Total Quality Management in an Automobile Supply Chain in Indian Market – A Case Study on Maruti Suzuki

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Abstract: In Indian market, customers see the quality of the product and simultaneously the price of that product. So, to be a winner in Indian market, quality of the product plays a major role with a peep into the different segmented customers. So, total quality management (TQM) has been widely accepted as the ways and means for maintaining supply chain quality. From design to manufacturing, from factory to retailers or dealers or to end customers business are accepting TQM approach for achieving quality excellence throughout the supply chain management. Hence, it is an attempt to describe how TQM is implemented for achieving supply chain quality management to influence Indian market. Maruti – Suzuki has taken as the best example for this context.

Key Words – Total Quality Management, Maruti – Suzuki

1. Introduction

Supply chain management is a holistic and strategic approach to demand, operations, procurement and logistics process management. (Chow 2006, Madu and Kuei 2004). Total quality management calls for developing a system emphasizing continuous improvement, employee focus, data driven decision making and the voice of the customers (kannan and Tan 2005, Tari and Vicente 2004, Kuei and Madu 2003).

Now, the products with high quality and low cost are available through out the world. This factor increased the pressure on companies around the world to improve their goods and services. Technologies and methodologies such as total quality management (TQM) have helped them to do this (Wordsworth 2012).

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2. Literature Review

There is a huge amount of published literature on TQM. A dominant theme in these writings is that TQM is an approach to management that is characterized by the principle of customer focus, continuous improvement and team work (Ugboro and Obeng 2000, Wadsworth et al., 2002, Chan and Quazi 2002, Hellsten and Klefsjo 2000, Scharitzer and Korunla 200000000, Young et al 2001, Woon 2000, Fok et al 2001). It is broadly agreed that TQM is an integrated management philosophy aimed at continuously improving the performance of products, processes and services to achieve and surpass customer expectation.

2.2.A number of research studies have been carried out to examine the implementation process of TQM and investigate the critical success features for implementing TQM. A common conclusion of these studies is that the way TQM is implemented is central to its long term success within an organization (Globadian and Gallear 2001). Flynn et al (1995) surveyed 42 US manufacturing firms and measured the degree of use of quality management practices.

Allen and Kilmann (2001) reported that using a cross functional planning approach when developing strategic plans, forming quality councils and teams and customer focus are the important TQM practices. Black and Porter (1996) conducted a study to determine the TQM critical success factors using members of the European foundation for quality management. They determined that TQM critical success factors were people and customer management , supplier partnerships, communications of improvement in formation, customer satisfaction orientation, external interface management, strategic quality management, team work structures for improvement, operational quality planning, quality improvement measurement system and corporate quality culture.

2.3.Dayton (2001) determined that all of the TQM critical success factors identified in the Black and

Porter (1996) study were important to US quality assurance professionals as well. Research conducted by Tsang and Antony (2001) showed the 11 critical success factors for the successful implementation of TQM in the UK service sector are : customer focus, continuous improvement, teamwork and involvement, top management commitment and recognition, training and development, quality system and policies, supervising leadership, communication within the company, supplier relationship and supplier management, measurement and feedback and culture change in employees' behavior and attitudes.

2.4..Matwani (2001) found seven critical success factors for TQM implementation after examining six empirical studies. He recommended that attention should be given mostly to those 5 constructs : top management commitment, employee training and empowerment, quality measurement and benchmarking, process management and customer involvement and satisfaction. Ugbaro and Obeng (2000) conducted research among 800 members of the Associations for Quality and participation. According to their study, top management leadership and commitment, teamwork, flow of information within the organization, employee involvement and empowerment are the critical strategies for successful TQM programme.

2.5 Total Quality Management (TQM) in a Supply chain -An Intense study

Total Quality Management (TQM) involves management and control of quality throughout the entire organization or the entire supply chain. (Strongly opined by A. V. Fiegenbaum in the U.S. and Kauro Ishikawa in Japan,)

TQM emphasizes

1. Top management commitment.
2. Focus on customer satisfaction.
3. Product design and manufacturing for quality.
4. Continuous improvement.
5. Extensive education and training of employees.
6. Employees involvement and empowerment.
7. Development and maintenance of an effective in house quality assurance system, as well as an effective suppliers quality management system.

