A STUDY OF QUALITY MANAGEMENT PRACTICES IN ELECTRONICS INDUSTRY OF NORTHERN INDIA

THESIS

Submitted

in fulfillment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

By

Salil Dey

University Regd. No

PHDMGT10028

Supervised by

Dr. Sandhir Sharma

Dr. Sunil Dutt

April' 2016

Department of Management

CHITKARA UNIVERSITY, HIMUDA EDUCATIONAL. HUB,

SOLAN, HIMACHAL PRADESH - 174103

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DECLARATION BY THE STUDENT

I hereby certify that the work which is being presented in this thesis entitled "**A study of Quality Management Practices in Electronics Industry of Northern India"** is for fulfillment of the requirement for the award of Degree of **Doctor of Philosophy** submitted in the **Department of Management, Chitkara University, Barotiwala, Solan, Himachal Pradesh** is an authentic record of my own work carried out under the supervision of Dr. Sandhir Sharma and Dr. Sunil Dutt.

The work has not formed the basis for the award of any other degree or diploma, in this or any other Institution or University. In keeping with the ethical practice in reporting scientific information, due acknowledgements have been made wherever the findings of others have been cited.

(Salil Dey)

CHITKARA UNIVERSITY, HIMACHAL PRADESH

CERTIFICATE BY THE SUPERVISORS

This is to certify that the thesis entitled "**A study of Quality Management Practices in Electronics Industry of Northern India**" submitted by **Salil Dey (Regd No.** PHDMGT10028) to the Chitkara University, Barotiwala, Solan, Himachal Pradesh in fulfillment of the award of the degree of **Doctor of Philosophy** is a bona fide record of research work carried out by him under our supervision. The content of the thesis, in full or in parts, have not been submitted to any other institution or University for the award of any degree or diploma.

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(Salil Dey)

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- Salil Dey, Sandhir Sharma, Sunil Dutt (2013) Kaizen- a way of Productivity Improvement in Electronics Industry: A case study, *Journal of Engineering & Technology Education*, vol.7, no. 1, pp 31-37.
- Salil Dey (2015) "A comparative study of application of Quality management practices and their benefit between small & medium scale versus large scale Electronics Industry in Northern India" proceedings of the Joint International conference on Communication, Computing and Power Technology and Artificial Intelligence and Evolution computations in Engineering System, Velammal Engineering College at Chennai.
- Salil Dey, Sandhir Sharma, Sunil Dutt (2015) A comparative study of application of Quality management practices and their benefit between small & medium scale versus large scale Electronics Industry in Northern India, *International Journal of Applied Engineering Research*, vol. 10, No.44.
- Salil Dey, Sandhir Sharma, Sunil Dutt (2015) An Empirical study of Leadership and motivational factors for successful implementation of QM practices in small & medium scale and large scale industry in Northern India. *International Journal of Advanced information*. Vol. 40, no. 40,

ABBREVATIONS

CII	-	Confederation of Indian Industries
CSF	-	Critical Success Factor
ELCINA	-	Electronics Industries Association of India
FDI	-	Foreign Direct Investment
FICCI	-	Federation of Indian Chamber of Commerce and Industry
FMEA	-	Failure Mode & Effect Analysis
GDP	-	Gross Domestic Product
ISO	-	International Organization for Standardization
JIT	-	Just In Time
PDCA	-	Plan Do Check Act
QA	-	Quality Assurance
QC	-	Quality Circle
QFD	-	Quality Function Deployment
QMS	-	Quality Management System
R & D	-	Research and Development
SPSS	-	Statistical package for Social Science
SQC	-	Statistical Quality Control
TQM	-	Total Quality Management
TPM	-	Total Productivity Maintenance

NOTE: The words TQM and QM are interchangeably used in this thesis.

LIST OF TABLES

LIST OF FIGURES

CONTENTS

ABSTRACT

During last decade, Government of India forced industries to compete with multinational industries both in home as well as export market due to globalization of economy and liberalization of import regulation. But after the liberalization process, these aspects become imperative for very survival of many industries. The aim of the research was to study the extent Indian industries have understood and implemented QM practices in small & medium sector and large scale Electronics industries in Northern India. It was also aimed to highlight problems faced in QM implementation and the benefits achieved by implementing QM practices in small & medium and large scale electronics industries. The study also unraveled the importance of leadership role in the implementation of QM in the industry. The research methodology included designing a research questionnaire for collection of data. Data were collected from Electronics Industries situated in North India having manpower strength of more than 50. A sample of 50 companies was chosen from industries enlisted in ELCINA and local industry list of Haryana, Punjab, Himachal Pradesh and NCR region. A set of seven questionnaires, were sent to those 50 industries personnel. Data were collected by post as well as in person. This study was among few studies to report QM assessment of North Indian Electronics manufacturing firm. Data were collected in the scale of 1 to 5, which gave respondent flexibility to choose accurately rather than choosing between two alternatives.

The study indicated that leadership plays a vital role in the implementation of QM practices in the organizations. The study also found that the majority of Indian Electronics industry was aware of the importance of quality and relatively confident about the knowledge of QM. These have implemented various quality practices to some extent. TQM philosophy has been adopted in manufacturing though a large proportion of the industries were maintaining quality certifications. Indian industries were taking advantage of ISO 9000, TQM, and Six sigma to improve their system. Quality management tools were practiced in both small & medium and large scale industries but the deployment of the tools are more in large scale industry than small & medium scale industry. Between Quality tools and behavioral tools, in both segments behavioral tools were implemented more than quality tools. Among quality tools, TPM, SQC, Flow charts, Check list, Quality circle, and Suggestion schemes

were most commonly implemented tools. The study revealed that some of the critical challenges for implementation of QM practices were quality objectives driven more on cost reduction rather than customer satisfaction, quality action procedure not clear, cross functional teams are not active, processes are not benchmarked.

Similarly benefits accrued by large scale industry were more than small & medium scale industry. Alternately the challenges were more to deploy quality management practices in small & medium scale industry than large scale industry.

In response to the pressure of open market economy, most of the Electronics industries have adopted QM practices. Industries should considered QM as an innovative tool for improving operational and organizational performance in today's dynamic manufacturing environment. The study has contributed to the practical and academic knowledge of quality management in Electronics Industry. This is among the few empirical studies on QM implementation in Electronic industry in India. Some recommendations for further research can be derived from this research work.

Chapter 1: Introduction

1.1. Introduction to study:

Global competition is the name of the game today. The pressure of competition is being felt with increasing intensity as the world opens up to trade and commerce, in the post WTO regime (Adam et al., 2001). In such a fiercely competitive environment, industries are under tremendous pressure to offer consistent quality of international standard product at a competitive price to provide value for money. This competition has contributed to the economic growth of a nation (Vander Wiele et al., 1994, Amar et al., 1994). While exploring the influence of domestic competition on international trade performance, using data from a broad sample of Japanese industry, it has been found that domestic competition has a positive and significant relationship with trade performance measured by world export share.

While examining the finer elements of competition, Garelli (2004) has described competition and competitiveness as the two faces of the same coin. According to him, competition is an external and environmental factor and competitiveness is an intrinsic feature of an entity that can be developed and nurtured. In today's perspectives, competitiveness has become a fundamental force in economics like gravity in physics. Across countries and regions, there is a drive to enhance competitiveness. This includes competitiveness of nations, industry sectors and individual units. Competitiveness describes economic strength of a country or industry or organization with respect to its competitors in the global market economy in which goods, services, people, skills, and ideas move freely across geographical borders. Highly competitive entities are winners in the global competitiveness game.

The biggest challenge for an Indian industry today is to be competitive, not only in the country but also internationally. Competitiveness, being a multi-dimensional concept, can be enhanced through many ways. An effective and proven way is through the quality way, which is a major source for creating sustainable competitive advantage for organizations. There are prominent

examples among countries and their organizations that have become competitive through the quality way.

1.1.1. Competitiveness of Indian Industries:

Garelli, in his work, explored that a new breed of competitors is emerging to reshape the world where Asia is attracting 60 percent of the investments. Most of the investment is done in China and the 4th largest exporter of manufactured goods in the world (Garelli, 2004). In this scenario, it is good to do a reality check on where India stands.

According to the *Global Competitiveness Report (GCR)* 2013-2014 released by the World Economic Forum (WEF), India is ranked 56th on the WEF's Growth Competitiveness Index (*Global Competitiveness Report*, 2013-2014). At the industry level, clearly much need to be done to enhance competitiveness to meet the onslaught of competition from around the world.

"India Inc." stands for India as a whole – representing government at the National and State level and representing Indian industry. Therefore, the focus lies on two key elements of competitiveness:

1. Competitiveness of the nation as a whole; and
2. Competitiveness of Indian industry

(Conference Papers of Quality Summit, 2002).

The business environment of the country during 1990 has undergone changes due to economic reforms and globalization of world markets, undertaken by the Government of India. This is further getting accentuated with start of economic dialogue between India and Pakistan, like Beijing declaration between India and China and the recent development in South and east Asia, talk of the formation of Regional Trade Blocks in the region, etc. With increased competition, all these opened up unlimited business opportunities to India Inc.

Despite of relentless competitive pressure for decades, progress in achieving high levels of quality till the last decade was very slow. Concerns were raised

regarding improvement of operative performance or real economic gains generated by adopting total quality management (TQM) programs. Hitomi (2004) questioned the ability of TQM to improve and sustain performances. Sahay et al. (2003) has raised the doubt about the value creation potential of TQM. Boaden (1996) proclaimed "Total Quality is Termed Only Partial Success".

While analyzing reasons for the slow progress of quality movements, Chatterjee et al. (1997), Ayoob et al. (2003) have concluded that industries are not able to link business results with their quality initiatives, due to the various prescriptions of the leading gurus. Black (1996), Tonk (2000) have argued that set of quality criteria no single quality system, or even quality philosophy is going to be a solution by itself to a industry's quality problems. However, there seems to be a little doubt that regardless of size, sector, structure, or maturity, organizations to be successful, need to establish appropriate management framework with clear purpose. In other words, there is a need for a holistic business and practical model, synthesizing the propositions of the quality gurus that can be used as a structure for the organization's management system. In this connection, it may be said that the pioneers in this area like Deming (1986), Crosby (1984), Feigenbaum (1983), Ishikawa (1985) and Juran (1986) – in spite of the differences in presenting their views have consensus in the core concepts like continuous improvement or customer satisfaction.

1.1.2. Electronics Industry in India:

Electronics Industry reported at USD 1.75 Trillion in 2012 globally is the largest and fastest growing manufacturing Industry in the world. It is expected to reach USD 2.4 Trillion by 2020.

The demand of Indian market was USD 45 Billion in 2008-09 and expected to reach USD 400 Billion by 2020. Domestic demand is driven by growth income levels leading to higher off take of electronics products, automation demands of corporate sector and government's focus on e-governance. The domestic production in 2008-09 was about USD 20 Billion but is saddled with

low values addition due to various structural changes resulting in high costs. At the current rate of growth, the domestic production can cater to a demand of USD 100 Billion by 2020 as against proposed demand of USD 400 Billion and the rest would have to be met by imports. It aggregates to a demand supply gap of nearly USD 300 Billion by 2020 and unless the situation is corrected, it is likely that by 2020, the electronics imports will exceed oil imports (ELCINA, 2012).

India is a recognized global player in software and software service sector. It lags behind electronics hardware manufacturing capabilities, though it is increasingly becoming a destination for chip design and embedded software. The vision of the policy is to transform India into a global hub for electronics system design and manufacturing (ESDM) so as to meet the growing domestic and global demand.

The National Policy of Electronics, 2011 envisions creating a globally competitive Electronics System Design and Manufacturing (EDSM) industry including nano-electronics to meet the country's need and serve the international market. The main policy objectives are:

- To achieve a turnover of about USD 400 Billion by 2020 involving investment of about USD 100 Billion and employment to around 28 million by 2020.
- To set up over 200 Electronics Manufacturing clusters.
- To significantly upscale high-end human resources creation to 2500 PhDs annually by 2020 in the sector.

1.1.2.1. Consumer Electronics:

Electronic hardware production contributing about 32% of the total Consumer electronics (durable) sector continues to be main stay of the Indian electronics industry. The segment is likely to grow at 10 to 12 percent per annum. The rural durables market is expanding at 25 percent annually and urban consumer

(durable) market is expanding at an annual rate of 7 to 10 percent. Some high-growth categories within the segment include music system, mobile phones and TV.

1.1.2.2. Computer Hardware:

The phenomenal growth of PC sales is mainly attributed to increased consumption by Industry segments such as Manufacturing, Telecom, Banking and Financial Services, retail, Education and BPO/IT-enabled services as well as e-governance initiatives of the State and Central Governments. Increased PC purchases in smaller towns and cities and significant consumption in the small and medium industries was witnessed during the year. PC consumption can accelerate in domestic market as it is expected that increased Governments focus on deployment of lowest cost of broadband.

1.1.2.3. Industrial Electronics:

As per as application segments are concerned, this is now a matured sector in the country. Various sections of the process industry, use state of the art reliable SCADA, PLC/Data acquisition systems. Latest AC drive systems from smaller to very high power level also find application in large engineering industry like steel plants / metal industry. To cater the need of the emerging digital economy, World class UPS systems are being manufactured in the country. However, for whole range of latest test and measuring instruments, it appears there is no manufacturing base in the country.

1.1.2.4. Communication and Broadcasting Sector:

The Telecommunication industry is identified as key driver and has gained tremendous recognition for all round development and growth. India has emerged as one of the largest in the world and second largest in Asia. Broadband connectivity holds tremendous potential in the country. India has emerged as the second largest market for handset. As a result of unprecedented growth in the mobile market, a number of companies are planning to setup production base for mobile handsets in the country for

meeting all local as well as export market. Direct to Home (DTH) broadcast service has gained popularity. Better quality digital broadcasting operation facility is now available almost everywhere in the country to the common people on their TV sets through the use of small dish antenna and a set top box.

1.1.2.5. Strategic Electronics:

The strategic Electronics business in India is limited to Govt. of India Organizations or Public sector undertaking units. However the process of getting private sector in the production of strategic equipment is at its nascent stage.

1.1.2.6. Electronics Components:

The components with major share in the export are CD-R, CPTs, PCBs, DVD-R, connectors, semiconductors devices, ferrites, resistors etc. Significant developments took place during the year in the area of coloured picture tubes and coloured glass parts. Another CPT manufacturer has successfully launched manufacture of pure flat tubes, leading to availability of flat tubes from three indigenous sources. The CPT units continued expansion of capacities to improve further their global competitiveness.

1.2. Quality:

Industry consciously put effort to improve quality, in order to meet customer satisfaction. In theory, improved quality will increase the customer demand, which will lead to increased production and profits. What then is quality? What does the customer look for in terms of quality?

According to Carmen et al. (2001), quality is a workmanship of various activities. In manufacturing activities, it is measured in terms of not only the product itself, but also the process of production. In case of sales, quality is not only the quality of the product, but also that of the services provided to the customer.

We do not buy a product for the product itself; we buy it for the particular function it performs. Its value is based on not merely appearance, but also usability.

