



Implementation of TQM: A Case Study in an Auto Company

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This case study has been carried on Total Quality Management (TQM) implementation in an auto company. The XYZ auto company is producing auto parts and components to large scale auto companies producing the various automotive vehicles. XYZ Auto Company is the best and tier one supplier to about 3 companies and their branches located in different places. This XYZ auto company is already an ISO 9000 certified company and planning to implement the TQM philosophy and best practicing the TQM tools and techniques in the company. The top management already identified a quality team comprises distinguished members from the different departments including design, marketing, HR, production, purchase, suppliers, industrial engineering and quality etc; the team is called as TQM implementation team. Expected results after TQM implementation are improved quality of supplies, improved quality of processes, improved employee satisfaction and improved customer satisfaction. In this case study, it was found that need of TQM training is very essential for the employees in the company to get in to the TQM implementation process.

Keywords: Total Quality Management, Critical Success Factors, Soft Elements of TQM, Hard Elements of TQM, TQM Framework, Manufacturing Excellence and Quality Improvement Awards

Introduction

The industrial world is becoming competitive and competitive in multiple times. There fore industries should become world class by performing excellence in manufacturing goods and should provide excellence in services. In these highly competitive markets the products and services produced are not simply sold. The industries should have the managerial and marketing philosophies to sell the goods and services. The important philosophy is TQM and its principles such as quality, quality of products, quality of services, quality of processes, quality of suppliers, quality of maintenance, quality of employees and their involvement etc;. The over all management of quality in the industries starting from suppliers to customers or end users is known as Total Quality Management (TQM).

Total quality management is also defined as a management philosophy, aims to maintain the standard qualities in procuring raw materials, able to manage the standard qualities in manufacturing processes, able to produce the standard quality of goods, able to manage the quality in logistics and distribution processes, finally able to satisfy the distributors and end customers with their excellent quality of products and services. Quality management deals

with the processes, products, services and initiates the innovations in the company to satisfy the customers. Quality management is concern for producing the excellent products having high quality and durability. TQM is applicable to beyond the boundaries of the company. It includes suppliers, supplier's suppliers, logistics providers, distributors, dealers, customers and end users. TQM tries to enhance the quality of each and every process of quality chain. TQM involves each and every person in the manufacturing and quality chain to take part in solving the problems and improving the quality of products and services continuously. TQM starts its innovativeness from suppliers quality management systems, supplier identification and supplier development processes, suppliers certification processes to get the quality of input materials, such as raw materials, parts with required quality at required time. Suppliers plays important role in supplying the quality of inputs to the manufacturers. Suppliers participate in the new product development process along with the manufacturers to have the knowledge about the product requirements and manufacturer quality requirements.

The case study conducted by interview method by asking various prior designed questions on critical success factors (CSF's) of TQM with top management

and middle management of the company. Finally the case study completed in a systematic and structured manner and got the fruitful results of the case study.

Literature Review

TQM is the process of practicing the quality tools and techniques to improve the quality of processes and products continuously. Continuous improvement practices increases the quality of products and satisfies the customers. Any auto company serves more number of customers, so the understanding of customer requirements is a factor of TQM and it helps in finding the updated customer needs. The best practices of organisational culture values positively impacted the critical success factors of TQM and improved the quality, performance of hospital services and improved the client's satisfaction (Kaluarachchi, 2010). In a case study (Katerina and George, 2007) it was found that, the ISO 9000 certification influences the organisational performance and further practices of TQM will enhance the growth in quality and gained manufacturing excellence awards. Henrik and Rickard (2005) conducted a case study to know the effectiveness of participating in quality award processes. Found that participation in quality award process strengthened their quality improvement process and gained quality awards. Benchmarking practices is one of the TQM techniques, practiced in a case study (Simmy and Zairi, 2008) suggested that benchmarking visits are a cost to business and should therefore be designed and executed with outmost care to achieve desired outcomes. Kiran et al., (1995), through their theoretical studies said that joint implementation of JIT and TQM in the industries are outperforming in improving the quality of products and processes as well as customer satisfaction. Keng boon Ooi et al., (2006) conducted case study to know the propensity of employees to stay in the TQM Company. It was found that by proper training the employees on TQM elements, there is no chance of leaving employees from the existing company due to the TQM implementation process. Zairi (1994) conducted same case studies at different company's ranges from auto manufacturing, Xerox companies to service organisation etc; on leadership role in TQM implementation process. Found that the strong leadership practices helped the various organisation in improving the quality and performance, through