2.6 Top management commitment and TQM

Top management commitment is essential for TQM. Top management must commit to quality by clearly stating quality objectives in mission statements and commit sufficient amount of resources for successfully accomplishing quality objectives. Top management commitment should be collaborative throughout the entire supply chain for achieving competitiveness in world market place using a common vision of quality excellence which starts with focus on total customers' satisfaction.

3. Framework of study

In this paper, a frame work is developed which facilitates to find the importance of different factors on TQM implementation. In addition, ANP is applied for the 1st time to assess the readiness of automobile industry in India to adopt TQM based on the survey on Maruti Suzuki, a leader in automobile industry in India.

4. Total Customers satisfaction and TQM

In a TQM approach most important goal is customers' satisfaction. Only satisfied customers come back and bring more business. Therefore, companies must design their products to satisfy their customers, Products should not only meet the needs but exceed the expectations of the customers, to make customers happy. A company must know its customers and their expectations about its products. This information must be regularly collected by marketing department through customer surveys.

Customer Survey

Many companies in India regularly collect customer expectation data for designing a new product and for continuously upgrading existing products. Customers' expectation data related to product's quality gathered by customer survey are generally passed to the product design department.

Product design and manufacturing and TQM

Product design translates the customer expectation data into technical specifications of the product design not only to meet the needs but also to exceed the expectations of the customers.

Innuchi Taguchi recommended a number of methods such as

(1) design of experiments, a statistical technique for analyzing customer expectation data, and prioritizing expectations for building them into the quality of product design.

(2) failure mode analysis, for building reliability in the products operating life.
(3) robust design techniques for designing the product to withstand any changes in its operating environment. It is the product designer who set the quality of the product at the first place. Therefore, product designers must be qualified and well trained inTaguchi's methods of product design for quality. Then, the product's drawings with specifications, dimensions and tolerances developed by product designers must be verified and validated by appropriate authority, and properly recorded and passed down to process engineering.

Process engineering and TQM

Process engineering prepares processing instructions for manufacturing of the product conforming to product design specifications and tolerances. Sometimes, product design and process engineering work simultaneously to speed up the process of designing the product and developing the processing instructions and tooling requirements for manufacturing. This practice is commonly known as simultaneous engineering, and has been successfully applied by Cadillac Motor Company which won the Malcom Baldridge Award in 1990. Processing instructions are passed down to the shop floor where the product is manufactured and quality control verify and insures conformance using inspection and process control.

Quality Control and TQM

Quality control includes inspection and process control. Inspection involves decisions regarding accepting or rejecting a lot qualities of product using test data. Two types of testing are there for collecting test data:
(1) Destructive testing which destroy the item, and
(2) Non destructive which does not destroy the item.

For zero defect quality, 100% inspection which involves checking every item of the lot must be used, otherwise sampling inspection which inspects a sample from the lot to determine the fate of the lot may be economical and acceptable.

While destructive testing is used then 100% inspection cannot be used and may resort to sampling inspection. Inspection is carried out in three stages: (1) outgoing inspection.
(2) work-in-progress inspection.
(3) Receiving inspection.

Outgoing inspection in TQM

For total customer satisfaction zero defect quality must be assured by outgoing inspection before any product is packaged and shipped to customer. Therefore, at the outgoing department 100% inspection is generally carried out. Each and every finished product is run through all possible test procedures and thoroughly inspected before it is packaged and shipped to customers. In India, auto sub-assemblers and auto assemblers generally run 100% inspection before packaging and shipping their finished products.

Work-in-progress inspection in TQM

Work-in-progress inspection involves the inspection of parts at various stages of their production. Inspection of works in progress may involve 100% inspection, sampling inspection and process control. In order to insure zero defect quality, 100% inspection must be carried out. 100% inspection can be carried out by the operator or an inspector or by a robot at the workstation. Sometimes, a "Pokay Okay" or a mistake proof system may be installed on-line to prevent making bad product at the first attempt. Where zero defect quality is not required, sampling inspection may prove to be economical. However, the most effective and economical way to control quality for work in progress is Statistical Process Control (SPC) in which the process is continuously monitored against the upper and lower control limits of a SPC chart predetermined for the process under control using statistical techniques.