Transitions of the Quality Concept

1950s	Fitness to the standards
1960s	Fitness to use
1970s	Fitness to cost
1980s	Fitness to requirement (i.e. safety & reliability, customer satisfaction)
1990s	Fitness to the latent requirements (Customer delight)
2000s	Fitness to need of all stakeholders (e.g., environmentally friendly)

(Quality Digest, 2001)

1.3. Total Quality Management:

In the Global marketplace, increased levels of competition have resulted in quality, becoming of increasing importance to organizations and consequently, Total Quality Management (TQM) has become a key management issue. A considerable number of industries are applying TQM and the topic is the subject of many books and papers. Today TQM appears to be a well accepted system of management. Yet two decades ago the terminology was not used. Before discussing the origin of TQM, it is necessary to understand definitions of the terminology. This is not easy task since every writer on this subject has their own definitions, by and large devising it to suit their own beliefs, prejudices and business and academic experiences. The result is a proliferation of unique definitions and confounds comparisons and it adds to the difficulties of understanding and analysis. Even with the publication of an international definitions of TQM in ISO 8402 (1994) there is ample evidence that writers

and researchers do not stick to this definition and create their own unique offering. Moreover, as Hackman et al.(1995), Christian et al.(1995) stated a large number of interventions not related with TQM are being encompassed under TQM banner; despite the divergence of views on what constitutes TQM there are a number of common elements running through the various definitions. Several writers have tried to define the different dimensions that shape TQM, including Ahire (1996), Dale et al. (1999), Flynn et al. (1994), Darrell (2003) and Eaton et al. (1998).

1.3.1. History of TQM:

Powell (1995) makes the point that, "TQM's origins can be traced to 1949, when the union of Japanese scientists and engineers formed a committee of scholars, engineers, and government officials devoted to improve Japanese productivity, and enhance their post-war quality of life" and "Americans firms began to take serious notice of TQM around 1980".

It can be argued that many of the TQM dimensions outlined were being applied by organizations before the TQM movement appeared, consequently, it is not easy to establish the exact date of birth of TQM. Ravichandran (2001), Hanjoo (2003) considered that in Fod and Crwter's book "My life and work", published in 1926, the origin of TQM can be found. Nevertheless, it is clear that the term and the philosophy as a whole appeared around the mid 80's. Berkowitz (2004), stated that the term TQM was initially coined in 1985 by Naval Air systems Command to describe its Japanese-style management approach to quality improvement.

Perhaps, the main reason for the origin of the term TQM could be a substitution in the previously used term of Total Quality Control (TQC), the word "control" by "management" with the reasoning that quality is not just a matter of control, it has to be managed. This is reinforced by Deming's (1993) view that the sampling inspection should be suppressed and also by Crosby (1984) who makes the point that "control" is sometimes understood as meaning control over the workforces activities, and this is clearly not the aim of TQM (Richard et al., 1995, Monga, 2005).

In USA, the development of quality management resulted from the penetration of its markets by Japanese products which started in the 70's, along with the impact of the writings of Crosby, Deming, Feigenbaum and Juran. Consequently, industries and academics studied the works of these authors and others, such as Ishikawa, and, integrating their approaches with quality management, gave rise to the concept of TQM. This movement was exported to other countries, the UK being one of the first.

Dale, who started his research in quality management back in 1981, believes that the term TQM arose in the UK from the activities of the Department of Trade and Industry national Quality campaign which was launched in 1983 and the pioneering work of organizations such as IBM. He relates a discussion with John MacDonald (one of the stalwarts of the UK quality management and the first managing Director of Crosby Associates UK Ltd.) who mentioned that around mid 1986, he was using the term TQM in his cross Atlantic communication with Philip Crosby, who responded with the retort "what is TQM"? It is also worth mentioning that in the early to mid eighties the use of quality related terms and acronyms was nothing as pronounced today.

1.3.2. Definition of TQM:

"TQM is a set of systematic activities carried out by the entire organization to effectively and efficiently achieve company objectives so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price." (TQM committee, 2002)

Total quality Management is commonly expressed in conjunction with business excellence. It is a scientific management methodology that the quality of industries or organizations measures quality not only in products, but also in their processes, in their organization's quality management. According to the TQM committee, in the 21st century, a company is to seek quality by establishing respectable existence and co-delighting relationship with stakeholders (TQM Committee, 2002). In order to accomplish this, the committee continues, "It is cruel that the company achieves competitive and praised ability, technology, speed and flexibility and vitality" and TQM has a significant role to play to meet those requirements.

TQM is a management method in which quality is required in all manners to satisfy customer requirements. It involves every employee's daily commitment in the office, which differentiates TQM from other management systems. The term "everybody" implies all levels in the industry from frontline operators to middle management to executive management since everybody contributes to the problem solving processes which strengthen the organizational capacity and management of the company.

TQM is not a program. It is a strategy, a way of doing business, a way of managing, a way of looking at the organizations and the activities (Robert et al., 2008, Mohanty et al., 1994, Zaramdini, 2007). Therefore, the success of TQM is measured not only by its tangible income but also by both the way in which the organizational structure is established and the processes by which corporate objective is achieved.

1.3.3. Stages of Quality Management:

There are four stages in evolution of quality management (Dale et al., 1999) shown in Fig 1.1. The details are as follows

- Inspection
- Quality Control
- Quality Assurance
- Total Quality Management

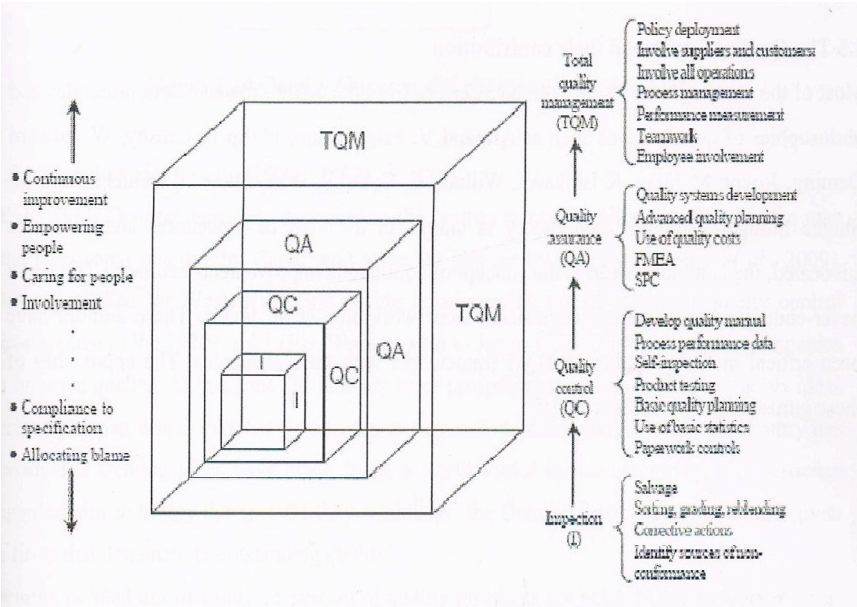

Fig 1.1 Stages of evolution of Quality Management

1.4. Quality Gurus and their contributions:

Most of the contemporary TQM literature derives from the quality management principles and philosophies of quality gurus such as Armand V. Feigenbaum, Philip B. Crosby, W. Edward Deming, Joseph M Juran, K Ishikawa, William Conway, W.A Shewart, Shigeo Shingo, and Genichi Taguchi. Every theory of the quality gurus is unique in nature; however there is a common thread in all of them and that is continuous improvement, central to TQM, never ending process through enthusiasm from workforce at all levels.

1.4.1. W. Edwards Deming (1900-1993):

Deming places great importance and responsibilities on management, at both individual and industry level, believing management to be responsible for 94% of quality problems. His fourteen point plan is a complete philosophy of management that can be applied to small or large organizations in the public, private or service sectors.

- Create constancy of purpose towards improvement of product and service
- Adopt the new philosophy. We can no longer live with commonly accepted levels of delay, mistake and defective workmanship
- Cease dependence on mass inspection. Instead, require statistical evidence that quality is built in
- End the practice of awarding business on the basis of price
- It is management ‘s job to work continually on the system
- Institute modern method of training on the job
- Institute modern methods of supervision of production workers. The responsibility of foreman must be changed from numbers to quality

- Drive out fear, so that everyone may work effectively for the industry
- Break down barriers between departments
- Eliminate numerical goals, posters and slogans for the workforce asking for new levels of productivity without providing methods
- Eliminate work standards that prescribe numerical quotas
- Remove barriers that stand between the hourly worker and their right to pride of workmanship
- Institute a vigorous programme of education and retraining
- Create a structure in top management that will push on the above points every day

He believed that adoption of, and action on, the fourteen points was a signal that management intended to stay in business. Deming also encouraged a systematic approach to problem solving and promoted the widely known Plan, Do, Check and Act (PDCA) cycle. (Fig 1.2)

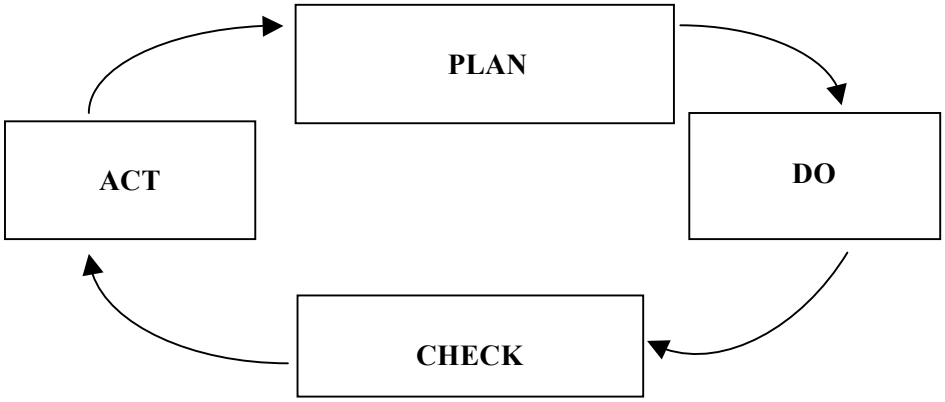

Fig 1.2 PDCA Cycle

It is universal improvement methodology, the idea being to constantly improve, and thereby reduce the difference between the requirements of the customers and the performance of the process.

The cycle is about learning and ongoing improvement, learning what works and what does not in a systematic way: and the cycle repeats; after one cycle is complete, another starts.

1.4.2. Joseph M. Juran (1904-2007):

Juran developed the quality triology – quality planning, quality control and quality improvement. Good quality management requires quality actions to be planned out, improved and controlled. The process achieves control at one level of quality performance, and then plans are made to improve the performance on a project by project basis, using tools and techniques such as Pareto analysis. This activity eventually achieves breakthrough to an improved level, which is again controlled, to prevent any deterioration.

Juran believed that quality is associated with customer satisfaction and dissatisfaction with the product, and emphasized the necessity for ongoing quality improvement through a succession of small improvement projects carried out throughout the organization. His ten steps to quality improvement are:

- Build awareness of the new and opportunity for improvement
- Set goals for improvement
- Organization to reach the goals
- Provide training
- Carry out projects to solve problems
- Report progress
- Give recognition
- Communicate result
- Keep score of improvements achieved

- Maintain momentum

He connected not just on the end customer, but on other external and internal customers. Each person along the chain, from product designer to final user, is a supplier and a customer.

1.4.3. Armand V. Feigenbaum (1920 - 2014):

Feigenbaum was the originator of "total quality control" often referred to as total quality. He defined it as, "An effective system for integrating quality development, quality maintenance and quality improvement efforts of the various groups within an organization, so as to enable production and service at the most economical levels that allow full customer satisfaction".

He saw it as a business method and proposed three steps of Quality:

- Quality leadership
- Modern quality technology
- Organizational commitment

1.4.4. Philip B. Crosby (1926 – 2001):

Crosby is known as the concepts of "Quality is Free" and "Zero Defects" and his quality improvement process is based on his four absolutes of quality:

- Quality is conformance to requirements
- The system of quality is preventive
- The performance standard is zero defects
- The measurement of quality is the price of non conformance.

His fourteen steps of quality improvements are:

- Management is committed to a formalized quality policy

- Form a management level quality improvement team (QIT) with responsibility of quality improvement process planning and administration
- Determine where current and potential quality problem lie
- Evaluate the cost of quality and explain its use as a management tool to measure waste
- Raise quality awareness and personal concern for quality amongst all employees
- Take corrective actions, using established formal systems to remove the root causes of problems
- Establish a zero defects committee and programme
- Train all employees in quality improvements
- Hold a zero defect day to broadcast the change and as a management recommitment and employee commitment
- Encourage individuals and groups to set improvement goals
- Encourage employees to communicate to management any obstacles they face in attaining their improvement goals
- Give formal recognition to all participants
- Establish quality councils for quality management information sharing
- Do it all over again – form a new quality improvement team

1.4.5. Karou Ishikawa (1915 – 1989):

Ishikawa made many contributions to quality, the most noteworthy being his total quality viewpoint, company wide quality control, his emphasis on the human side of quality, the Ishikawa diagram and the assembly and use of the seven basic tools

• Pareto analysis	What are the big problems?
• Cause and effect diagram	What causes the problem?
• Stratification	How is the data made up?
• Check sheets	How often it occurs or is done?
• Histograms	What do overall variations look like ?
• Scatter diagram	What are the relationships between factors?
• Process control charts	Which variations to control and how ?

He believed these seven tools should be known widely, if not by everyone, in an industry and used to analyze problems and develop improvements. Combination of tools, they form a powerful kit. One of the most widely known of these is the Ishikawa (or fishbone or cause and effect) refer Fig 1.3.

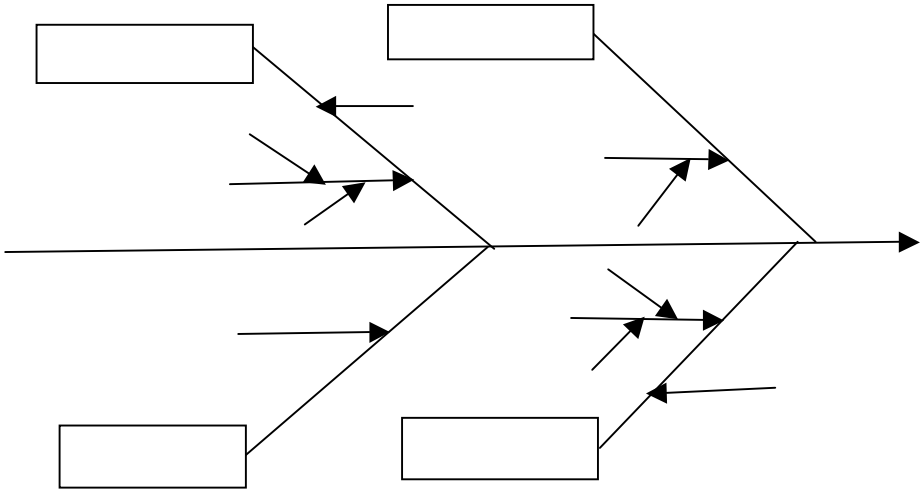

Fig 1.3 Ishikawa Diagram

Like other tools, it assists group in quality improvements. The diagram systematically represents and analyses the real cause behind a problem or effect. It organizes the major and minor contributing causes leading to one effect (or problem), defines the problem, and identifies possible and probable

causes by narrowing down possible ones. It also helps groups to be systematic in the generation of ideas and to check that it has stated the direction of causation correctly. The diagrammatic format helps when presenting result to others.

1.4.6. Genichi Taguchi (1924 – 2012):

Taguchi propagated that it is preferable to design product which is insensitive to variation or robust in the manufacturing process, rather than attempt to control all variations during manufacturing process. To convey this idea into practice, he took the knowledge of design of experiment and made it more practical and useable for quality professionals. His message was emphasizing quality with the routine optimization of product and process prior to manufacture rather than quality through inspection. Quality and reliability are taking care in the design stages where they really belong and broke down off-line quality into three stages which is shown in Fig 1.4.