successfully implementing TQM. Roslina and James (2009) conducted a case study at XYZ company to identify CSF's and problem faced during the ISO 9000 certification maintenance process for its sustainability. The problems avoided through best practices of TQM such as the committed leadership of top management changed the OC, attitudes, behaviour of the employees through various supportive actions such as training, team building, suggestion schemes and reward systems. This case study suggested that by identifying and best performing the CSF's of TQM will helps in solving the problems and improves the sustainability of ISO 9000 certification maintenance process. Christos and Evagelos, (2009) conducted a case study of industries at Greek to know the level of usage of TQM tools and technique and to know the level of training given to the employees to improve their quality performances. Most of the Greek industries (manufacturing, service and corporate) are small in size, having ISO 9000 certification were enthusiastically practicing TQM tools and techniques and training their employees on TQM philosophy to enhance their productivity and improve their quality of products and processes. These small industries are not only practicing simple TQM tools but also advanced TQM tools and techniques such as QFD, DOE etc; to gain the competitive edge and customer satisfaction. Hsuan-Kai Chen et al., (2004) conducted a case study at Taiwan pharmaceutical industries to implement the TQM philosophy. With an exhaustive literature survey they have identified CSF's and TQM tools and techniques practiced effectively and implemented successfully. During the implementation process they faced the various barriers such as lack of management support, lack of cooperation between the employees, lack of understanding teambuilding approach etc. The pharmaceutical industries are successfully implemented TQM and gained competitive strength, increased productivity, reduced quality costs and increased sale and profits. With these extensive literature studies it was found that implementation of TQM elements plays vital role in gaining the competitive edge and customer satisfaction.

Gaps observed in the literature and fill those gaps through this case study:

- Most of the case studies have been conducted outside countries and have showed the positive results on TQM implementation process.

- There is a need of Indian industries should give importance to TQM philosophy and its implementation process, specifically in the auto industries.
- Specific TQM frameworks for auto companies are limited in the literature.
 - Designed a specific TQM framework for Indian auto companies through this case study work at an XYZ company.
- Mainly the lack of knowledge on CSF's of TQM and its positive impact on organisational performances by Indian auto industries.
 - Designed a framework comprises of different CSF's of TQM through this case study.
- Lack of confidence on TQM benefits by the top management of the companies.
- Lack of training on TQM tools and techniques
- Lack of improving customer satisfaction methods in the companies.
 - Used training methodology to gain the confidence on TQM philosophy and its implementation benefits.

About the Company

XYZ auto-company is having more than 1000 employees all together. It is located in one of the state capitals of India. It has a quality department headed by Sr. manager and having managers, engineers, supervisors and inspection operators and altogether 100 employees in the quality department. The quality department has its sub departments in all manufacturing shop floors. Such as quality sub dept. in press shop, machine shop, polishing and assembly etc.

Quality team work towards minimising the defect part flow rate from one shop floor to the shop floor by conducting intermittent inspection of processes, product dimensions and specifications. Periodical inspection reports were developed and sent to the Sr. Management and Top management. Continuous monitoring of processes, machinery and products enhances the satisfaction level of all the employees, management and finally the customers. The quality team of the company works towards, achieving the

zero defect policy by implementing and best practicing TQM tools and techniques.

Head of the **Department** of quality conducts meetings with other dept. Sr. Managers and Managers about the quality improvement processes, quality tools to be utilised by the shop floor levels, the importance of quality tools and their effectiveness on the quality improvement of products and processes. He also discusses about the support and requirements if any needed by the manufacturing team to gain the skills and knowledge about the TQM tools and techniques and their practices.