Receiving inspection in TQM

All incoming raw materials, parts and subassemblies must be inspected at the receiving inspection to insure zero defect quality or the quality rquirements specified in the purchase agreement. If sampling inspection may be economical, it does not guarantee zero defect quality,and if sampling inspection is used, the sampling plan must be agreed upon by both the buyer and the supplier, as it involves risk for both parties .For minimizing cost of receiving inspection, and insure high quality of incoming materials, customers prefer to choose high quality raw materials and parts suppliers using extensive quality audit of their potential suppliers' plants.

Suppliers' quality audit and TQM

Supplier's quality audit s are commonly performed by customer's quality auditors and is known as second party audit. Quality audits are performed against quality standards or requirements pre-

established by the customer. Thus, multitudes of standards had been developed by large customers in various types of industries. However, once the businesses crossed countries boundaries and became international harmonization and internationalization of all standards was needed and ISO9000 series of quality standards was developed in early 1990s for suppliers quality audit.American automakers such as General Motors corporation, Ford Motor company and Chrysler Corporation have individually developed their own standards and applied them for their suppliers'audits in the past decades, and by mid 1990s U.S. auto makers and truck manufacturers together developed QS-9000 series of quality systems requirements for their suppliers' quality audit . Premier Padmini of Indian market had also adopted the same policy for quality management.

ISO-9000 and QS-9000

ISO-9000 and QS-9000 standards are designed for audit of the quality system based upon the hypothesis that if a supplier has a good quality system in place, the supplier can be trusted for supply of good quality parts/products. ISO-9000 has twenty elements of requirements for examining the presence of an effective quality assurance system using TQM approach.. QS-9000 also uses these same twenty elements of ISO-9000 as core requirements along with the auto industry's specific requirements, and individual customer's specific requirements.

Third Party registration and TQM

With the internationalization of businesses, and development of ISO-9000 and QS-9000 standards, a number of independent companies called "registrars" were formed all over the world for performing independent or third party quality audit of a company using ISO-9000 or QS-9000 standards. These registrars use third party or independent and certified quality auditors for performing quality audits. This type of quality audit is known as third party audit. After a third party audit if a supplier meets the compliance to the ISO-9000 standards, the supplier is issued a certificate of compliance, and the supplier's name is place in the register of ISO-9000 certified companies .Customers now prefer to do business with ISO-9000 certified companies to other suppliers, and they are gradually phasing out second party auditing. Similarly, automakers are currently demanding QS-9000 certification of their tier one suppliers prior to issuing any contract.

India Loves Maruti Suzuki

Customers relate to a company in multiple ways.

--They expect the company to serve them with care, offer products that give them best value and fulfill their desires including unstated ones .

--When a company is able to do this over time, through repeated instructions, a relationship is born. In the three decades Maruti Suzuki has been in existence ,the passenger car landscape has changed considerably.

--Today, the company's relationships with customers go beyond just transactions. Maruti have connected with the millions of families through trust and faith .This truth and faith is contingent upon the company continuing to deliver better service, superior products and unmatched value.

--Maruti Suzuki is India's largest passenger vehicle company with a market share close to 40%.

--Founded in 1891, with the Maruti 800 as its first product offering, the company today offers 14 models with over 200 variant across the Industry segment like Passenger cars , Utility vehicles and Vans . 5 plants in the Gurgaon and Manesar areas of Haryana equip Maruti Suzuki with a production capability of 1.55 million units per annum.

Passenger Cars- Alto, Ritz, Wagonr, Swift , Estilo, Kizashi, SX4, A-STAR, Dzire

Vans - OMNI, EECO

Employees---- 9100

Cars sold in FY 12 ----- 1.13 MN

Top selling passenger cars –

1st - Alto

2nd - Swift

3rd - Wagonr

4th- Dzire

Maruti is of the opinion – When performance is not negotiable. There are those who like their cars and There are those who love them.

The Recent days and Maruti

The year 2011-12 has been difficult year not only for Maruti but also for all the world economies as well as the Indian economy. The events of 2008-09 have not yet played out and the growth trajectory remains low everywhere. Even China has slowed down. Many countries in Europe have serious problems with their economies and the Euro periodically creates a major problem for central bankers and governments. The stock market remains volatile . During the year, crude prices increased sharply and the rising dollar created even more serious problems for the company in India. In Manesar , there was a strike which led to loss of production and market share .

