will answer the queries framed in the questionnaire. The hypothesis is formulated from dissertation model shown in Fig. 1.1 and is divided into three parts namely employee satisfaction, effective operations and customer satisfaction. Hypothesis 1 - TQM SME's will have a higher degree of employees' satisfaction than NON TQM SME's. A committed and well trained work force required to excel quality improvement activities for a successful TQM environment.

Topics	Number of Questions	Content
General Information		
Personal details	4	Shows name, designation , educational qualification, experience etc
Organizational details	5	Firm name, workforce size, type of industry etc
Influencing Factors		
Leadership and vision	5	Indicates management view on quality improvement policy & plans.
Quality commitment	5	Shows quality in product design, review and feedback from experts.
Employee involvement	5	Meetings and encouragement of employees, quality circles
Costumer focus	5	Customer feedback, programs to implement customer service etc
Continuous improvement	5	labels and signboards, ,waste elimination, etc
Process monitoring and control	5	Includes periodic audits, review of targets etc
Incentive and recognition system	4	Company certification, employees incentives etc
Fact based management	3	Quantitative techniques in process, training etc

Table 1.1 List of factors considered in the formulation of questionnaire.

It is reinforced by reward, recognition, on-going education and training of all employees supports the drive for quality. Employees are encouraged to take more responsibility, communicate more effectively, act creatively, and innovatively. TQM links remuneration to customer satisfaction metrics based on how the people behave the way they are measured and remunerated. Employees play a rather crucial role in creating customer satisfaction, through their service delivery approach. Reichwald R and Seibert J (2004) emphasized that the

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TQM is the empowerment of employees to generate improved individual and organizational performance and as well help them to attain personal goals by participating in the decision making process. Empowerment programmes provide employees with a positive experience thus lead to greater employee satisfaction.

Before Hypothesis 2- TQM approach will have greater customer satisfaction compared to non-TQM practice in small and medium scale enterprises. It is evident that it is true from the Fig. 1.2 according to Jordan, 2002. Satisfaction of customers is the highest priority of any company and it believes too. Company practicing TQM is sensitive to customer requirement and responds to them rapidly. TQM emphasizes customer focus as shown in Fig. 1.2 to improve the quality of service provided to customers by understanding the needs and problems of customers. SME's need to understand their customer's needs and compare it with organizational performance in meeting the needs and as well Fig. 1.1 Dissertation Model (Researchers, 2008).

to maintain a level of customer satisfaction. A high level of customer satisfaction is obtained by providing services or products whose features will satisfy customer's requirements or needs according to Muffatto and Panizzolo (1995). Hypothesis 3 - TQM approach will have greater operational performance compared to non-TQM practice in small and medium scale enterprises.The adoption of TQM is believed to have great impact on organizational effectiveness. Suppliers involvement in the overall process of quality improvement have a major role to play in the overall effectiveness of operations as it is proved by Sila(2007). In addition, the continuous improvement is also another major tenet of TQM as it leads to efficient operation.

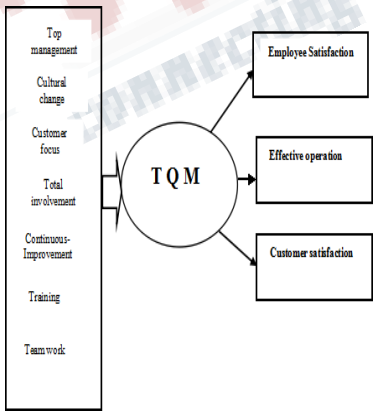

Fig. 1.1 Dissertation Model (Researchers, 2008).

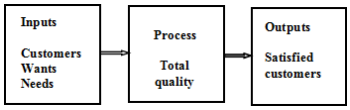

Fig. 1.2 Model of TQM Process (Jordan, 2002).