Head of the Department of the quality also conducts the brain storming sessions for quality improvement in all the processes starting from supplier inputs, manufacturing processes, products, policies, customer satisfaction principles and methods. In this brain storming session all the specific field experts will be participated in conducive environment to get the solid inputs to the quality improvement and quality development processes. The suggested and finalised minutes of meeting will be sent to the members of the committee and top management. After getting the feedback and suggestions from the top management the development process will be initiated by the quality department.

TQM Framework and Implementation Plan

One of the **outcomes** of the brainstorming session was TQM implementation in the company. The specific field or critical areas of TQM have been identified in the brainstorming sessions. The identified areas also known as critical success factors (CSF's) of TQM. These factors also again classified as "Soft elements of TQM" and "Hard elements of TQM". The soft elements are human and cultural development activities for understand about the TQM and tries to support the TQM implementation process. The hard elements are to be best practiced and performed during the TQM implementation process. With this understanding about TQM elements, designed a TQM framework (figure 1) for this case company according to the company requirements and policy. The framework comprises of various factors having great value according to the literature studies. In most of the literature and also in the company brain

storming session identified factors of TQM are to be implemented and best practiced for gaining the manufacturing excellence, improving the quality and productivity.

The TQM framework CSF's are as follows:

- Top management support.
- Supplier quality improvement (input materials quality)
- Leadership development
- Manufacturing process management (products quality)
- Training and involvement of employees
- TQM tools and techniques
- Customer satisfaction (Output products quality)

These CSF's have been further divided in to soft and hard TQM elements for the ease of understanding and implementation purpose.

Soft TQM Elements

- Top management support
- Leadership development

- Training and involvement of employees

Hard TQM Elements

- Supplier quality improvement
- Manufacturing process management
- TQM tools and techniques
- Customer satisfaction

With the above factors a simple TQM framework has been framed to better understanding and best practising to gain the manufacturing quality excellence awards has been shown in the figure 1: In the case study process the following questions have been asked with responsible top management and middle management team.

Top Management Support for TQM Framework to be Implemented

Top management of XYZ Company is comprised of Management Director, Executive Director, GM's, DGM's of different departments. Top management also conducted a meeting to discuss the proposed TQM model to be implemented. Positive direction

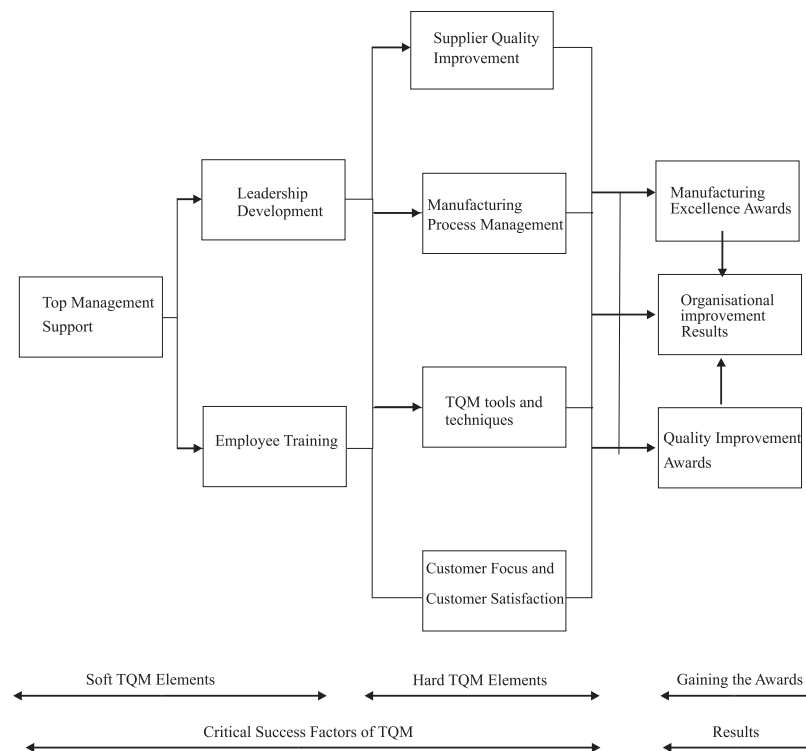


Figure 1: A TQM Model for the Gaining Awards

came from the top management meeting and accepted to support the proposed model or framework. Top management has taken the decision to implement the proposed model. Top management nominated some names of managers, engineers, supervisors and employees to form a quality circle or TQM implementation team headed by a head of the dept. of quality. Top management has assured to support in all respects to implement the TQM excellence model successfully. The top management suggested to provide the development report every week end by the leader of the TQM team. The TQM implementation team head accepted the responsibility and planned to start the work of TQM implementation process.