The company has been built by its employees, its vendors and dealers and the support of shareholders and the customers The company was with the high thought for long term benefits and not to be carried away by short term benefits.

Financial results

The Company's financial performance during the year 2011-12, as compared to the previous year 2010-11 is summarized below:

Particulars 2011 -2012 2010 -011 (` in millions)
Total revenue 364,139 371,272
Profit before tax 21,462 31,088
Tax expense 5,110 8,202
Profit after tax 16,352 22,886
Balance brought forward 118,578 100,499
Profit available for appropriation 134,930 123,385
Appropriations:
General reserve 1,635 2,289
Proposed dividend 2,167 2,167
Corporate dividend tax 351 351
Balance carried forward to balance sheet 130,777 118,578

Financial Highlights

The total revenue (net of excise) was ` 364,139 million as against ` 371,272 million in the previous year showing a marginal decline of 1.92 per cent. Sale of vehicles in the domestic market was 1,006,316 units as compared
to 1,132,739 units in the previous year. Total number of vehicles exported was 127,379 as compared to 138,266 in the previous year.
Profit before tax (PBT) was ` 21,462 million against ` 31,088 million and profit after tax (PAT) stood at ` 16,352 million against ` 22,886 million in the previous year.

Dividend

The board recommends a dividend of ` 7.50 per equity share of ` 5 each for the year ended 31st March 2012 amounting to ` 2167 million.

Operational Highlights

The operations are exhaustively discussed in the report on 'Management Discussion and Analysis' which forms part of this annual report.

Crisil Ratings

The Company has been awarded the highest financial credit rating of AAA/stable (long term) and A1+ (short term) on its bank facilities by CRISIL. The rating underscores the financial strength of the Company in terms of the highest safety with regard to timely fulfillment of its financial obligations.
QUALITY
The Company has again been awarded ISO: 27001certification by STQC Directorate (Standardizations, Testing and Quality Certificate), Ministry of Communications and Information Technology, Government of India after re-assessment. The Company is thus certified to meet international standards for maintaining information security. During the year, ISO 14001 re-certification audits were carried out by M/s AVI, Belgium and the auditors renewed the ISO 14001 certificate till 2014. The quality management system of the Company is certified against ISO 9001:2008 standard.

Awards/recognition/rankings

J D Power Customer Satisfaction Index (CSI) Study ranked the Company highest for the 12th time in a row.
J D Power Asia Pacific 2011 India Vehicle Dependability Study ranked Zen Estilo and Swift DZire as the 'most dependable cars'.JD Power IQS ranked Zen Estilo and Swift DZire highest in the 'compact' and 'entry midsize' segment respectively.

J D Power APEAL Study 2011 ranked Alto and Zen Estilo highest in the 'compact' segment. Swift DZire received an award in the 'entry midsize car' segment for a fourth consecutive year.

CNBC TV 18 Overdrive awarded 'Compact Car of the year 2012' to new Swift.

NDTV CNB's 'Premium hatchback of the year' awarded to new Swift.

BBC India Top Gear's 'Small car of the year 2011' awarded to new Swift.

ICOTY 2012 'Indian Car of the Year 2012' awarded to new Swift.

Bloomberg UTVi's 'Compact Car of the Year' awarded to new Swift.
Mr. R. C. Bhargava, Chairman was bestowed with 'The Order of the Rising Sun, Gold and Silver Star' by His Majesty Emperor Akihito of Japan.

Subsidiary Companies and their Accounts

The Company's subsidiaries which were engaged in the business of insurance distribution in the past generated an investment income of ` 163.80 million including a dividend income of ` 28.65 million and long term capital gain of ` 129.13 million through mutual funds.