DISTRIBUTION OF RESPONDENTS

Table 1.2 shows the representation of gender in the population of 22 respondents in TQM and non-TQM small and medium scale enterprises. It is summarized that the percentage of the respondents based on gender for both TQM and non-TQM is 81.81% male and 18.18% female.Table 1.3 shows the representation of respondents having the knowledge of TQM

The knowledge of TQM is higher among the employee of TQM SME's compared to non-TQM SME's.The 2 respondents are familiar with the principles of TQM among 20 in an non-TQM SME's. It has been observed that the around 18 % have prior knowledge of TQM and the remaining 82 % do not have any knowledge of TQM

Table 1.2 Distribution of respondents by gender

GENDER	TQM	NON-TQM	TOTAL	%
MALE	4	14	18	82
FEMALE	0	4	4	18
TOTAL	4	18	22	100

The detailed analysis of data collected through questionnaire has been discussed. Further, the tests such as descriptive analysis and statistical tests carried out for two categories i.e. TQM and non-TQM SME's have been discussed in detail. In the descriptive analysis, the statistics and other associated things such as mean, standard deviation, and mean performance based on mean difference has been calculated for both TQM and non-TQM SME's with respect to employee satisfaction, customer satisfaction and operational effectiveness. Further, the two significance tests suggested by Fisher and Neyman were conducted. The test favoured by Fisher is more suitable for scientific research and is adopted in the present work. The latter is more suitable for applications in which a yes or no decision must be made. To start, according to Fisher, the probability value reflects the strength of the evidence against the null hypothesis. Data provides strong evidence and the null hypothesis is false if the probability is below 0.01. Null hypothesis is typically rejected if the probability value is below 0.05 and larger than 0.01. Probability values between 0.05 and

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0.10 provide weak evidence against the null hypothesis and, are not considered low enough to justify rejecting it. Higher probabilities provide less evidence that the null hypothesis is false. With this discussion, the statistical test of each hypothesis has been carried using T-test.

C. Descriptive Analysis for Employee Satisfaction

Table 1.4 shows the variables used in testing the satisfaction of employees between the TQM and non-TQM SME's. It is observed that the average performance of TQM SME's exceeds compared to non-TQM SME's for all variable except the variables depends on individual efforts. Also, the average mean value evidences that the TQM SME's have a mean score of 3.85 compared to an value of 2.49 in non-TQM SME's. It is found that the mean difference between the two categories is 1.36 as tabulated in Table 1.5.

Table 1.3 Distribution of respondents based on knowledge of TQM

TQM KNOWLEDGE	TQM	NON-TQM	TOTAL	%
KNOWLEDGE OF TQM	2	2	4	18.18
NO KNOWLEDGE OF TQM	0	18	18	81.18
TOTAL	2	20	22	100

Table 1.4 Descriptive statistics for employee satisfaction

VARIABLES	SME's	N	MEAN	Std. Deviation
Satisfied with Authority	TQM SME's	2	4.5	0.707
	NON TQM SME's	20	2.8	0.767
Regular Training	TQM SME's	2	4	0
	NON TQM SME's	20	2.25	0.444
Encourage Team-work	TQM SME's	2	4	0
	NON TQM SME's	20	2.75	0.4443
Continuous Improvement	TQM SME's	2	4	0
	NON TQM SME's	20	2.75	0.5026
Suggestion Count	TQM SME's	2	3.5	0.707
	NON TQM SME's	20	2.65	0.745
Responding to Customers	TQM SME's	2	3.5	0.7071
	NON TQM SME's	20	2.5	0.7608
Job Flexibility	TQM SME's	2	3.5	0.7071
	NON TQM SME's	20	2.3	0.8031
Involvement in Decision	TQM SME's	2	3.5	0.7071
	NON TQM SME's	20	2.55	0.7515
Satisfaction with salary	TQM SME's	2	4	0
	NON TQM SME's	20	2.15	0.366
Individual effort	TQM SME's	2	4	0
	NON TQM SME's	20	2.55	0.5104