Leadership Development Programme for TQM Team Members

In this leadership development programme, the TQM team planned to take the training on TQM implementation process and roles to be played by the leaders during the TQM implementation. The team has been undergone training in two phase. In first phase the training took place at the institute where the theoretical training and software package training will be given. Some of the leadership activities, behavioural aspects and cultural aspects to be improved by the leaders also covered in this training. The second phase of training was took place at already TQM implemented company. Where the training was took place to know the barriers, problems, bottlenecks faced by the industry and also how they have been rectified. Most of the Sr. Managers of the industry took training classes and shared their experiences, like resistance from the employees, lack of resources, lack of middle management support etc; have been covered. The following questions have been cleared during the training process:

- (i) What types of TQM tools and techniques have to be implemented?
- (ii) Which type of software packages they are using to improve the quality of process?

In this training and development process, they spared two days especially for the leadership improvement programme. The leaders have been given training on the roles to be played by the leaders, how to motivate the employees, how to involve the employees in problem solving techniques and how to participate actively in

productivity and performance improvement etc; How to reduce the bossism or old leadership of autocratic behaviour of the managers and how to improve the cooperative leadership skills have been explained very well with some case examples. With these two phases of training and development the TQM team has been gained the knowledge and skills in:

- TQM tools and techniques
- Software utilised in quality improvement
- Leadership roles to be played
- TQM implementation procedures
- Changed managerial behaviours etc.

Training and Involvement of Employees in TQM Implementation Process

The training was given to all the employees on TQM procedures, tools, techniques, quality monitoring systems and explained the advantages of TQM implementation processes. Training also emphasized on the satisfaction of internal and external customers. In the training process specific training has been given to the employees to actively participate in problem solving skills and continuous quality improvement processes. Some of the employees, who are working in quality dept., were given specialised training in data collection, data analysis and carrying out statistical process control techniques. In the TQM implementation training employees have been motivated to learn cooperative working, take individual responsibilities and learn safety habits and changed working habits. The TQM implementation process motivated the employees to participate in suggestion scheme through filled in format. The recognised employees have been given training on conducting DOE and SPC techniques to improve the standards of product specifications.

Suppliers Quality Improvement Measures

The costs of input materials (raw materials) are more than the operational costs in the industry. So, the quality of input materials considered as highly important to the company. Supplier quality improvement process plays very important role in reducing the quality costs and improving the quality of input materials. Supplier quality may be improved by the **following methods:**

- Involving the suppliers in the new product development process
- Training the suppliers on the quality systems
- Frequent visits to the suppliers companies
- Financial and technical support to implement TQM
- Timely payments to suppliers
- Transference in information sharing

Some of the nearest and reliable suppliers will be continuously helped by providing technical guidance to produce the goods to conformance to requirements. The suppliers are also supported to best practice the TQM tools and techniques, such as histogram, perato diagram, control charts, cause and effect diagram to eliminate the cause of variations in the manufacturing processes. By developing and maintaining long term relationships with suppliers, frequent deliveries, improved quality and reduced cost of input materials has been achieved in the company.

Manufacturing Process Management Measures for Quality Improvement

Managing the processes to the required levels leads to produce improved quality of products, optimum utilisation of quality tools to reduced percentage of rejection levels, reduced percentage of rework levels, minimise wastage, improved satisfaction of employees, improved employee productivity and so on. The company TQM team decided to implement the manufacturing process management technique to gain the manufacturing excellence awards. The main functions of manufacturing process management are:

- Process planning
- Process design
- Process control
- Process measurement

Always the TQM team followed the process planning procedure to produce any product. Processes are planned to produce optimally with required quality. A good process design helps in reducing the process defects. A systematic approach for process planning is essential for achieving the process goals. That is planning the processes, design the processes,

control the processes and measure the processes systematically to produce the products with specified quality standards. Close control of processes are achieved by continuously measuring the process variations and make the adjustments in the processes if any variations are falling outside the controlling limits. TQM tools and techniques, such as SPC and preventive maintenance techniques have been extensively utilised to improve the process quality and improve the machine efficiency.