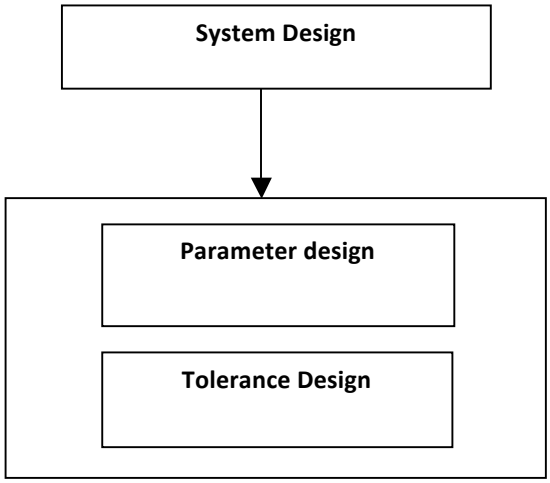

Fig 1.4 Taguchi design approach

"Taguchi methodology" is fundamentally a prototyping method that suggests the designer to identify the optimal settings to produce a robust product that can survive manufacturing time after time, piece after piece and provide what the customer wants. Today, industries see a close link between Taguchi methods, which can be viewed along a continuum and quality function deployment (QFD).

1.4.7. Shiego Shingo (1909 – 1990):

Shingo is strongly associated with Just in time manufacturing and was the inventor of the single minute die exchange (SMDE) system, in which set up times are reduced from hours to minutes and the Poka-Yoke (mistake proofing) system. In Poka Yoke, defects are examined, the production system is stopped and immediate feedback is given, so that the root cause of the problem may be identified and prevented from occurring again. The addition of a checklist recognizes that human can forget or make mistake. He distinguished between "errors", which are inevitable and "defects", which result when an error reaches a customer, and the aim of Poka-Yoke is to stop errors becoming defects. Defects arise because errors are made and there is a cause and effect relationship between the two. Zero quality control is the ideal production system and there is a cause and effect relationship between the two. Zero quality control is the ideal production system and this requires both Poka Yoke and source inspections. In the latter, errors are looked at before they become defects, and the system is either stopped for correction or the error condition automatically adjusted to prevent it from becoming defect.

1.4.8. Tom Peter (1942 - Present):

Tom Peter identified leadership as being central to the quality improvement process, discarding the word "Management" for "Leadership". The new role is of a facilitator and the basis is "Managing by walking about" (MBWA), enabling the leader to keep in touch with customers, innovation and people, the three main areas in the pursuit of excellence. He believes that, the effective leader walks, at least 3 major objectives are happening:

- Listening
- Teaching
- Facilitating

Having researched successfully American industries, he concluded that any intelligent approach to organizing had to encompass and treat as interdependent seven variables, in what became known as the McKinsey 7-S framework. The concept of quality as described by Quality Guru's is shown in Table 1.1

Table 1.1 Concept of Quality

Concept / Author	Crosby	Deming	Feigenbaum	Ishikawa	Juran
Customer Satisfaction	Maturity grid : form goodness and delighting the customer to satisfaction and conformance	Customer defines quality: consumers are the most important part of the production line	Quality is what the customer says it is; customer focus is embedded in the management of quality	Total quality control (TQC) means having a consumer orientation	Customer satisfaction which drives market share and profits comes from product satisfaction
Cost Reduction	The price of non conformance means that quality is free.	Doing it right first time means less waste, less rework and lower cost.	Controlling quality costs less than correcting mistakes.	TQC reduces cost over the long term not the short term.	Costs of poor quality remain unknown, but they are very high.
Leadership and top management commitment	Leadership by example- commitment is demonstrated by participation and attitude.	Management job is leadership (to show constancy of purpose in their focus on quality).	Requires complete support of the top management, who realizes that it is not a temporary cost reduction project.	Top management commitment should be shown by adopting the lead role in implementation.	Top management job is motivation, which includes participation in quality programme.
Training and education	Use training in quality, from the CEO down, to internalize concepts; training and education is continuous.	Vigorous, continuous programme for training employees in new knowledge and skills; statistical methods to check training	Training (on the job, classroom, problem solving) and education are fundamental to achieving full commitment to quality.	TQC is a revolution in thinking, so training and education must be continuous for all employees (from CEO down).	To make quality happen, training should include the entire hierarchy, starting at the top; purpose of training is to create and update

		efficiency.			knowledge.
Teams	Use management team for quality for internal communication, quality council for internal/external communication.	Cross-functional teams can create improvement in product, service and quality and reduce costs.	Quality control committees should have representatives from all functional areas.	Cross-functional management committees (teams) facilitate the responsible development of quality assurance.	Major quality improvement projects are multi-functional in nature, thus requiring multifunctional teams.
Culture	Quality commitment-genuine belief by employees in importance of good quality, workmanship, good designs and service.	A new philosophy is required: drive out fear (of quotas, questioning accepted methods, etc.) and instill pride in quality.	Quality control is a spirit of quality mindedness", from CEO to the shop floor; it is a communication channel and means of participation.	TQC requires organization wide participation; where there are no voluntary quality circle activities, there is no quality control.	Changing to a company- wide quality system means changing existing cultural patterns; there may well be cultural resistance.

(Source: Reed, Lemak and Mero (2000, p.8))

1.5. QMS Approach:

The international Organization for standardization (ISO) was established in Geneva in 1947. The purpose of the organization is to prepare International standard. ISO 9000 series in terms of Quality standard has come to existence in 1987. According to ISO/CD 9001/2000," ISO 9001 states quality management system requirements for use as a means of ensuring confirming product and/or services and may be used for certification process. The application for ISO 9000 presents requirements for quality management systems, the certification of which can be utilized (1) to demonstrate company's capability to meet customer requirements for products and or services, and (2) for assessment of that capability by internal parties" (International standardization 1999, 19).

According to Richard et. al. (2003), "while, it is important to understand and apply the principles in the development of quality management systems, it is

equally important to understand that the principles do not contain auditable requirements." So, it is absolutely important to understand the motive behind ISO 9000. There are eight quality management principles.

ISO 9001 uses a process-oriented approach e.g. there are 21 processes in its scope, which is the entire Quality Management System. Thus, it can be concluded that QMS is a single large process that avails many inputs to generate many outputs.

ISO 9001 encourages process approach for managing an organization. Managing an organization requires a number of interlinked processes which is shown in Fig 1.5.

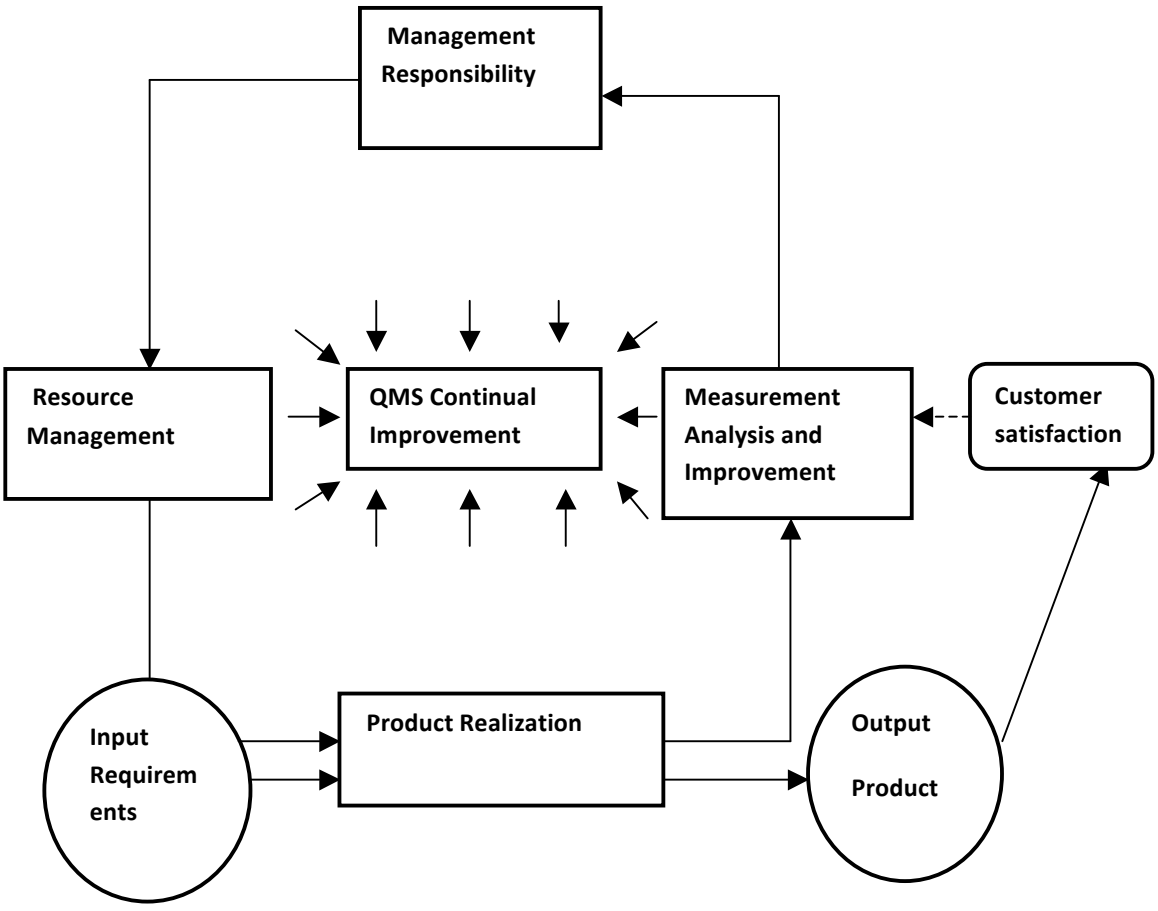

Fig 1.5 QMS process

Irrespective of organization size, every organization is made up of integrating processes. Process can be defined as a set of activities to convert input to output with the use of resources. The output of one process can be input to

another process. ISO 9001 standard talks about management and improvement of the processes.

1. Identify Key processes.
2. Define quality standard of those processes.
3. Decide which parameter to be measured and how to measure.
4. Document the process to achieve desired quality.
5. Evaluate quality and improve continuously.

Year wise total Industry accredited to ISO is shown in Table 1.2 and top ten countries ISO accreditation list is shown in Table 1.3.

Table 1.2 Global ISO certification year wise

No of companies ISO Certified	Year
10,64,785	Dec 2009
11,18,510	Dec 2010
11,11,638	Dec 2011
10,96,987	Dec 2012
11,29,446	Dec 2013

Table 1.3 Top ten countries for ISO 9001 certifications

Rank	Country	No.of certificates
1	China	3,28,213
2.	Italy	1,71,947
3.	Japan	56,912
4.	Spain	53,057
5.	Germany	49,540
6.	United Kingdom	45,564
7.	India	29,574
8.	USA	28,935
9.	Brazil	28,325
10.	Republic of Korea	27,284

(Source ISO Survey 2013)

1.6. Quality Award Approach of TQM:

Quality awards are instituted by various forums all over the country to honor the TQM implementation effort done by the company to promote excellence in services and production processes. There are various types of Quality awards. The Deming prize was instituted in 1951, which is the oldest award. It was instituted by the Union of Japanese Scientist and Engineers (JUSE). The award is instituted to recognize significant contributions to quality Control research and industries which have excelled in applying Quality Control programme. Malcom Balbridge award was established in 1987 in the United States. The award is given in the categories of service and manufacturing. In the line of Balbridge award, European community has also come out with Quality award named EFQM in 1991. Subsequently Australian Quality award was instituted in 1992.

Vokurka et al. (2000) have compared the western model of Quality awards with Deming Quality award on the basis of quality principle and criteria, objectives etc. Commonality is that all of them use minimum seven criteria:

1. Business result
2. Leadership
3. Planning
4. Customer
5. Human resources focus
6. Process management
7. Information and analysis.

In the entire above quality award forums, paramount interest is Customer. To satisfy customer demand, it aligns all other processes like Product Design, Leadership, and Strategy Planning etc.

In all the awards, customer satisfaction, employees' satisfaction and community satisfaction are given importance. A comparison of these shows that except Deming award, in all the other awards, result has given considerable weightage. Researchers are of the opinion that if enabling factors are good then the result will follow automatically. The researchers are of the view that the enablers are independent variable and results criteria are dependent variable, however it is not fair to add two types of variables under uni-dimensional additive scale.

The comparison between Malocm award and Deming award clearly indicate that processes are given more importance than Malcom model. Whereas in Malcom model "Business result" is given maximum weightage and in Deming's model, this is totally missing.

The commonality and differences of both developed and developing countries are compared with respect to Deming award, MBNQA and EQA. A comparison of nine quality awards of nine countries were compared by Hui et al. (2002), is given in Table 1.4.

Table 1.4 Criteria of Quality awards

U.S. Malcom Balbridge National Quality Award	Japan Quality Award
Leadership	Management Vision and Leadership
Strategic Planning	Understanding and Interaction with Customer
Customer and Market focus	Strategic Planning and Deployment
Information and Analysis	Human Resource Development and Learning
Human Resource Focus	Environment
Process Management	Process management
Business Result	Sharing and Utilization of Information's
	Result of Enterprise Activities
	Customer Satisfaction

European Quality Award Leadership Policy & Strategy People Partnership and Resources Processes Customer Result People Result Society Result Key Performance Result	Costa Rica Excellence Award Customer satisfaction Managerial Leadership and Strategic Planning Human Resources Quality System and Processes Innovation and Technology Environ Management
Canadian award for Excellence Leadership Planning Customer Focus People Focus Process management Partner/Supplier Focus Organizational / Business performance	South African Excellence Award Leadership Policy & Strategy Customer & Market focus People management Resource and Information Management Processes Impact on Society Customer Satisfaction People Satisfaction Supplier and Partnership Performance Business Result
Australian Business Excellence Award Leadership and Motivation Strategy and Planning process Data, Information and Knowledge People Customers and market Focus Business Results Process, Products and Services	Jordan: King Abdullah II award for Excellence Leadership Strategic Planning Process Management Resource Management Results

Singapore Quality Award Leadership Planning Information People Processes Customers Results	

(Source: based on Hua et al. (2000, 63))

1.6.1. Indian Quality Award:

The concept of quality awards started to take root in Indian Industries. Rajiv Gandhi Quality Award is the first Quality Award instituted in India in 1991 and thereafter many Quality Awards have been instituted. Among them the prominent award is CII-Exim Bank Excellence award. The model of the Award is as follows in Fig 1.6

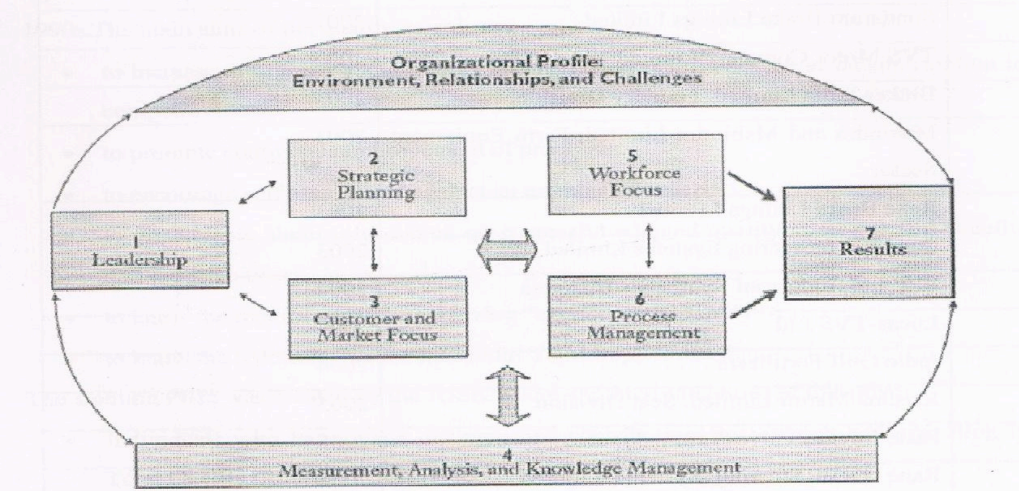

Fig 1.6 CII-Exim Bank Award model

The Indian quality awards are compared among themselves in Table 1.5.