The Company's subsidiary 'True Value Solutions Limited' has contributed towards smooth operations of business processes and supported the dealerships in enhancing the sale of certified pre-owned cars under the brand 'Maruti
True Value'. It has contributed significantly to the efforts of customer retention by facilitating sale and re-purchase of new cars through exchange and has made significant contribution towards enhancing dealers' rofitability.
In terms of the general circular dated 8th February 2011issued by the Government of India, Ministry of Corporate Affairs, the balance sheets, profit & loss accounts, reports of the board of directors and auditors of the subsidiary companies have not been attached with the balance sheet of the Company. Annual accounts of the subsidiary companies and the related
detailed information shall be made available to shareholders of the Company and subsidiary companies seeking such information at any point
of time. The annual accounts of the subsidiary companies shall also be available for inspection by any shareholder at the head office of the Company and of the subsidiary companies. Hard copy of details of accounts of subsidiaries shall be furnished to any shareholder on demand. Further,
pursuant to Accounting Standard – 21 issued by the Institute of Chartered Accountants of India, consolidated financial statements presented by the Company include the financial information of its subsidiaries.

Human Resource Development

The Company provides tremendous learning and development opportunities to its employees starting from induction and orientation when a new employee joins the Company. The Company believes that to have a sustainable competitive advantage in the new knowledge economy,learning would be the key catalyst for an organisation's survival and success. The Company's extensive training calendar encompasses training programs for all categories of employees i.e. associates, supervisors and those at junior, middle, senior and top management level. To have a well rounded development of employees, the training calendar comprises of behavioral, functional and safety trainings. The training programmes vary according to the need of the employees at various levels and business requirements and are designed after doing a thorough process of three stage need identification.

In 2011 - 12, a total of 47,000 man-days of training were conducted for employees across all the levels. This translates to an average of 5.15 days of training per employee.

A. Energy Conservation

The Company continued its energy conservation drive more prominently through various energy saving activities and adaptation of new technology.
Energy saving initiatives throughout the plant helped the Company in reducing energy consumption by 2 per cent in most of the areas. Some of the activities carried out during the year towards environment, energy and water conservation are mentioned under: Fluidised bed type incinerator was installed in Manesar plant for cleaning of paint booth gratings instead of direct burning type incinerator to reduce emission.

In order to utilise the exhaust gases of the Gas Turbine Generators (GTGs), Waste Heat Recovery Boilers (WHRB) & Steam Turbine Generators (STGs) were installed in Gurgaon plant which will reduce the cost of energy by 20 per cent. Newly built plant at Manesar was designed in a special way so as to make maximum use of natural light. New generation Electro Deposition (ED) paint coating on car body was introduced which operates at low voltage and thus consumes less energy.
Gravity conveyors were used in weld shop. Light Emitting Diodes (LED) lights were used in shop floors in stockyards, Manesar and Gurgaon plant. Aerodynamic energy efficient Fibre Reinforced Plastic (FRP) blades were used in lieu of standard blades for cooling towers which consume less energy.
Voltage was optimized in shops for lighting and motor loads.
Improvement was achieved in efficiency of air washers by replacing spray zone with celdec media. Desiccant type air dryers were introduced to reduce energy consumption. Direct cooling type system was introduced for air conditioning system. Utilization of cooling towers was optimized.
Energy efficient motors were used in water treatment plant at Manesar.
Use of natural light was substituted for artificial lights for achieving energy saving. Air cooled cooling towers were used in Gurgaon and Manesar plants. Air cooled air dryers were used in compressed air plant.
Usage of recycled water was increased in lieu of fresh water.

B. Research & Development:

The Company's R&D team has been working with the following vision - "Build on our engineering skills to

design and develop cars to delight the Indian consumer and establish Maruti as the R&D hub of Suzuki Motor Corporation (SMC) in Asia outside Japan." The Company has envisioned the path of achieving the vision through: New model and minor change design and development; and Engineering capability development for design and development of full body change. The Company has taken every possible step to scale up its R&D strength and infrastructure. Skilled manpower is the key for achieving the goals of any company. The Company has increased the strength of R&D manpower from 1070 numbers in
2010-11 to 1210 numbers in 2011-12. The Company has a plan of increasing this manpower from 1210 numbers to more than 1400 numbers in 2012-13.

Conclusion

A detailed intensive analysis is done on Total Quality Management (TQM) in a supply chain including commitment of management.

The research work is confined to a multinational company Maruti Suzuki. More over research is needed to prove its suitability for other national and international company. The scope of this research is to study optimizing availability of both new and existing multiple varied technologies within the business.