Best Practices of TQM Tools and Techniques to Improve the Quality of Processes and Products Continuously

During management development and employee training programme all the managers and employees have been given training on the TQM tools and techniques. Now these tools and techniques have to be practiced in the manufacturing quality improvement process. Most of the TQM tools and techniques observed in the literature are as follows:

- Statistical quality control
- Statistical process control
- Control charts
- Data collection and analysis
- Histogram
- Pareto charts
- Stratification diagram
- Scatter plots
- Cause and effect diagram
- FMEA
- Benchmarking

These tools and techniques are utilised to control the process quality, product quality, quality of cutting tools, raw materials quality and to achieve the benchmark standards etc;. By best practicing these tools and techniques systematically the products produced met the customer requirements and satisfied the customers. The benchmarking process is also one of the TQM techniques to improve the quality and improve the production targets. In the auto company the benchmarking practices are properly implemented

to enhance the technology up gradation, increase production capabilities, to improve quality standards and to satisfy the end customers with innovative products.

Customer Focus and Customer Satisfaction Measures

XYZ auto-company supplies its parts and components to three large scale auto companies. Company gets orders in frequent intervals depending up on the performance of company products, quality of products and quality systems followed in the company. The aim is to keep these three customers as our regular customers and in further planned to increase the new customer base. Due to the competitiveness, all the customers are looking for best suppliers, certified suppliers, quick deliverable suppliers, cost cutting suppliers and award winning suppliers etc. The objective is to become the number one suppliers to at least 5 to 7 companies. To become a regular supplier to these 7 companies, our company should be TQM implemented company or best practising the quality award models. Now our company is in the process of TQM implementation and customer satisfaction is one of the criteria of company. The company is planning to utilise the following customer satisfaction criteria:

- Conducting customer surveys
- Customer requirement survey
- Customer feedback analysis
- Customer complaint analysis
- Customer product analysis
- Customer final products analysis
- Customer relationship management
- Customer satisfaction index determination
- Commitment to customers

The company TQM implementation team has suggested above techniques to be practiced by the marketing and sales departments. Weekly reports on customer satisfaction criteria should be sent to the TQM team by the marketing and sales personnel. Regular customer feedback surveys have been conducted to assess the customer satisfaction levels and accordingly the products quality has been

improved. Identification of customer requirements with personal contact and participating in the new product development processes are the company best practices.

In this way the auto company has implemented TQM and satisfied the customers and gained the manufacturing excellent awards. The company also identified the thrust areas of customer satisfaction index (CSI) are as follows:

- Product quality
- Product price
- Product delivery and
- Product safety

TQM Implementation Outcome

After TQM implementation the materials and products with required quality flowing from suppliers plants to manufacturing and manufacturing plants to end customers. All the quality systems are implemented, so the quality has become the first priority in all the operations. Suppliers are supplying the materials with required quality, in required time and with required prices. Quality costs, quality systems in the supplier plants are always monitored and controlled to the TQM standards. All the suppliers are encouraged to give importance to quality, encouraged to get ISO 9000:2008 certification and to implement TQM. The suppliers are encouraged to produce the goods world class to satisfy their customers. Manufacturing processes are fully controlled by implementing TQM philosophy, trained manpower, preventive maintenance, benchmarking practices etc; Manufacturing practices are updated with enhanced techniques to improve their products quality to the world class quality. TQM tools and techniques are implemented and best practiced to reduce the defects, minimise wastage, control the processes, improve the production targets, reduce the machine down time, improve the productivity and over all performance of the organisation. Seven quality improvement tools such as SPC, pareto analysis etc; are utilised in the manufacturing and service operations to minimise the variations in the processes and products. With improved leadership skills the Sr. managers are performing well in getting the work done by all the employees in a cooperative environment. With the

cooperative leadership style the managers are able to solve the problems easily.