Table 1.5 Comparison of Indian Quality awards

Awards	Golden Peacock Award	CII – EXIM	IMC Ramakrishna	Rajiv Gandhi National

	2003		Bajaj Award	Quality Award (1999)
Organizations	Institute of Directors	Confederation of Indian Industry and Export Import Bank of India, New Delhi	Indian Merchant's Chamber Bombay	Bureau Of Indian Standard, New Delhi
Criteria Enablers	Organizational Leadership Strategic Planning Human Resource Management Information Analysis Process management	Leadership Policy and Strategy People Management Resources Process	Leadership Strategic Planning Human Resource development and management Information Analysis Process management	Leadership Policy & Strategies Human Resource Management Resources Processes
Result	Customer satisfaction Employee Satisfaction Impact on Society Business Result	Customer Satisfaction People Satisfaction Impact on Society Business Result	Customer satisfaction Business focus	Customer Satisfaction Employee satisfaction Impact on Environment and society Business Result

1.7. TQM Methodology:

TQM is being practiced through a set of tools. These tools help the organization to generate creativity, encourage participation, apply mind to understand the problem, gather data, analyze data, arrive at optimum solution and apply to solve problem. There are two types of tools a) Hard tools and b) Soft tools. Hard tools are those by whose application the result can be obtained

which is visible, whereas soft tools are those whose result is obtained in the long run. There are numerous types of tools; some of them will be discussed briefly.

1.7.1. 5S Methodology:

The name of workplace organization method is called 5S. These are all Japanese word: *seiri, seiton, seiso, seiketsu,* and *shitsuke.* All these words start with 'S' and when translated into English which also starts with 'S'. These words describe how to organize a work space for efficiency and effectiveness. These are achieved by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The decision-making process usually comes from a dialogue about standardization, which builds understanding among employees of how they should do the work (Mr. Hirano, coined 5S terms for Just in Time).

The phases of 5S are: sorting, straightening, systematic cleaning, standardizing, and sustaining.

Sorting (*Seiri*):

Meticulously go through the entire work area and plant. Keep only necessary tools, parts instructions. All unnecessary things are to be eliminated. Prioritizing items are as per requirement and kept in easy accessible position and all other things are to be discarded.

Stabilizing (*Seiton*):

All items are to be properly placed with identification. Nothing should be identified. There should be place for every item.

Sweeping (*Seiso*):

Keep work place tidy. After every day's work, work place is to be cleaned and everything should be placed at the right place. This will help to know whether anything done in a messy manner or not. This gives a visual signal. This needs

to be continued each and every day, not only when things are unclean and beyond control.

Standardizing (*Seiketsu*):

Similar work places should be identical. They need to use similar tools if they are working on the same type of work. So tools need to be standardized. Any person can work in any work place if the same type of work is being carried out.

Sustaining the Practice (*Shitsuke*):

Maintain the standard and not to allow it go back to the original position. Earlier 4S have to be maintained. If any change is to be done then it needs to be done such a way that new way is the better way of doing previous things. Once new way is established then that needs to be maintained. The same cycle continues and continual improvement becomes habit of the organization.

1.7.2. Andon Light:

An Andon light is a visual signal when an abnormal condition has occurred in the production line. The color of the light is yellow. In lean management this is one of the common forms of tool.

In practice, the following scenario takes place:

1. A worker can not find a special stool he needs to do a job.
2. In a chain production line there will be specific time allotted to do the job. Everybody has to finish within that specified time; otherwise the succeeding production stage will suffer. To fix the problem worker pulls an andon cord and the yellow light glows. A person or supervisor comes quickly for helping the worker. The person or supervisor also cannot find the tool and immediately the red light is pressed, which indicates a line stoppage.
3. Line Manager or Engineering team comes on to the spot and fixes the problem. The line starts once again.

4. The line supervisor notes the problem. The actual root cause of not availability is to be investigated and proper action is to be taken so that same problem may not repeat. This is a part of the continuous improvement process.

(Used in Toyota Production system)

1.7.3. Control Chart:

Control chart is the tool to understand that the process is under statistical control or not. This is also known as Shewart Chart being the originator of the concept.

A control chart consists of:

- Data pertaining to process is collected.
- Mean of the means, mean of the range and mean of the proportion are calculated.
- A line is drawn based on the mean which is called central line.
- The standard error is calculated.
- Based on 3 times standard error upper control and lower control limits are calculated and these are drawn along either sides of central limit. (Fig 1.7).

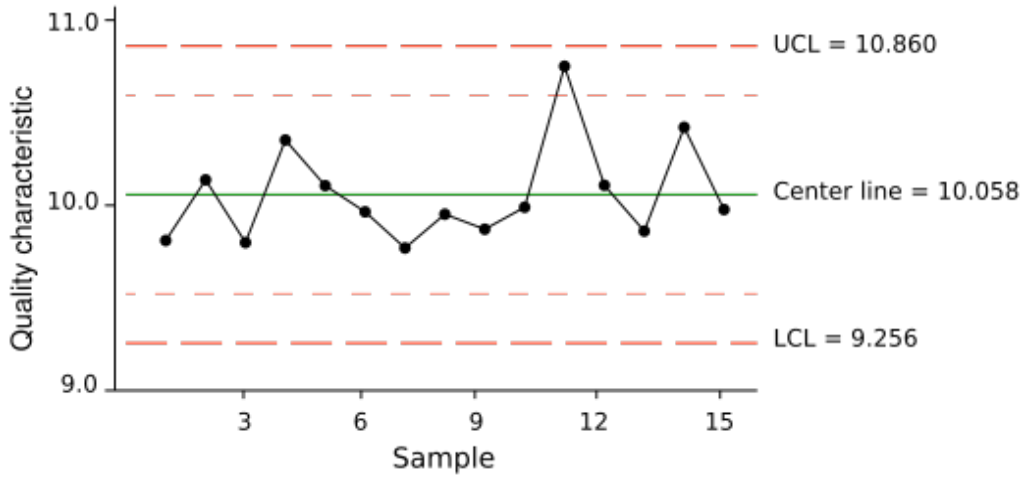

Fig 1.7 Control Chart

Some of the control charts are given in Table 1.6.

Table 1.6 Control chart details

Chart	Process	Relationship	Observation type
X and R Chart	With in one subgroup quality characteristics measurement	Independent	Variables
X and S chart	With in one subgroup quality characteristics measurement	Independent	Variables
P chart	Fraction nonconforming within one subgroup	Independent	Attributes
U Chart	Nonconformances per unit within one subgroup	Independent	Attributes
C Chart	Number of non conformances within one subgroup	Independent	Attributes

1.7.4. Flow Chart:

The Flowchart shows a diagrammatic view how the process takes place. It was first introduced by Frank Gilbreth. It shows all the steps and their interlinking is shown by arrows. Algorithm moves in a step by step manner, being represented in boxes, which helps to understand the process. Flow chart is extensively used in designing, documenting, analyzing and managing a process or operation.

1.7.5. Histogram:

A distribution of data when represented through the visual form is called a Histogram. It was introduced by Karl Pearson. Data is displayed as a series of rectangles of equal width and varying height. The height depicts the quantity of data available in that subgroup. The pattern varying height shows the distribution of data values. By examining the height, one can understand the behavior of the process.

1.7.6. Cause and Effect Diagram:

A cause and effect diagram is a tool which shows the relationship between the result or a symptom or an effect and its possible cause. The diagram was devised by Dr. Ishikawa and is also known as Iskikawa diagram. The diagram

helps to understand probable causes which can create the problem. In a systematic way, all causes are analyzed and the root cause is identified.

1.8. Need of Study:

In 1987 a Havard Business school professor and quality expert, David Gravin claimed, "Given its long history, surprisingly little is known about quality management. Academic research on the subject is in its infancy". After a decade, Ahire et al. (1998) maintained that "only recently has empirical research, focused on the developing the theory of quality management, started to appear in scholarly journals…". Now, roughly two decades after Garvin's formative observation, empirical research related to TQM has emerged with noticeable vigour. Now TQM has become ubiquitous phenomenon in the service as well as manufacturing industry. There are many literatures available in TQM as on date. TQM research has grown in stature and has become customary in top management journals all over the world.

The present challenge, is to find a clear pattern in existing research that can help to bring consensus around empirically proven factors in quality management which are critical to quality management, factors are not completely agreed upon or defined (Sila et al., 2002, 2005). Quality management theory moves from infancy to early development, and demand for more practical (empirical) research in quality to be continued. Though general management researcher accepted TQM, but little methodological improvement has been made, systematic and well organized studies are not common. This is particularly true in the context of developing countries like India.

In view of large consumer base and huge potential markets in some of the developing countries, MNC's searching for the growth, are increasingly realizing that they must produce and cater to the emerging markets of developing countries such as China, India, Brazil and Russia. Bloom et al. (2009) suggested that Indian industries are unaware of the many modern management practices that are used in Japanese firms. Management practices

evolve over time, with innovation like Taylor's "Scientific Management", Ford's mass production, Sloan's M-from corporation, Deming's quality movement and Toyota's "lean production". These management techniques spread slowly across countries and firms - for example, the US automotive Industry took two decades to adopt Japanese lean manufacturing. We find our Indian firms (Mehta et al., 2014) are far from the management technological frontier and often have little or no exposure to modern management practices that are now the standard in the US, Japan and Europe.

Escobar et al. (2006) analyzed that the ISO 9000 has created a lot of dissatisfaction in the industries those who have implemented it, the same needs to be critically analysed because the new version of ISO 9000 is more in line with TQM. Although there is some agreement over which factors constitute TQM, different studies still produced different sets of TQM factors that might have arisen from certain differences in the methodological or definitional approaches taken by various researchers. Using the criteria of quality awards such as Malcom Balbridge National Quality Award (MBNQA) and the European foundation of Quality Management (EFQM) as their preferred TQM factors in their studies, some researchers attempted to overcome these disparities in the set of TQM factors. However, the fact that various studies yielded different factors may also be due to the differences between countries 'business environments' in which the surveyed firms operate, which in turn are affected by various factors including culture, religion, education levels, the extent of industrialization, information technology, government regulations and so on. It brings into debatable point about the universal acceptability of certain TQM factors, which have been implemented successfully by industries by various countries. Tan et al. (2002) states that a culture of high power distance and / or strong uncertainty avoidance is not conducive for TQM. Indian culture shows high power distance and strong uncertainty avoidance which promote hierarchical relationship, dependency on superiors and a preference for regulations and rules for every situations rather than handling uncertain situations using discretionary decision making. This indicates that the Indian culture is not

conducive for TQM implementations. Several studies (Sila et al., 2002), also suggested the need to conduct more studies in the field of TQM. Tannock (2002), also narrated that many under developed countries currently are undergoing lack of industrial competitiveness, caused due to an inability to attract foreign business investment and value addition to exports. QM has a important role to play here, as it has been done already in the development of manufacturing in many Asian countries. How effective are QM practices to be disseminated to and adopted in these nations? The issue calls for research in QM in the developing countries including India.

In order to comprehend a more fundamental level of understanding of these quality management practices, a deeper level of analysis is needed. This type of analysis is needed particularly in India as pointed by Crosby that India is still in the bottom ladder of quality (Crosby, 1984). Indian Industries are passing through a difficult phase due to globalization of economy. Specially electronics industry, where technological change, takes place at a rapid phase. To sustain competitive environment and to cope up with the technological pace and threats from multinational companies, local electronics industry equip themselves with improvement of productivity along with the quality. Quality management practices are adopted both by small and medium scale industry as well as large scale industry. Adoption of quality management practices for the industry is not at all a smooth affair. There are difficulties in adaptation of quality management practices.

This study investigated the current state of adoption and implementation of quality management in the Indian industry via a questionnaire survey targeted at general and prime organizations. The purpose of survey research is to find out which situations, events, attitudes or opinions are occurring within group of the population. Survey research aimed at description asks simply about the distribution of some phenomena on a population or among subgroups of a population. The literature suggested the existence of different practices in different industry because of the unique business environment, in terms of customer expectations, competition and technology changes; which are

expected to create different opportunities and threats. Therefore different corporate and manufacturing strategies among industrial sectors should be expected. Curkovic et al. (2000), argues that the dimension of quality may differ in number or identity from one industry to another. So this study will also be directed to find out the difference between automotive and other manufacturing industry w.r.t to QM implementation. Data will be collected to fulfill all the above objectives. The major obstacles to implement QM in the industry as cited in the literature are found to be lack of expertise/resources in QM, behavior of executive management towards quality ,rigid attitude and minimal employees' commitment towards quality and lack of training and education to drive the improvement process.

Since there is little information available regarding the extent of QM usages in Indian Industry is available, the investigation of the adoption and implementation of QM in the Indian Industry is carried out through questionnaire survey.

The findings based on the empirical research would be useful to both decision making and researchers who are interested in the growth of industries of the world.

1.9. Research Objectives:

This study is aimed at discovering the extent to which Indian manufacturing especially Electronics Industry has understood and implemented QM and the benefit secured from QM. If the industry has not implemented QM yet, then what are the factors for non implementation? As such the objectives are;

1. To study the leadership visions for implementation of TQM in Electronics Industry.
2. To study various kinds of Quality Management practices in force & extent of their implementation in the Electronics Industry.
3. To study the factors that motivates for the implementation of quality management practices.

4. To study the extent to which organizations have gained benefits through implementing Quality management practices.

5. To identify the problems and challenges in the implementation of Quality Management practices

1.10. Delimitations:

The study was delimited to:

1. Only 50 Electronics companies having annual turnover more than Rs 10 Crores and having employee strength more than 50.

2. Responses are collected from either shop floor manager or quality control manger.

3. Questionnaires were from QM practices of the Electronics Industries.

Chapter 2: Review of Literature

2.1. Introduction:

This chapter reviews the knowledge based on quality management. The literature survey is intended to position this research vis-à-vis previous research effort. A large number of research studies on quality management provide a basis of present study. This chapter explains and summarizes the extensive search process in reviewing the QM and its implementation in the literature. The purpose is to categorize and classify past research with the intent of identifying issues and areas of gaps in our knowledge. Literature review was conducted to establish background information on conceptual issues of Quality Management, its critical success factors, implementation frameworks and its impact on performance and problem faced during implementation. A number of journals and books are consulted for this literature review. The list of main research journals is given in table 2.1.

Table 2.1 Main Research Journals

International Journal of Quality & Reliability Management	International Journal of Production Economics
Journal of Operation Management	Academy of Management Journal
International Journal of Production Research	International Journal of Operations & Production Management
Journal of Management in Engineering	European Journal of Operation Research
Total Quality Management and Business Excellence	International Journal of Quality Science
The TQM Journal	International Journal of Quality Science
OMEGA- International Journal of Management Science	Production and Inventory Management Journal
Management Science	Decision Science
ISO Management System	Manufacturing and Service Operations Management
Academy Management Review	European Management Review
Business process management Journal	The TQM Magazine

2.2. Review of literature on Quality Management:

Quality is the one of the critical factors in the success of any Industry. Quality assurance and quality management systems are topics which have recently received increasing attention worldwide (Ahmed et al., 2005). Total quality management (TQM) has spread its wings in every sphere of the global corporate world and Indian companies are no exception (Jagadeesh, 1999).