Thus, starting from product design to supplier certification, the total quality management (TQM) approach can be effectively implemented in a supply chain for achieving quality excellence and competitiveness in a world market place. In India, Maruti Suzuki have successfully implemented the TQM approach for gaining a competitive edge in the Indian marketplace.

References

[1] Monden, Y. Toyota Production System, second edition, Industrial Engineering & Management Press, 1993.

[2] Gitlow, Oppenheim & Oppenheim, Quality Management Tools and Methods for Improvement, second edition, McGraw-Hill, 1995.

[3] Bandyopadhyay, J.K., QS-9000 Handbook for Implementation and Audit, CRC Press, Tampa, FL, 1995.

[4] Flynn et al 1995 – survey of 42 US manufacturing firms

[5] Bandyopadhyay, J.K., QS-9000 Handbook for Implementation and Audit, CRC Press, Tampa, FL, 1995.

[6] Bandyopadhyay, J.K. " Internationalization and Harmonization of Automotive Industry

[7] Stan- dards With QS-9000", International Journal of Management, London, U. K., December 1996

[8] Bandyopadhyay, J.K. " QS-9000: The new quality systems requirement for automotive industry" Production and Inventory Management Journal, APICS, Falls, Church, VI, December, 1996,

[9] Black and Porter 1996 – " TQM critical success factors"

[10] Inman, R.R., and Gonsalvez, D.J.A.,"The Causes of Scheduling Instability in an Automotive Supply Chain" Production and Inventory Management Journal, APICS, Falls, Church, VI, May ,1997,

[11] Litsikas, Mary. "QS-9000 Scores High Among Suppliers." Quality, October 1997, p. 24-30.

[12] Anderson, E and Adams D.A., "Evaluating the success of TQM Implementation" Production and Inventory Management Journal, APICS, Falls, Church, VI, December, 1997, p.1-6.

[13] Aft, L.S., Industrial Quality Control, Third edition, St. Lucie Press, Boca Raton, Florida 1998.

[14] Berg, Douglas L. and William M. Harral. "The Small Company Route to ISO 9000" Quality Digest , July, 1998.

[15] Geisler, Cathi D. and Richard Justus. "Training: A Strategic Tool for ISO and QS-9000 Implementation." IIE Solutions ,April 1998 p. 24-27.

[16] Gupta, Praveen and Dan Pongetti. "Are ISO/QS-9000 Certifications Worth the Time and Money?" Quality Progress, October 1998 p. 19-24.

[17] Wilson, Hilary W. "Do the Right Things Right".Quality Progress ,December 1998, p.27-30

[18] Besterfield, D.H. Total Quality Management, second edition, Prentice Hall, 1999.

[19] Fletcher, Anthony G. and Rebecca M. Sukes. "Why Implement ISO 9002 If You Don't Have To?" Quality Digest ,November 1999, p. 37-41.

[20] Handfield, R. and E. Nichols, Introduction to Supply Chain Management, Printece Hall, 1999.

[21] Larson, Melissa. "Tips for ISO 9000 Preparation: It Starts with Top Management" Quality, January 1999, p. 57-58.

[22] Norris, Leslie. "The Pros and Cons of Sector-Specific Standards." Quality Progress, April, 1999, p. 92-96.

[23] Ferguson, B. "Implementing Supply Chain Management" Production and Inventory Management Journal, APICS, Falls, Church, VI, May, 2000, p.64

[24] Reid, R. Dan. "Why QS-9000 Was Developed and What's in Its Future." Quality Progress, April 2000, p. 115-117.

[25] Ugbero and Obeng 2000 – conducted research on 800 members of Association for quality.

[26] Globadian and Gallear 2001, "TQM is implemented in central to its long term success
[27] Allen and Kilmann 2001 – "forming quality councils and teams."
[28] Dayton 2001 – "TQM critical success factors"
[29] Tsang and Antony 2001 – "11 critical success factors"
[30] Motwani 2001 – "7 critical success factors"
[31] Madu and Kuei 2004 "Demand, operations, procurement and logistics process management."
[32] Kannan and Tan 2005"voice of the customers".
[33] Wordsworth 2012 –"Technology is total quality management (TQM)".