This TQM trained managers are performing the leadership roles in a different way that is cooperative way to improve the quality and productivity of the employees. The leaders are striving to improve the quality of suppliers and satisfying the customers. Leaders are always in contact with customers to know their requirements and to get the feedback about their products and services. Leaders in continuous improvement process, conducts various surveys to know the changed needs of the customers. Leaders take the individual responsibility to delight all their customers with the innovative products. Leaders constantly monitor the customer complaints to enhance their service levels by attempting the complaints with in 24 hrs time. After TQM implementation and best practising the customer satisfaction techniques, the customer satisfaction index has been increased. Some of the TQM principles have been taken serious and practiced better to enhance the customer satisfaction index. The TQM principles includes the customer is king, customer should be treated as our own employee, customers are the best, customer enhances the financial capabilities etc; So our TQM trained leaders played gigantic role in satisfying the customers, retaining the customers and enhancing the customer base. The company customers are satisfied with our quality improved products, services, lower prices and innovativeness in our products.

Results after TQM Implementation

In the TQM implementation case study, we have utilised seven quality tools and techniques extensively to improve the quality performances of the company. After TQM implementation and best practicing the soft and hard TQM elements the following results have been achieved.

- Improved leadership skills
- Improved supplier quality (reduced raw materials rejection to 4% to 1.5%)
- Frequent delivery of supplies (every alternate day)
- Reduced inventory (5 days to 2 days)
- Improved manufacturing processes (5% efficiency)

- Improved customer satisfaction
- Improved employee satisfaction
- Reduced defect rate (from 6.34% to 1.4%)
- Reduced variations in the processes (2%)
- Reduced quality costs (from 3% to 1%)
- Reduced machine breakdown time (from 24 hrs to 8 hrs)
- Improved productivity and performance (30%)
- Increased sales (16%)
- Improved cultural habits and cooperative working etc.

Conclusions

During the case study research process identified critical success factors of TQM through extensive literature study conducted and through brainstorming sessions in the company. Now the case study is conducted at XYZ auto-company to know the effects of implementing critical success factors of TQM and best practicing the TQM tools and techniques. It was observed that the soft elements of TQM practices improve the strength for implementing hard elements of TQM. The hard elements of TQM practices improves the quality and over all performance of the company. All the critical success factors of TQM are to be best practiced to gain the manufacturing excellence and quality improvement awards. It was proved in this case study. TQM implementation and best practices of TQM tools and techniques gained various advantages like reduced quality costs and improved customer satisfaction.

The improved leadership skills of managers and supervisors played different role in motivating the employees to participate in decision making process and daily problem solving activities. Maintaining best relationship with suppliers, quality of supply services have been improved, quality of raw materials have been received in time, reduced quality problems from suppliers, quality management systems have been implemented in the suppliers companies, so that the over all supply performance index is improved steeply. The TQM implementation has impacted positively in the manufacturing quality improvement. Employees are encouraged to participate in suggestion scheme and awarded for their best suggestions. Employees

are trained on new technology, new quality tools to improve their quality performances. In the beginning of training process employees were scared about new tools and technology, but later they understood the concept very well and now employing these tools and technology well in working. Improved morale boosts the employee participation level. Employee satisfaction increased many fold through TQM training process. Product rejection, rework and scrapings were reduced drastically by best practicing the TQM tools and techniques by the shop floor employees. The TQM implementation process provides the in depth knowledge to all the stake holders of the company about the benefits they are going to get in future. TQM implementation has gained the competitive edge and customer satisfaction. Tangible and intangible benefits also gained by company after TQM implementation. Committed leadership of top management, supportive leadership of middle management and total involvement of employees have made TQM a successful endeavour in the company.

There were so many benefits by implementing TQM philosophy in auto companies in India. Still there is gap in understanding the TQM philosophy and its implementation procedure. There is an essential thing we identified is that, some certificate should be issued for TQM implementation so that the industries should get the interest in implanting TQM philosophy.

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