TQM is a structured approach to improvement. If correctly applied, it would assist an industry in improving its performance. While problems such as rework, scrap, delivery, delays etc. may be minimized by adopting a Quality Assurance (QA) programme, issues like unnoticed delays, frustration, redundant internal efforts, over control, manpower inefficiency, low morale etc. which are largely hidden, can only be exposed and cured by adopting TQM (Ahmed et al., 2003). In an attempt to provide a solid theoretical basis of QM, the Academy of Management review devoted special editions to QM theory.

Total five distinct areas of research emerge during the process of TQM literature survey. These are: Total Quality management implementation and Frameworks, Use of Tools and Technique of TQM, Benefit obtained from TQM, ISO 9000 and related literature, Obstacles to TQM implementations.

Following are some of the studies conducted on different aspects of TQM conducted in India and abroad. The basic concepts of the theories put by various quality gurus are given in the introduction itself. Here the emphasis is given on the specific studies which are conducted by various authors in different countries and reported in various international journals on management, quality management, quality and reliability research etc. The general investigations, conclusions are only reported.

2.2.1. Review of literature on Total Quality Management Implementation and Frame work:

Following studies are conducted on TQM implementations in various countries:

Frias (2015) analysed the critical factors which affect implementation of TQM in construction company in U.A.E. Through a questionnaire, data were collected from 60 respondents. The result showed that management commitment is the most important factors in the implementation of TQM in construction company. It depicted during implementation of TQM, the most effected outcome is project cost.

Mangal (2013) found supply chain management as a tool to improve the total quality management in Sugar Industry. Sugar plant consists of complex process which comprises of various sub systems namely feeding, crushing, steam generation, crystallization and refining etc. Supply chain management is one of the central and important area of academic research due to its impact on process industry, competing in today's global economy. SCM is the integration and co-ordination of business processes that manages flow of distribution of material from supplier to customer. Objective is to avoid delay in deliveries, minimize inventory level, reduction of raw material cost by 5% and reduce delay in export document and custom clearance. It is really difficult to produce high quality and low cost products without considering a set of suppliers.

Faisal et al. (2013) studied the relationship between Total Quality Management (TQM) practices and quality performance in Indian service industries. The data are collected using questionnaire that was distributed among 600 Indian service industries. Out of 600 questionnaires e-mailed, 172 replies were received, giving a response rate of 28.6 per cent. A sampling technique is used to obtain the minimum sample size of 600 from the four types of service industry (i.e. Healthcare, Banking, Information and Communication Technology (ICT), and Hospitality). The data have been analyzed using multiple regression correlation analysis, factor analysis and Pearson's correlation. The finding states that TQM practices are found to be partially correlated with quality performances of Indian service industries. It is also concluded that quality culture is perceived as one of the dominant TQM

practices. Other practices such as benchmarking, teamwork, quality system also showed a positive relationship with quality performance.

Islam et al. (2013) developed a conceptual model which involved six pillars (key characteristics of TQM) and their associated factors which should be considered as key aspects for TQM implementation. The model was examined by sending questionnaires to 31 export oriented unit (Ready Made Garment Factory in Bangladesh). The model depicted that the most significant factor associated with the pillars were, training of employees on TQM, trust based relationship with suppliers, formal customer feedback, recognition and reward of the employees, proper information sharing, practices of quality tools and techniques etc.

Natcha (2010) presented an all encompassing structure for selecting QM and change activity. The exploration was completed in three stages. Stage one set up a calculated foundation for the appropriation taking into account broad writing audit. Stage two gave observational investigations of the QM approaches received in three driving case commercial ventures in Thailand and meetings with quality specialists. At last, Phase three constructed a hypothesis of choice in view of cross-case investigation and a worldview display. Triggers for the reception were the inward variables (i.e. need to survive, sustain competitiveness, and increase operational effectiveness) and outside variables i.e. institutional push, trade barrier, and company image). The choice system and the hypothesis of selecting QM and change activities clarified the four choice perspectives of fashion setting, pay-off, strategic fit, and organization fit.

Tas et al. (2010) researched the execution level and the sorts of TQM practices received in construction companies. Eight components had been recognized, These components were top management leadership, customer management, people management, supplier management, quality information management, process management, organizational learning and continual improvement. A poll review was led to request the usage level of the recognized TQM components. The overview showed that procedure administration and top

administration initiative were actualized at a more elevated amount than the remaining components with quality data administration, executed at the most minimal level. Critical practices that constitute every component were also identified.

Khanna (2009) narrated that though there is tremendous growth in automobile sector in India, still globally impact is marginal. Though TQM assumed an essential part in the development of automobile sector, there is little evidence among the dynamic interaction among the sub system groups. Similar to Malcom Baldrige Quality Award model, the study depicted the casual relationship among "result" and "enablers" operating within 44 identified feedback loop. Out of them, 33 are positives and balances are negatives. The result showed an insight into the understanding TQM interactions among the various sub systems which help to identify action in implementing TQM.

Zhao et al. (2008) studied the result of quality-management survey conducted among manufacturing industries in India, China and Mexico, The result show that the majority of the manufacturers in the three countries are well aware of modern quality management concepts and philosophies. The study compared, among the Chinese companies in terms of quality performance, quality improvement efforts, application of ISO 9000 certificates, and adoption of the "quality is free" philosophy. The survey depicts that understanding of quality management principles is least in Chinese industries, among other three nation survey.

Fred et al. (2008) explored the relationship between quality management practices and SME performance in Ghana. As mentioned in the literature, MBNQA variables were leadership, strategic planning, human resource, customer focus, information and analysis, process management, and quality and operational results as tools of quality management practices. Seven speculations were hypothesized to look at the relationship of each of the MBNQA variables with the five SME execution pointers of profitability, customer satisfaction, sales growth, employee morale, and market share. A study containing 80 inquiries was regulated to a specimen of 200 little firms

utilizing less than 50 specialists and covering all segments in Ghana. The survey requested that the members show on a five-point Likert scale the degree to which every quality management practice was clear or was honed on those that impact their organizations' execution. Measurable examinations were directed utilizing SPSS to figure descriptive statistics, reliability analysis, correlation and regression. The paper found a number of significant relationships between the quality management variables and firm performance. The paper found various huge connections between the quality management variables and firm execution. It additionally discovered backing for the contention that quality administration hones enhance hierarchical execution in both substantial and little organizations and in any part of the world.

Sharma et al. (2008) portrayed that Total Quality Management (TQM) as an imperative component for the long haul accomplishment of an association. Nonetheless, there exist a great deal of global quality grants, aside from various forms of national quality awards (NQAs), created by the administrations of numerous nations. Notwithstanding these grants, there were a plenty of systems proposed by different specialists and experts. The author specified that numerous commercial ventures were not in a position to see obviously the idea of TQM, as far as recognizing what must be implemented and what territory to concentrate on. To conquer these issues, this study endeavoured to introduce a rundown of TQM implementation components for assembling perfection. A literature survey was completed to give a brief review about the 28 models, grants and systems given by national, international agencies and individuals. A similar examination was done to recognize the rundown of TQM components and a system for TQM usage components had been proposed through exchange with specialists and space information. The result of this examination was a structure of TQM usage components for maintaining manufacturing excellence, got from the similar investigation of different TQM models and national/international quality awards.

Pinto et al. (2008) revealed that the industries having TQM and ISO 9000 were only engaging themselves in implementation of new quality initiatives. There is positive correlation between ISO 9000 norm and TQM programme which cause to have financial gains. The most significant cause of failure of TQM was the failure in training programme of the employees, weak support given by the management and overestimated performance indicators settled by the industries.

Ramadan et al. (2007) compared quality practices in five nations: Malaysia, Palestine, Saudi Arabia, Kuwait and Libya. On the premise of such examination, the study proposed a model of global benchmarking for effective usage of TQM. The study, contended that while the model got from cultural settings, corporate conditions, visions and experiences of developing countries (Africa, Middle East and Asia), it possibly conveyed the making of a non specific structure for effective execution of TQM in other developing countries.

Ling-Feng et al. (2006) developed a performance evaluation system for the e-library in universities in Taiwan. The Delphi Method was then used to summarize the opinions of experts in completing the construction of a performance evaluation model for e-library. Analytic Hierarchy Process was used to illustrate the problems. The weightage of all indicators within hierarchies were calculated and then the weightage of the overall hierarchies were worked out. The e-library played two important roles: data searching and academic study.

Frieselban (2005) depicted that improvements in quality, benefit industry in terms of revenue and cost. The quality improvement enables industry to improve the bottom line, by combine effect of decrease in cost and increase in revenue. Only in rare case it may happen that cost of improvement exceeded the cost reduction and revenue boosting effect.

Gosen et al. (2005) explored the influence of organizational structure and international variables on quality, in developing countries. Gathering data

from industries and literatures, the study formulated specific prepositions depicting the influence of organizational (goal / priorities, commitment and control, networking, centralization/ decentralized) and international (cultural/social, political/legal) factors on quality. A number of gaps were identified. There were significant challenges including perceptions of quality, the legacy of colonization etc. The research developed general relationship between quality and international and organizational variables.

Baidoun (2004) identified critical success factors for implementation of TQM. It is understood that the process of implementation of TQM is gradual and careful selection of major top management actions. A logical framework was derived out of the study with three levels of investigations. These were including top management actions, the organizational activities and guidelines that need to be taken while addressing core components and foundation elements.

Ahmed et al. (2003) emphasized on the state of application of QM techniques and tools in small and medium industry. The finding revealed that by and large, lack of methodical analysis is a major weakness of small and medium scale industry. Still some rule of thumb and subjective observations are dominating over objective evaluation in the process of quality control decisions.

Li et al. (2003) depicted the evolution of quality practices and link to economic reform in China. A questionnaire was developed to access the quality practice in China. Total data were collected from 428 industries. There was no fixed pattern in the implementation of quality practices. It has been observed that joint venture companied were implemented more quality practices than the rest. Private industries were second and the state owned companies are having poor quality management.

Tata et al. (2003) concentrated on the procedure towards combination by distinguishing production design in International quality management in growing, recently industrialized and industrialized districts. Quality

management practices can be affected by the opposition confronted by the business. The components can fluctuate from country to country. Some case it might cost lessening other case it might be better item productions. The connection between quality management and organizational performances is more grounded in low innovation industry than high innovation intensive industry. In industrialized countries quality administration might be honed for an entirely decent number of years than creating areas.

Antony et al. (2002) provided an empirical study to identify critical success factors of implementation of TQM in Hongkong industries. A questionnaire was developed having 11 success factors and 72 elements. Data were collected from 32 Hongkong industries. A factor analysis was carried out to identified seven CSFs with 38 elements. The factors were shown to be reliable and provide a insights into understanding of TQM in Hongkong industries.

Sila et al. (2002) studied the critical factors for TQM. There are lot of studies have been taken place regarding TQM and its applicability. Based on the survey a host of critical factors are enlisted. An examination of 76 survey, reveals that TQM factors can be grouped into 25 categories. Data collected between period of 1989 to 2000 considering total survey of 347 also reveals that these 25 critical factors are the most frequently critical factors of TQM.

Tan et al. (2002) provided insight what leaders need to know the culture related values of India's workforce. Rajiv Gandhi National Quality Award (RGNQA) is taken as India's approach to TQ excellence. The method suggested that the leaders should hold authority with kindness, there should exist planning and ethical practices, considering cultural background for human resource management, employees training and team building.

Ghobadian et al. (2001) described the process of implementation of TQM among 31 industries where nine operated in service and manufacturing sector, 16 operating in manufacturing sector and 6 operated in service sectors. The study tried to findout the commonalities in the implementation process for successful companies and whether these commonalties lies a bit deeper than

activity level. The finding suggested that successful TQM organizations improves internal capability before the external influences are dealt with through process focus and customer focus.

Thiagaragan et al. (2001) distinguished quality elements for powerful TQM implementation, which are basic for TQM to thrive in Malaysian industry and to comprehend the elements of TQM implementation in a Malaysian context. The paper turns out with the result of the research as an implementation structure, built using viable rules, the key stride of which have been approved and upheld.

Gupta (2000) narrated the difference between non ISO and ISO industries in India. Data were collected from various industries for about four years regarding quality improvement program, quality control techniques used, technology management etc. It has been observed that there is significant difference in parameters between ISO and non ISO industries.

Mandal et al. (2000) described the propagation of quality management among Indian manufacturing industries. Data collected with in the period 1980 to 1996. Data were collected from 14 manufacturing sector covering 500 manufacturing industries. The study revealed the obstacles to adopt quality management practices and the extent quality management practices have implemented in these industries.

Reed et al. (2000) explored the relationship between competitive advantage and TQM of the firm. The study provided the argument that how strategy contains of TQM can generate cost differentiate based advantage. Using concepts from system theory and resource based theory, it can be shown that a sustainable advantage can be created and depicted that the process of TQM has the potential to create sustainable advantages.

Cheng et al. (1999) described motivation effect of different aspects of TQM as perceived by the employees of manufacturing industries in Chine. The results of this have revealed that mainland and HongKong Chinese front line workers perceive quality motivation to be in two dimensions, humanistic and

technological. Both sample groups revealed that the technological factor as more motivating than the humanistic factor.

Lawerence et al. (1999) described the current status and possible future of TQM as a major management concept. It looked at its strength in areas such as industrial and product oriented commercial business, in which it has become well established and demonstrably helpful to organizational objectives and its weakness in areas in which it has been less successful than would have been anticipated. The paper also considered the applicability of TQM concepts to product and service organizations and argues that there is evidence of greater ease of adoption and more apparent success, within product based companies than with service based organizations.

Neergaurd (1999) revealed that most of the Danish enterprises work with quality explicitly and as a result of their efforts, production errors have declined in parallel with customer complaints. However a number of industries lack the capacity to measure directly the benefits realised from quality initiatives.

Eaton et al. (1998) depicted the effect of TQM, utilizing financial data as parameters for business achievement. The financial data depended on operational income, net income, sales and day by day return stocks. Two gathering were framed for 108 firms, which were part as indicated by how cutting-edge the TQM advancement was in the organizations. An aggregate of 44 firms were delegated more progressed, while 64 firms were considered as less progressed. The more propelled organizations were accounted for as more fruitful.

Anderson et al. (1995) depicted about the investigation of 670 little business in Australia. There were inquiries relating to six quality variables (leadership, strategy, policy and planning, information and analysis, people, customer focus) in the review. Respondent were requested to rate questionnaire, utilizing a five point scale, the effect of these variables on six measures of business execution (sales, exports, cash flow, employment levels, overall

competitiveness and market share). Sixty two little business returned the complete questionnaire. It was accounted for that quality practices and systems were seen to have most astounding effect on the general aggressiveness of the business, trailed by sales, market share, employment levels and cash flow.

Jaideep et al. (1994) distinguished basic elements that should be rehearsed to accomplish viable quality management in an organization in light of the amalgamation of literature on quality ideas. A system to be created by organization to assess their quality practices. A field study was led to recognize the extent to which quality management is being practiced in Indian manufacturing organizations and to find the organizational area where better management control can make the quality program more successful. It purposes that all prerequisites for powerful quality administration can be characterized into the accompanying nine noteworthy basic elements, top management, quality policies, role of quality department, training, product design, vendor quality management, process design, quality data and feedback and employee relations. Seventy three organizations with more than 500 representatives took an interest in the study. The study presumed that all nine factors require not be available to guarantee the accomplishment of total quality program.