D. Descriptive Analysis for Customer Satisfaction

Table 1.6 shows the variables used in testing the satisfaction of customer between the TQM and non-TQM SME's. The non-TQM SME's register a higher number of customer complaints and their response to customer complaint is poor based on average mean. The quality standard of the TQM SME's is higher based on average mean, thus the customers are willing to recommend their services to others.It is evident that the mean values of the TQM SME's are higher on comparison of each variable with the non-TQM SME's. It implies that the customers of the TQM SME's are more satisfied than the non-TQM SME's. It is observed the average mean values are 3.84 and 2.424 for TQM and non-TQM SME's respectively as listed in Table 1.7.

SME's	Total mean	Average mean	Mean difference
TQM SME's	38.5	3.85	1.36
NON TQM SME's	24.9	2.49	

E. Descriptive Analysis for Operation Effectiveness

Table 1.8 shows the variables used in the measurement of operation effectiveness between the TQM and non-TQM SME's. It is found that the TQM SME's recorded higher

VARIABLES	SME's	N	MEAN	Std. Deviation
Standard of quality	TQM SME's	2	4	0
	NON TQM SME's	20	3.15	0.4894
Listen to Customer complain	TQM SME's	2	4.5	0.7071
	NON TQM SME's	20	2.3	0.6569
Repeat customers	TQM SME's	2	4	0
	NON TQM SME's	20	2.45	0.6864
Customer recommendations	TQM SME's	2	4	0
	NON TQM SME's	20	2.6	0.4955
Response to customers	TQM SME's	2	3.5	0.7071
	NON TQM SME's	20	2.85	0.3664
Product guarantee to customers	TQM SME's	2	3	0
	NON TQM SME's	20	1.2	0.4104

means in all the variables assessed compared to non-TQM SME's. It evidences that there is a difference in operations of the TQM SME's and non-TQM SME's. The mean difference between the TQM and non-TQM SME's is 1.235. An average mean of 1.41 was determined for

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TQM SME's and 0.175 for non-TQM SME's as shown in Table 1.9.

F. Statistical Test of Hypothesis I

Statistical test of each hypothesis was carried out using T-test. It determines the significant difference in employee satisfaction between TQM and non-TQM SME's. To start, one is Null hypothesis i.e.H0 in which there is no difference in satisfaction between TQM and non-TQM SME's. The other one is alternate hypothesis i.e. H1 in which TQM SME's have a higher degree of employee's satisfaction than non-TQM SME's. A significant difference has been observed in employee satisfaction between the TQM SME's and non-TQM SME's. Significance level for the levene's test is 0.14 which is greater than the cut off value of 0.05. Thus, the variances are equal and therefore the T–value for the first row will lead to the conclusion that the variances are equal as shown in Table 1.10.

SME's	Total mean	Average mean	Mean difference
TQM SME's	23	3.84	1.416
NON TQM SME's	14.55	2.424	

Table 1.7 Mean Performance for Customer satisfaction

To assess the difference between the two categories of SME's, the value of the sig. (2–tailed) column in the first row is 0.00 which is less than 0.5, as a result a significant difference has been found between TQM and non-TQM SME's

Table 1.8 Descriptive statistics for Operational Effectiveness

VARIABLES	SME's	N	MEAN	Std. Deviation
ISO Certification	TQM SME's	2	1	0
	NON TQM SME's	20	0.05	0.224
Management commitment to quality	TQM SME's	2	1	0
	NON TQM SME's	20	0	0
Application of SPC(statistical process control)	TQM SME's	2	1	0
	NON TQM SME's	20	0	0
Quality practices followed	TQM SME's	2	3.5	0.7071
	NON TQM SME's	20	0.5	0.7608
Responding to demand	TQM SME's	2	1	0
	NON TQM SME's	20	0.45	0.5104
Material handling	TQM SME's	2	1	0
	NON TQM SME's	20	0.05	0.2236

Therefore the alternate hypothesis (H1) states that TQM SME's have been more satisfied employee by rejecting the null hypothesis (H0). This indicates a significant difference in employee satisfaction between two categories of SME's.