Maheshwari et al. (1994) revealed that objective of the research is to study the quality management practices of Indian manufacturing organizations. It depicts the result of survey conducted among the chief operating officers of medium and large size Indian manufacturing industries. The study investigated several quality management related issues including adherence to the “quality is free’ philosophy, causes of poor quality, quality performance, efforts to improve quality and status of ISO 9000 certification among the Indian companies. The study compared quality practices in India with industrialized nations as USA, Japan, Canada and Germany.

2.2.2. Review of literature on use of TQM tools and techniques:

Michael et al. (2015) narrated that TQM is used as a tool to enhance performance measurement of SME's of Ghana. Data were collected from 450 respondents to prove/disprove hypothesis. It revealed that customer's concern to be addressed first to improve performance of SME's in Ghana.

Mehta et al. (2014) studied the utilization of TQM standards in Education framework which was for the most part winning in the manufacturing area. Delphi procedure was utilized to actualize 13 principles of TQM. A relationship among these standards was created utilizing interpretive structural modeling (ISM) technique. It helped to identify the hierarchy of action to be made up for the change of engineering education. Order of these standards in view of their driving force (standards which hold different standards) and reliance (standards which are subject to different standards) had additionally been inspected for TQM usage to contemplate the driving power and reliance power of these standards. The goal was to decide a guide of TQM implementation and arrange TQM standards in view of their driving power for quality change in engineering education with the use of an ISM-based model. The outcomes showed that the standards having higher driving power, for example, quality mission and vision proclamation and top administration responsibility and visionary initiative ought to be given more consideration for general change in quality.

Kumar et al. (2011) expressed that Six Sigma has been in business lexicon for over 20 years, research had demonstrated the need of practical implementation structure for effective deployment of Six Sigma, particularly with regards to small and medium-sized enterprises (SMEs). The paper proposed a Six Sigma implementation framework modified to the necessities of SMEs by performing an evaluate of quality management systems/models for SMEs and reaching inference from the exact examination directed more than 3 years. In spite of the fact that the framework was tried in three SMEs amended, still its vigor

should have been checked and refined in view of recommendations and remarks from industry, professionals and scholastics.

Sayeda et al. (2010) explored the adoption of quality management practices in engineering educational institutions (EEIs) in India from management's perspective. A questionnaire was developed based on a literature review of research in quality management and based on the responses of the pilot survey among the senior faculty/management. The psychometric properties of this instrument were examined using tests of reliability and validity. Correlation and multiple regression analyses were used to analyze the impact of the total quality management (TQM) dimensions on institutional performance (effectiveness). The result stated that there were 27 critical factors/dimensions of quality management, which analyzed the relationship between TQM dimensions and institutional performance, which had been formulated using five dimensions. Positive and significant relationships among the TQM dimensions and institutional performance had been observed.

Jun et al. (2010) identified seven factors from CQA categories: leadership, strategic planning, human resource focus, process management, customer and market focus, information and analysis, and results. Extending the basic Baldrige theory "Leadership drives the system that creates results," this paper identified driver (leadership), direction (strategic planning), foundation (information and analysis), system (human resource focus, process management, and customer and market focus), and result (business results). Structural equation model (SEM) was used to analyze the empirical data and estimate the path coefficients among CQA categories. First, driver has not only a direct influence on results, but also has an indirect influence on results through system. Leadership has a great influence on foundation and direction. Second, direction affects human resource focus and customer and market focus of system while it has no influence on process management. Third, human resource focus on customer and market focus both affects process management, and process management has a significant impact on results. Fourth, foundation affects direction and all of the categories of system.

Mehmet et al. (2010) investigated the role of quality management (QM) in the development of mass customization (MC) capability. The paper proposed that these six practices reflected the core principles of QM, and in turn QM contributed to the development of MC capability. Using the survey data collected from 167 manufacturing plants in three industry and eight countries, structural equation modeling was employed to test the hypotheses. The results provided empirical evidence supporting the proposed relationships between QM and MC capability.

Gadenne et al, (2009) investigated that affect of the key “hard” and “soft” quality management factors used by Australian small and medium enterprises (SMEs) and their association with organisational performance. A survey questionnaire was constructed for this research using Powell's quality management framework. The respondents were required to indicate their degree of implementation of quality management practices and to rate their TQM performance in relation to overall performance, return on assets, market share and customer satisfaction. The study found that improved overall performance appears to be favorably influenced by a combination of “hard” TQM factors such as benchmarking and quality measurement, continuous improvement, and efficiency improvement; and the “soft” TQM factors consisting of top management philosophy and supplier support, employee training and increased interaction with employees and customers. Furthermore, the TQM factors of employee training, efficiency improvement, and employee and customer involvement would appear to be important in maintaining customer satisfaction, whilst employee and customer involvement also appeared to be important in maintaining a competitive edge in terms of return on assets.

Knouse et al. (2009) described the impact of Deming's ideas on the twenty-first century. A ProQuest search of articles was done mentioning “Deming” and “quality” or “legacy” in the title published between 1994 (Deming died in December 1993) and 2006. It was found that 136 articles described Deming's legacy. Legacy in five areas are examined: professional accreditation,

customer satisfaction, business ethics, human error, and supply-side management. Deming's ideas have furthered not only quality management but have also touched areas in the social sciences, such as ethics and organizational relationships. This study showed that Deming's ideas continue to flourish in areas that he emphasized, such as the importance of customer satisfaction and understanding human error, and areas that he did not foresee, such as business ethics and supply-side management.

Magd (2008) investigated about the state of benchmarking in a variety of organizations in Egypt. More specifically, the study aimed to understand the state of benchmarking in Egyptian organizations as well as the driving forces, benefits behind undertaking benchmarking and the reasons for not benchmarking in non-benchmarking organizations. The study investigated the most important influential factors for effective benchmarking. The present study was based upon the results of an empirical research in which the state of benchmarking in Egyptian organizations was studied. Mail surveys carried out on 500 organizations and 45 percent responded. Results indicated that the most important reasons for initiating benchmarking are to maintain and increase competitive advantage, increased profitability and achieve continuous improvement. Moreover, the most important benefits derived from benchmarking include improved customer satisfaction and improved response time. Further, top management commitment was found to be an important influential factor for effective benchmarking.

Kakkar et al. (2007) revealed the status of TQM implementation in India and overall performance in Indian context. A questionnaire was framed based on current practices and unexplored areas identified by literature survey. The questionnaire is having 11 contributing variable and nine contribution variables. The scores for different organization is put to factor analysis. The result showed that underlying dimensions, or extracted factors, are four in number and are related to, efficiency, customer, people, and teambuilding. It shows that all the 20 TQM variables can be summarized into these four dimensions, which are taken as the four pillars of the suggested TQM model

for Indian organizations. The model was named as TQMEF (TQM-efficiency model).

Keng et al. (2007) described the perceptions of TQM practices and their impact on job satisfaction within a large Malaysian outsourced semiconductor assembly and test (OSAT) organization. Despite extensive research on TQM practices, none examines this scope of investigative study. Therefore, the proposed model was developed with the intention of examining this relationship. Original research using self-completed questionnaires which were distributed to all staff members within the organization is thoroughly reported. The study sample consisted of 230 employees, resulting in a response rate of 76.6 percent. A questionnaire developed by Wright and Cropanzana was used for ascertaining the level of overall job satisfaction. Data were analyzed by employing correlation and multiple regression analysis. The results revealed that teamwork, organizational trust, organizational culture and customer focus are positively associated with employees' job satisfaction. It is also found that, where teamwork was perceived as a dominant TQM practice, improvements in job satisfaction levels were significant. Further, the result of the multiple regression analysis supports the proposed model based on the empirically validated soft TQM instruments, which are reliable and valid.

Escobar et al. (2006) stated the level of dissatisfaction caused by ISO 9000 certification among small companies in Spain. An empirical examination was done on 131 ISO 9000:2000 certified small companies. The authors measured the dissatisfaction by comparing expectations before certifications to perceived results after certification. The higher expectations of smaller companies with respect to ISO 9000 refer to commercial aspects: access to new market, increase of market share and business portfolio. However, many of these objectives depend upon differentiating power of certification. When the number of certified companies increase in number, the differentiating power of certification falls. The study showed that this effect resulted in lower commercial advantages and higher dissatisfaction of small companies.

Sila et al. (2005) stated about the plethora of published research related to total quality management in the last few decades. However there were very few studies focused on cataloguing critical factors of TQM. One of the main objectives of literature review was to investigate the state of TQM by examining and listing various TQM factors identified based on survey studies conducted in different countries and published in various journals over the past decade. An examination of 76 survey studies that used an integrated approach to TQM showed that the TQM factors could be grouped under 25 categories. An analysis of the 347 survey based research articles published between 1989 to 2000 using these 25 factors as a framework revealed that they were the most frequently covered TQM factors in the literature. Another goal of the paper was to analyze the objectives of these articles by year and type of journal they were published in to determine the trend in TQM survey based studies and recommended future direction for research.

Garelli (2004) analysed about world economy and explained which country of the world will do good in future. The world competitiveness would undergo a major shift. Asian countries like China, India and most Asian nations are considered as providers of economic inputs to Japan, European countries and America. At some point of time Asian nations will have purchasing power and will create strong middle class society. And lastly these Asian countries will become a world competitor in their own right. Russia and Central Europe, also emerge as world competitors in their own right. They will challenge the competitiveness of the Europe and USA. Wealthy and ageing society will consumes more than it produces. Europe will suffer most and may fail to reform itself. World manufacturing explodes but manufacturing jobs implode. The productivity boom spreads via globalization into low cost areas. The next paradigm shift will affect the service industry.

Kumar et al. (2001) carried out a survey to find out that how many Indian Industries understand TQM and how are they implemented. The study revealed that 76% of the surveyed companies are implementing vigorously and other 24% are moving moderately. Majority of the respondents considered

management leadership and commitments, continuous improvement, customer focus and satisfaction, education and training, SPC and quality awards as major determinants of TQM implementation. The TQM implementation is viewed to be increasingly complex and cumbersome exercise. Since the complete results of TQM implementation are visible after a long time period and people feel frustrated who are involved in TQM in view of time, money and energy which is invested in its implementation.

Rahman (2001) studied that the relationship between TQM practices and the business outcomes in SMEs in Western Australia. A questionnaire was developed which asked the respondents to rate themselves on the extent to which they practiced 36 TQM practices. Business outcome are defined in terms of revenue, profit and the number of customers. A self rating scale was asked to measure business outcome. It was reported that 'leadership', 'process', 'products and services', 'people' and 'customer focus' were all significantly correlated with business outcomes.

2.2.3. Review of literature on benefits obtained from TQM:

Umair et al. (2015) assesses TQM effectiveness in construction industries. There are four dimensions of TQM fundamentally associated with construction process. They are Quality control, quality assurance, quality management and quality inspection. The empirical result stated that the quality assurance and management have most effects towards quality than other two quality aspects.

Kumar et al. (2011) depicted that Total quality management (TQM) is a modern management philosophy and a journey, not a destination. TQM is a systematic management approach to meet the competitive and technological challenges which has been accepted by both service and manufacturing organizations globally. The author studied to find the benefits of TQM, shortcomings of TQM and significant differences, if any in the understanding of seven success factors of TQM in manufacturing and service industry of North India. Success factors have been identified through a critical literature

review and a survey approach has been used to collect relevant data from manufacturing and service industry. In total, 30 manufacturing industry and 30 service industry from North India were chosen for study, where all were responded. The study finds that success factors have different rankings in manufacturing and service industry, but both sectors comprehend that implementation of TQM success factors is very important. The results also verified by rejection of the null hypotheses.

Kureshi et al. (2010) assessed the current quality management practices of service sector SMEs in Pakistan, and provide an insight for policy development for SMEs. A investigation of 100 SMEs in northern Pakistan was conducted through focused interviews and e-mail survey. The survey was based on a list of 19 quality management techniques selected through Delphi research. A significant gap is reported between the knowledge of quality management techniques and their usage by SME entrepreneurs. The results show strong usage of CRM related techniques while low usage of suppliers' development related and statistically extensive techniques. Significant correlation is found between the usage of TQM and other quality management techniques, particularly six sigma and 5S. The results offer insight into quality management practices in Pakistani SMEs which represent the broader South Asian business culture which consist a huge share of outsourcing to developed economies.

Abdullah (2010) analyzed the relationship between quality improvement practices on firm performances. The authors found a significant positive relationship between firm performances and quality improvement practices. Data were collected from 256 electrical and electronics industries across Malaysia. Out of six factors, only three factors i.e. management commitment, employee involvement and customer focus have shown positive significant effect on performance.

Gaddene et al. (2009) studied the factors of TQM. They are classified as hard factor and soft factor. The study revealed the association of both factors with organizational performances. Data were collected from 119 SMEs of

Australian industries. Total factors were classified into three hard factors and three soft factors. The hard factors were efficiency improvements, quality improvements and continuous improvement, the three soft factors were employee training, employee and customer involvement and top management philosophy and supplier support. None of the factors were significantly associated with market share but all them were significantly associated with over all performances.

Leopoldo et al. (2009) investigated the effects of six sigma, teamwork and statistical process control (SPC) on organizational-shared vision. The information used, comes from a larger study, the data for which, were collected from a random sample of 237 European firms. Of these 237 organizations, 58 have implemented six sigma. Structural equation modeling (SEM) was used to test the hypotheses. The main findings show that six sigma teamwork and SPC positively affect the development of organizational-shared vision. A positive but not significant influence is also observed between shared vision and organizational performance.

Mady (2009) depicted solid and legitimate develops for measuring quality management practices and test the impact of sort of industry and plant size on the implementation level. A survey was managed, with the assistance of the Kuwaiti Public Authority for Industry (PAFI), to a stratified specimen of 105 Kuwaiti plants. Corroborative component investigation and internal consistency tests were utilized to confirm scales validity and unwavering quality. Analysis of variance (ANOVA) and 't-test' were used researcher for measurable impacts of kind of industry and plant estimate individually. The outcomes uncovered four solid and substantial builds: client centre, total quality management (TQM) human practices, process quality resource, and quality measurements. While sort of industry demonstrated no noteworthy impact on the level of execution of the four quality administration develops, plant size was a determinant component of the implementation of customer focus and process quality practices.

Fisher et al. (2009) portrayed the historical backdrop of Quality Management, from its development in the late nineteenth and mid twentieth hundreds of years through to the present day. Specific emphasis is put on activities in Japan immediately following the end of the Second World War, and ensuing advancements somewhere else on the planet. The Study drew a watchful refinement between Quality Management and different systems that guide in its usage, for example, Six Sigma.

Das et al. (2008) portrayed a solid and substantial develops of total quality management (TQM) and an estimation instrument with regards to manufacturing industry in newly industrialized nations for assessing the TQM implementation. In view of an review of TQM literature and master suppositions, ten TQM constructs (nine implementation builds and one result build) were recognized. A nitty gritty questionnaire was produced with the things for ten TQM constructs alongside the inquiries on quality performance and data about the respondents. The survey was then sent to arbitrarily chosen ISO 9000 ensured producing organizations in Thailand. Out of 1,000 polls sent, 275 usable specimens were returned, giving a reaction rate of 27.5 percent. Taking into account the information from the overview, exploratory variable investigation was done to guarantee that things in every scale reflected adequately the extent of every build. Internal consistency analysis was done to guarantee the dependability of the develops. Paradigm related legitimacy and develop legitimacy were assessed factually to guarantee that the arrangement of measures effectively speaks to the builds, and the extent to which they are free from any orderly or non-irregular mistake. This paper recognized ten solid and substantial TQM constructs. Nine were usage builds and a solitary result develop. These builds had a sum of 52 things, lesser in number when contrasted with different instruments accessible in the TQM literature that had higher reliability also.

Ghobadian et al. (2007) portrayed the likenesses and contrasts between Total Quality Management (TQM) and Corporate Social Responsibility (CSR). In addition, the paper considers the ramifications of these similitudes and

contrasts for the future improvement of TQM and CSR. This paper is having structured discourse analysis which is utilized to deliberately investigate these two digressive subjects. Both ideas envelop verbose thoughts and practices. The findings in the paper recommend that the two ideas have comparative philosophical roots, that there is a generous cover between the components of the two ideas, and that a definitive expected result indicates huge likenesses. In spite of these likenesses, be that as it may, usage of TQM won't as a matter of course result in CSR

Joiner (2007) conducted a study on eighty motor vehicle parts and accessories manufacturing industries in Australia. TQM implementation was measured using seven item instruments. The six performance measurements were chosen which included financial and non financial criteria, achievement of budget targets, quality of output, new product development and cost reduction. The study supported a strong positive relationship between the extent of implementation of TQM practices and organizational performance and an environmental support provides a synergetic boost to organizational performance. It was premised that an environment of support within the organization enhances the effectiveness of TQM implementation confirming the appropriateness of a contingency theory approach to the successful implementation of TQM.

Dutta (2007) basically analyzed the system of one of the main leading awards of India by testing the relationship between stakeholder results and empowering works on utilizing regression analysis, structural equation model and data envelopment analysis. The consequences of the study uncovered that the structure is utilized by the organizations to upgrade firm level intensity yet not as an tool to add to national competitiveness. There is extension for further research to survey the adequacy and legitimacy of this model by applying the model in selected organizations and to analyze whether there is any huge change in results and practices over a time frame. The findings can likewise be compared and results and practices of those organizations not honing this model.

Lakhal et al. (2006) explored the relationship between performance and quality management practices. Ten practices were identified for TQM; Employee training, top management commitment, organization for quality, employee participation, supplier quality management, customer support, customer focus, quality system improvement, information and analysis. The study was conducted in Tunisia by taking data from 133 industries, The result depicted that infrastructure practices have a significant role on operational performance via core business.

Kaynak et al. (2005) investigated the relationship between the extent of quality management implementation and performance in high tech manufacturing industry. High tech industry ingenuity lies on the ability to respond to dynamic environments and to quickly develop innovative new products. Cluster analysis was done based on three performance variables, product quality, total inventory turnover and sales growth. As a result of cluster analysis, one high performing and other low performing group emerged out. The result showed that high performing industries have implemented QM more extensively than low performing high tech industry.

Yusof et al. (2003) investigated Chinese industries about the extent of implementation of TQM. The questionnaire was sent to 120 randomly chosen Chinese industries and 36 of them answered the questionnaire. The result showed that nearly 60% were implementing or have implemented TQM and 70% of those industries was in manufacturing sector. The result pointed out that TQM is widely adopted management approach in Chinese industries especially in manufacturing. TQM adopting companies showed better performance than those that did not adopt TQM. Majority of the companies felt that their employee involvement has increased with implementation of TQM.

Eriksson et al. (2002) examined the impact of TQM implementation on performances of 17 manufacturing industries in Sweden which have received the national (Swedish quality award), regional or in-house quality awards. Each quality award winner was individually compared with one of its

competitors. The indicator on which comparison made were percentage change in sales, return on assets, return on sales, percent change in total assets and percentage change in number of employees. Six year period was chosen and divided into one implementation period and one post implementation period. Most of the award recipients outperform their competitors and branch indices for indicators of change in sales, change in total assets and change in total number of employees for most of the studied period. The award recipients show a significantly higher return of assets and branch indices during the post implementation period of TQM. Thus TQM implementation improved the financial performances of the industry considerably.

Sohail et al. (2003) compared the total quality management practices (TQM) and organizational performances of small & medium industries (SMEs) with and without ISO 9000 certification in Malaysia. Based on the critical success factors, a quality management framework of the TQM programme is developed in this paper. Research was carried out to determine the differences. The quality management framework developed in this paper provided a benchmark of TQM practices for SMEs, which are in the early implementation stage of quality programme and this is proposed as a quality agenda for SMEs to enhance concentrate on particular territories of their separate quality project. Results taking into account the mean difference between firms with and without ISO 9000 affirmation demonstrate that there are noteworthy differences in exhibitions in the middle of certified and non certified firms.

Brah et al. (2002) revealed that the implementation of TQM directly relates with the quality performances of the industries. In particular, the authors claimed that the behavioral factors like leadership, role of top management, a customer focus, a human resource focus as well as TQM tools and techniques like process control, information and analysis, contribute to successful implementation of TQM. The finding also supported the conclusion that the size of the company affects the rigor of TQM implementation and the resulting level of quality performance i.e. larger industry achieve better quality

performance than smaller industry. The finding does not support the nature of industry i.e. manufacturing or service.

Chapman et al. (2002) described the degree of application of total quality management (TQM) philosophy and practices in Industrial Corporation of Jordon. The author used primary and secondary empirical data to examine the link between TQM and labour productivity. Survey responses were classified into two groups, low TQM implementation and high TQM implementation. It was found that mean labour productivity measurements for high TQM industries were significantly higher than for low TQM industries over the period 1993 to 1998. The mean growth rates of labour productivity measurements for industries with high TQM level were higher than for those with low TQM level during this period.

Ahire et al. (1998) studied the association between the product quality and integrated quality management constructs. Data was collected from 449 Auto firms. The result shows that variation (approximately 26%) of product quality is depend upon three parameters namely customer focus, empowerment, and supplier quality management. The management role is explained by splitting management strata in three tiers, high, medium and low. Firms with high top management commitment produce high quality products despite variations in individual constructs.

Solis et al. (1997) described the result of quality management practices on Central and North region of Mexico and US Midwest region. Total seven quality management practices- strategic quality planning, top management support, employee training, customer focus, supplier quality, quality information availability and quality citizenship were assessed and compared. Total 327 industries covered in two countries. There was significant difference in quality level between North Mexican industries with central and US Midwest industries.

2.2.4. Review on ISO 9000 and related literature:

Isuf et al. (2016) carried out ISO 9000 literature review to understand its benefit. The study showed clearly that there are benefits on employees systematization operational efficiency, customer handling. In simple term ISO certified industries improve operational efficiency, people and stakeholder performance.

Borut et al. (2010) distinguished and ordered potential and checked advantages of actualizing quality management Systems (QMSs) as indicated by ISO 9000 norms. The study depends on a far comprehensive review of the pertinent literature, for the most part articles identifying with usage of the ISO 9000 QMS and its effect on customer satisfaction and business performance. The literature illustrates conceivable advantages of the successful usage of the ISO 9000 QMS and scans for related backing in distributed empirical research. It additionally relates the potential advantages to particular standard prerequisites and the pre-conditions that should be met in the usage phase of the ISO 9001 with a specific end goal to achieve these advantages.

Masahiro et al. (2010) investigated the relationship between total quality management (TQM) rehearses and the business execution of Japanese-claimed producers in the USA. In this study, 200 organizations were picked by arbitrary testing from the universe group of 519 in August 2007. An aggregate of 32 usable questionnaires were received, and the overall response rate was 16 percent. The review comes about demonstrate that TQM practices significantly impact the general organization execution of Japanese-claimed producers in the USA. This infers TQM is a powerful technique for enhancing business execution, paying little mind to where the organization may be working, the length of the TQM practices are suitably actualized. Notwithstanding the examination information, discoveries from a field scrutinize additionally give supplementary confirmation to bolster this conclusion.

Tannock (2010) depicted the quality management practices followed in China. The data was collected from six Shanghai based manufacturing organization by taking interview of 14 managers from those companies. In

addition to that three quality expert were interviewed. The study revealed that Chinese manufacturing organizations does not blindly follow quality management practices rather they follow the practices based on several rational adoption factors.

Bloom et al. (2009) stated the growth of East Asia during 1965 to 1990 large depended upon human capital accumulation, high saving rate, trade openness and macroeconomic policy. Later on demographic changes was also shown as one of the major reform factor. To revive the situation East Asia has undertaken major economic reforms in response to financial crises and other factors, since 1990. It has been pointed out that, to offset potential negative effects of ageing population, a policy is needed to counter measure the same.

Paulo et al. (2009) depicted that the larger part of ISO 9001 accreditation research studies so far are bolstered by survey procedures and descriptive statictics. Accordingly, they express conclusions that are essentially got from suppositions and discernments about the subject. Hence, it is regular to discover in the open literature references that bring up the profoundly subjective results got from such studies (to some degree conflicting nature). With a specific end goal to accomplish this goal, a thorough writing audit of ISO 9000 studies was completed. For that reason roughly 100 articles were investigated, which were sorted in the accompanying classes, as per the utilized technique: overviews; examination of money related markers; contextual analyses; interviews; writing audit; and measurable information examination. This paper mirrors a comprehensive writing survey, which permitted the recognizable proof of a gathering of issues that ISO 9000 research examines have attempted to address, and additionally the most usually utilized philosophies utilized and fundamental conclusions achieved so far by the diverse writers. At that point utilizing such a cutting edge as a beginning stage, it brought up various inquiries that appear to be pertinent yet have not been so far tended to in the open writing as far as giving clear and exact replies, and in addition others that are at the center of the authors' future work around there.

Psomas et al. (2009) concluded on the basis of meta-analysis of research that the studies undertaken regarding the ISO 9000:2000 implementation, although there were signs that the initial results are not so positive, the general conclusion is that the standard has positive impact on the company's operational as well as business performance and on the company's effort to move towards total quality management. The author concluded that the ISO 9000 certified companies move towards TQM has not completely been determined and there is need to do research on this issue as well as long term effect of certifications.

Girdhar (2008) portrayed that the ISO 9000 certification guidelines have been most generally utilized norms as a part of the world. By an exceptionally preservationist evaluate, more than 2 lakhs units the world over and 20,000 in India have been confirmed to ISO 9000:2000. The standard empowers the working of dynamism and aggressiveness in authoritative frameworks. It accommodates a straightforward and free outsider affirmation system. Certification Bodies (CBs), which guarantee units for consistence of this standard, are required to be surveyed for their capability by the Accreditation Bodies (ABs), for the most part one in every nation. At that point there is the component of common acknowledgment between different Accreditation Bodies through the International Accreditation Forum (IAF). The procedure of affirmation and accreditation generally has gone under basic examination. The expansion of the confirmation movement acquired rivalry. This, combined with insufficient control on Certification Bodies, has brought about impressive weakening in the Certification Process (CP). The way that the global instrument of similarity appraisal has an imperative part in household and universal exchange demonstrates that believability in the Certification Process is an issue of fundamental significance. It is in this connection that a thorough study has been attempted on more than 400 Quality Management System (QMS) ensured units to evaluate the viability of the QMS Certification Process. The result of the study depicted in the paper is to give helpful inputs to the IAF and ISO, the two chief bodies, which are similarly worried with the issue.

Bayati et al. (2007) tended to the accompanying inquiries: to what degree do the performances of SMEs change previously, then after the fact securing the ISO 9000 certification and how far do they vary from non-ISO certified companies? The authors have examined an example of SMEs, involving those that have gained the ISO 9000 certifications after the end of September 2004 and were situated in Greater Tehran. Based on the literature review, the authors outlined the accompanying system to study the chosen SMEs: they developed a questionnaire containing 27 questions significant to focal points of securing ISO certification and sent the same to the chosen SMEs; then analyzed the responses and performed non-parametric tests, for example, sign-test and chi-squared test; and they utilized Minitab and SPSS to analyze the information. Getting the ISO 9000 confirmation seemed to enhance the performance of SMEs in the sample studied. As such, SMEs have profit by accomplishing the ISO 9000 certification.

Costa et al. (2007) studied the relationship between ISO 9000 accreditation with industry performance. It explored the source of motivation for implementation of ISO 9000 on industry's performances. The result revealed that performances of ISO 9000 certified industries are better off than non certified industries.

Chow et al. (2006) examined the problems in getting certifications and perceived benefits for Singapore based industries. The survey was conducted in 146 industries of Singapore. Result revealed that certification leads to better overall financial performances. Some problems encountered in certification include the failure to establish adequate monitoring programme and to follow set procedure and to carry out appropriate management reviews of the new system.

Naseer et al. (2004) studied corporate management performance with respect to adaptation of ISO 9000 certifications in Malaysian industries. The samples were taken from 162 industries. A performance evaluation model was established on the basis of four predictor variables that include free cash flow, economic value added, return on sales. The author revealed that there is

relationship existed between ISO 9000 registration and performance of the industries.

2.2.5. Review of literature on obstacles to TQM implementation:

Faisal et al. (2015) narrated various TQM obstacles for ineffective implementation of TQM in service industries. The study identified 12 TQM barriers through extensive literature review. These barriers are lack of communication, employees resistance to change, lack of co-ordination between departments. The least significant barrier is found to be high turnover at managerial level.

Singh et al. (2012) identified the barriers of Total Productive Maintenance (TPM) and Total Quality Management (TQM) implementations for evaluating the challenges, being faced by the Indian manufacturing organizations in order to adapt these techniques. The aim of this research was to critically examine the barriers affecting the implementation of these quality drives and then devise various critical success factors for overcoming the obstacles for successful implementation of TQM and TPM in the Indian manufacturing industry. An extensive literature review was carried out to understand various barriers to TQM and TPM implementation, in order to achieve the required objective. This was followed by survey of TQM and TPM questionnaires which were used to collect the responses from the managers and employees of various Indian manufacturing organizations. The paper concluded that implementing these quality drives requires fulfilling quality and leadership, employee's culture, personnel, technical and process management, recourses, infrastructure and internal communications obstacles.

Talwar (2011) assessed the advancement of BEMs/NQAs and takes a comparative view on these models. It additionally throws some light on the developing situation. This study depends on data accumulated through a broad writing survey utilizing print media and exploration databases like Emerald, EBSCO and Pro-Quest. Discussions with experts helped in reviewing the viability of BEMs and visualizing the rising situation. An outlook change has

been seen in the comprehension of quality. In spite of the fact that MBNQA, EFQM and the Deming Prize are the three comprehensively acknowledged major BEMs, some remarkable models are likewise developing. The paper distinguishes 100 BEMs/NQAs being utilized over the world. They are subject to changes according to the evolution of the external environment and are considered a contemporary way to attain excellence.The advantages and impediments of BEMs are recognized. BEMs should be calibrated by joining lessons from antiquated teachings to achieve "sustained business results".

Prajajo et al. (2011) studied the relationship between four cultural dimensions of the competing values framework (group, development, hierarchical, rational cultures) and four types of performance, product quality, process quality, product innovation and process innovation. Data were collected from 194 middle and senior managers of Australian farms who had knowledge of past and present organizational practices relating to quality and innovation related aspects in the organization. Among the four cultural dimensions, development culture was found to be the strongest. Three of the performance measures are product innovation, product quality and process innovation. Rational culture shows a relationship with product quality.

Burcher et al. (2010) explored the incidences of quality practices in Britain and Australia and the challenges faced during implementation of these practices. The main obstacle was lack of dedicated budget to facilitate changes in quality approaches in both countries, which reflects a continuing lack of serious commitment amongst senior management. There is also lack of influence at senior levels amongst quality managers to redress the situation.