Statistical Test of Hypothesis 2

The test of hypothesis 2 shown in Table 1.11 determines the significant difference in customer satisfaction between TQM SME's and non-TQM SME's. The significant level for the levene's test is 0.788 which is higher than the cut off value of 0.05. Thus the variances are equal and hence the T-value for the first row assumes the equal variances are used. The value of sig. (2-tailed) column in the first row is 0.002 which is less than 0.5 and indicated that there is a significant difference between two SME's in order to assess the difference between the two categories of SME's. It is concluded that the alternate hypothesis states that TQM SME's have more satisfied customers is accepted while the null hypothesis is rejected

Table 1.9 Mean Performance for Operational Effectiveness

SME's	Total mean	Average mean	Mean difference
TQM SME's	8.5	1.41	1.235
NON TQM SME's	1.05	0.175	

Statistical Test of Hypothesis 3

The test of hypothesis 3 shown in Table 1.11 determines the significant difference in operational performance between TQM SME's and non-TQM SME's. The significant level for the levene's test for the first row is 0.108 which is higher than cut off value of 0.05. Thus the assumption of equal variances is not violated and henceforth the T-value for the first row the equal variances is assumed. It is evidenced that there is significant diffidence between TQM and non-TQM SME's based on the value of sig. (2 –tailed) column on the first row is 0.16 which is less than 0.5. It is summarized that the alternate hypothesis stating TQM SME's are more effective in operations is accepted while the null hypothesis is rejected.

CONCLUSION

In the present study, the critical success factors were identified and their analysis have been carried out for the implementation of quality management practices in SME's. From the statistical tests, it is evident that the critical factors have been played a major role in increased

performance and sustainability of TQM in small and medium scale enterprises.Also, it has been observed that the implementation of TQM improved quality and cost saving in both service and production area,which in turn increases the productivity with less rejection and faster job. The input factors such as quality related, commitment of management, quality policy, planning, responsibility authority, resource management, purchasing, measurement of analysis increased the performance of output factors namely employee satisfaction, customer satisfaction, product realization, quality results, environmental factors and all these improved the quality management system. Each success factor has been played a critical role in SME's. It has been found that the significant difference is high in case of customer satisfaction and operational effectiveness compared to employee satisfaction. The hypothesis stating TQM has been greater impact in SME's. All critical factors showed highly positive correlation with TQM performance.

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Table 1.10 Test of hypothesis for Employee satisfaction

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	T	df	Sig. (2 tailed)	Mean difference	Std. Error difference	85% confidence interval of difference	
									Lower	Upper
Total Customer Satisfaction	Equal variances assumed	.076	.788	4.073	10	.002	1.40833	.34579	.63787	2.1788
	Equal variances not assumed			4.073	9.38	.003	1.40833	.34579	.63094	2.1857

Table 1.11 Test of hypothesis for Customer satisfaction

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	T	df	Sig. (2 tailed)	Mean difference	Std. Error difference	85% confidence interval of difference	
									Lower	Upper
Total Customer Satisfaction	Equal variances assumed	.076	.788	4.073	10	.002	1.40833	.34579	.63787	2.1788
	Equal variances not assumed			4.073	9.38	.003	1.40833	.34579	.63094	2.1857

Table 1.12 Test of hypothesis for Operational effectiveness

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	T	df	Sig. (2 tailed)	Mean difference	Std. Error difference	85% confidence interval of difference	
									Lower	Upper
Total Operational effectiveness	Equal variances assumed	3.12	.108	2.905	10	.016	1.24167	.42748	.28919	2.19414
	Equal variances not assumed			2.905	5.5	.030	1.24167	.42748	.17344	2.30990