Robert et al. (2008) depicted the possible impediments to radical innovation created by the pursuit of quality improvement in the dynamic hi-tech sector. He first examined contributions and limitations of existing literature. Then analyzed three cases from the Japanese hi-tech sector, dynamic random access memory chips, network equipment, and system integration, to understand the conditions under which the pursuit of quality created impediments for radical innovation. It identified a number of mechanisms, beyond the existing

literature, through which the quality culture of Japanese hi-tech firms can inhibit innovation. Particular attention was paid to the risk adverse culture that may be created, thereby damaging the potential to develop radical innovation. Some exploratory strategies were offered through which firms might minimize these problems.

Inkpen et al. (2007) inspected five patterns that MNC administrators should consider as they make systems to contend in the contemporary worldwide commercial center. Exhibits an exchange on five key patterns that include: the end of the customary multinational company and the development of another way to deal with organizing and planning cross-fringe exercises; the declining significance of geology and rising entomb connectedness crosswise over limits as industry globalize quickly; the new flood of MNCs from India and China and their way to deal with worldwide rivalry; the expanding pertinence of making particularly customized systems to contend in developing markets; and the basic to oversee learning on a worldwide scale. Proceeded with globalization is unavoidable and there are few industry, assuming any, untouched by worldwide focused powers.

Amar et al. (2002) examined the challenges faced by Indonesian manufacturing industry in the implementation of TQM. Data from 78 industries were collected and analyzed. 11 factors were identified to deter TQM efforts. These factors were related to human resources, material, machine & equipment, attitude towards quality, information, management, finance, training, methods, interdepartmental relation and culture.

Detert et al. (2000) described, one common denominator of the failure of most previous quality effort was the failure to change the culture of the environment in which these tools and mechanism are used. The organization has embraced quality initiatives such TQM without first understanding their existing organizational culture contexts. Such an approach could lead to costly failure.

Salegna et al. (2000) revealed, among 109 industries of USA found that the most common challenges for implementing TQM is lack of companywide definition of quality, lack of formalized strategic plan to change, lack of customer focus, poor inter organizational communication, empowerment, lack

of employee trust on management, view of quality programme as a quick fix, drive for short term financial results, lack of strong motivation, lack of leadership.

Tamimi (1995) depicted the main challenges to TQM implementation were inadequate resources for TQM implementation, management compensation was not linked to achievement of quality goals, lack of training in communication methods, quality improvement skills, problem identification and problem solving skills.

2.2.6. Summary:

Literature survey gave an insight into the management theories supporting QM practices; and provides an authentic basis for selecting the pertinent dimension of QM practices and performance variables for the present study. There are several studies carried out regarding quality management, both by quality practitioners and academicians. Although some of the issues are exhaustively analyzed by various researchers, leading to consistent results, but there are others with contradictory conclusions, namely regarding the quality management impacts over industry performance. The review confirmed that a relationship between QM practices and business performance has been found in firms where quality measures have been properly deployed.

2.3. Hypotheses:

On the basis of review of literature, following hypotheses were formulated:

1. There exists no significant relationship between visionary leadership and successful implementation of TQM.
2. There exists no significant relationship between motivational factors and successful implementation of Quality Management practices between small and medium scale industries and large scale industries.
3. There exists no benefit accrued to organizations implementing TQM practices in Electronics Industry as compared to non existence of TQM practices.
4. There exists no significant difference of problems in the implementation of TQM between small & medium scale industry and large scale industry.

Chapter 3: Method and Procedure

3.1. Introduction:

Research methodology can be viewed as the process taken to accomplish the key objectives of the research undertaken. In this thesis, the previous two chapters have focused on the concept of quality management and its importance as well as the research carried out in the field so far. A clearly perceived need for studying the quality management in Indian context has emerged. The study has been conducted mainly, to promote an understanding of quality management system prevailing in Indian Electronics Industry. This chapter describes the objectives of present work, the research strategy and methodology, the scheme of chapterisation. This chapter looks at the research instrument and discusses why self completion questionnaires were chosen as the appropriate method for data collection, thus, enabling the research question to provide answers and the research objectives to be met with.

3.2. Scope of Study:

The scope of study is limited to Electronics Industry in Northern part of India. The data will be collected from the electronics Industry of Punjab. Himachal Pradesh, Haryana, UP, Delhi and NCR. The turnover of the electronics industry should be more than Rs 10 Crores annually and having employee more than 50. At least three responses need to be collected from the same organization, to have consistence of data.

3.3. Research Approach:

There are two approaches to research work: deduction and induction. These two approaches outline the nature of the relationship between theory and research. The deductive approach involves moving from general theoretical position to the specific inquiry to the research. The inductive approach starts from the observations to build a theory. According to the deductive approach, researchers deduce their studies, hypotheses based on known theories,

translate them into operational terms and test them in empirical ways by using statistical methods.

This research is mainly deductive based on survey as method of primary data collection. The reasons behind this choice are

1. The literature of TQM enables the researcher to define a theoretical framework and develop hypotheses, which lead themselves more readily to the deductive approach.

2. The scope and coverage is wider. More information can be captured as compared to theory methods. In survey, research is also accurate (within sampling error).

3. Adopting a cross-sectional survey methodology leads to saving of time, effort and resources required in comparison with longitudinal methodologies. Although surveys are more expensive than laboratory and field experiments but the volume and quality of information they yield are more economical. In addition a wider cross-section of respondents can be selected, more information can be obtained, through surveys.

4. A large number of cases studied in a given survey, provided opportunity for findings to be replicated among several subgroups strengthening the assurance that it represents a general phenomenon in the society. Furthermore careful reporting of the methodology of a given survey promotes replication by other samples and subgroups.

3.4. Research Design and Strategy:

Yin (2002) defines research design “an action plan for getting from here to there”, “here” may be defined as the initial set of questions to be answered and “there” is a set of conclusions (answer) about these questions. Research design is the plan, structure, and strategy of investigation aimed at answering the research questions. The research design must follow on from the research questions and provide data that enables them to be answered. It defines the

main lines of the strategy, including sampling methods and data collection tools and procedures to be used to collect and analyze empirical data while taking account of limits on the resources that are available. The research strategy for this study has been developed to promote high quality approach to the population and sample selection, instrument design and validation, data collection and statistical analysis used. The research has adopted quantitative methods which have been found to be more suitable for this kind of study in order to obtain reliable and valid information. The research strategies chosen in the study are:

1. Extensive literature review
2. Talking with the field of QM (academicians and practioners)
3. Attending training course
4. Conducting survey

This study is exploratory in nature and seeks to collect data about management attitude/perceptions towards quality management. Table 3.1 summarizes the main methodological aspects of survey.

Table 3.1 Data collection methodology

Research Instrument	Questionnaire
Type of Questions	Open ended and close ended
Universe	Questionnaire sent to 200 selected personnel those who are working in Electronics Industry situated in Northern India.
Selection of Industry	Companies listed in ELCINA (Electronics Industry components manufacturing association) and local electronics companies.
Repeatability	Data were selected from industry having response at least 3.
Rate of return	167 questionnaire returned out of that 165 are complete in all respect. Only completed questionnaire were taken for data analysis.

3.5. Sample:

Random sampling technique was used to draw the sample in which member of the population is to be studied has an equal and independent chance of being chosen to participate in the sample. If random selection is carried out, there will be no chance of the systematic bias which can arise from subjective judgement in sample selection. Sample may by chance be unrepresentative of population, but this risk can be reduced by stratified sample and ultimately suitable research respondents were selected for the primary research. The respondent industries are from Electronics Industry sector. The respondent industries are mostly from North Indian states namely Punjab, Haryana, Himachal Pradesh, Uttar Pradesh and NCR region.

The use of research criteria formed the foundation for the selection of suitable research sample for current research. It was decided that questionnaire was sent to a target of 200 respondents in Electronics Industry. It was also decided that at least three responses to be collected from each and every company to have data accuracy. Data covered around 50 Electronics Industries. The mailing list was obtained from ELCINA enlisted companies, local companies which have a turnover of more than Rs 10 crores, annually and employee strength of more than 50. Respondent was working in the industry as an executive, in the area of quality or shop floor management. A covering letter accompanied the questionnaire, which explained the nature of the study, asked the participants to fill in and return the questionnaire in the self addressed envelope provided. Based on the survey of organization about 200 questionnaires were sent to these organizations by Post and by direct contact with friends and relatives who were working for these organizations and were asked to send the questionnaires to target respondent in their organization. After personal contact, reminders, phone calls etc., about 167 responses were received yielding 82.5% response rate.

3.6. Measuring Tools used:

In the context of present study, seven set of questionnaires were developed by the investigator to collect the requisite information as detailed below:

1. The extent organization gained benefits through implementation of quality management practices.
2. Problems and challenges in the implementation of Quality Management practices.
3. Factors that motivate industry for implementation of Quality Management practices.
4. Leadership vision implementation in the industry.
5. Leadership vision importance in the industry.
6. Kinds of Quality Management practices in force and their implementation in the Electronics industry.
7. General information of the industry.

3.6.1. Development of Measuring Tools:

In deciding about the most suitable method for collecting the required data, it is important to note that a review of around 150 articles from 1997 to 2014 in the three major journals in the field of quality management, i.e, The TQM Journal, Total Quality Management and Business excellence and International Journal of Quality and Reliability management revealed that positive studies are predominant in quality management research and the survey method was used in more than half the articles. The present research about QM has been conducted via quantitative approaches predominantly through postal questionnaires to cover various issues of quality management. Questionnaires are popular within the various studies on QM due to the fact that they are stable, consistent and uniform in statistical measure, provide less opportunity for bias or error than interviews, provided greater assistance of anonymity and can be completed at the participants' conveniences (Lipovatz et al.,1999).

In quality management research, the researchers developed their questionnaires for studying QM issues. These questionnaires differed from each other. After the questionnaire was examined, it was decided to have more

comprehensive questionnaire which includes previously discussed (Chapter-1) approaches of QM i.e. elemental approach, QMS approach (for details of the questionnaire, refer to Annexure - I). As it has been pointed out that QM area has evolved to the stage where three major approaches dominated: the standard based approach is ISO 9000 is the most prominent, the quality award approach which comprises business excellence and quality awards and the elemental approach promoted by various academicians and practitioners. None of the published images truly reflect the three pronged approaches that currently dominate (Singh et al., 2006). However, the questionnaires, developed by these researchers did give some insights into developing the questionnaire required for this research purpose.

The use of information technology is also a critical success factor of TQM which is included in a limited number of studies. Impact of TQM on society as well as safety in the organizations has also been studied previously.

The questionnaires consist of number of sections. First section investigates general information of the companies participating in the research. This includes the size of the company, type of business, turnover of the company, number of employees, quality activities implemented etc. The practical level of implementation have been explored in the other sections by asking question on identified parameters of TQM. The participants are asked to provide their perceptions on a 5 point scale. The scale ranged from 1 to 5. Indicating [1] = Very low, [2] = Low, [3]= Medium, [4] = High, [5]= Very high. The scale allowed people to express a neutral stance rather than forcing them to take a preferred position using a scale with an even number of alternatives. It also permitted respondents to respond in varying degree to each item that described the perceptions. One section of the instrument will determine the obstacles to TQM implementation. Another section will explore the benefits of TQM realized by the company. Before using the TQM measurement instrument to achieve various objectives the research, the instrument has to be tested for its reliability and validity because of the mean of measuring a concept purposed. The measurement mean must be reliable and valid. Clearly a critical aspect of

the survey methodology was the development of a questionnaire. The process of development of questionnaire is shown in Fig 3.1.

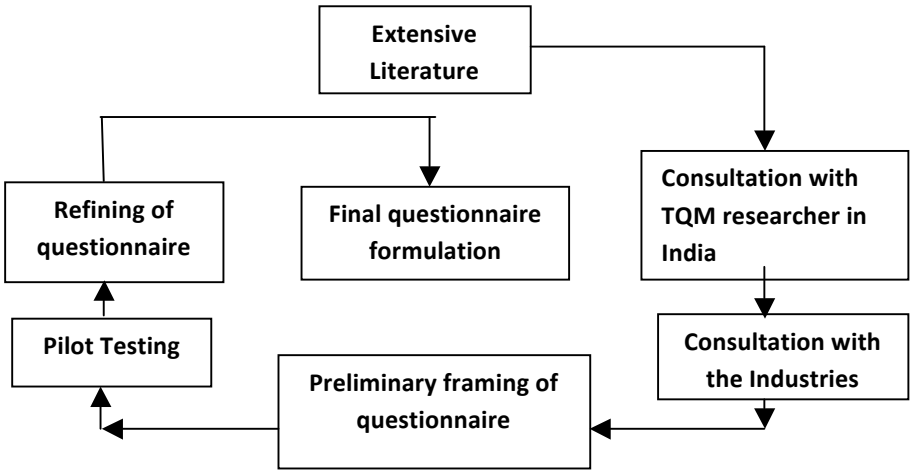

Fig 3.1 Development of questionnaire

In the present study, factors in respect of both importance and implementation are rated on five point scale. They are measuring two different aspects of management perceptions of the criteria. The higher the rating scale the better is the result of the statement and vice versa. Besides, other closed and open questions were designed to describe in detail the organizations surveyed. The questionnaire was developed with the advice from several experts which included two senior academicians in the field of quality management and two industry personnel.

Once the first draft was completed, it was considered necessary to refine the questionnaire. It was vital to make sure that the questions were not misunderstood and the answers were usable. Wordings and instructions were improved. However, it was essential that "real" respondents fill up the instrument to explore whether the questionnaire should not present the following issues (Forza, 2002).

1. Instructions and/or questions unclear/ ambiguous.

2. Use of academic language.

3. Questions that may be discarded or treated cautiously because of unexpected problems.
4. Open ended questions yielding answers that were impossible to code into theoretical meaningful dimensions.
5. Consuming more time than anticipated to complete the questionnaire
6. Inadequate question sequences
7. Response bias because of question wording.
8. Problem in understanding what kind of answers were expected or in providing answers to the questions posed
9. The planned administration procedure was not effective as anticipated
10. Inadequate measures in relation to the sample

An instrument is called reliable when it gives same result applied to different persons under different circumstances. Instrument reliability can be tested by checking the correlation of the instrument's element (internal consistency method).

Internal consistency method is used for the research, since it is most popular for testing instrument reliability. This method is also suggested as particularly important in measurement instruments with super-variables or multiple elements dimensions, as in case with TQM categories.

Measurement of instrument reliability is necessary but not enough, since the instrument must also to be valid, which means the instrument, must really measure the concept or the phenomenon that it was designed to measure. There are three validity measures

1. Content Validity
2. Predictive validity
3. Construct validity

Content validity is the degree to which elements of an assessment instrument is relevant to and representative of the targeted construct for a particular assessment purpose. Determination of whether the scales or item set of a quality management questionnaire have good content validity can be made from a number of sources, e.g relevant theory, empirical literature, expert judgment.

The preliminary instrument was framed and that was circulated to Expert group (Academician and Industry expert) to ascertain the content of the instrument. Based on the feedback, a second set of instrument was designed.

Validity of instrument refers to the degree to which the test actually measures what it claims to measure. It is essential for a test to be valid in order for the results to be accurately applied and interpreted. Content validity is a non-statistical type of validity. Items are chosen so that they comply with the test specification which is drawn up through a thorough examination of the subject domain. To determine the content validity, a test was conducted for the present study. Four industry representatives and three academicians were chosen and asked them to individually review the test items and comment on whether each item appropriately matched to the content area specified. As the table of specifications and the items were found to match adequately, the content validity of the achievement test was ascertained. Correction to the instrument was made to incorporate necessary changes.

The reliability refers to the degree to which a test is consistent and stable in measuring what it is intended to measure. Reliability has been defined as "the degree to which test scores for a group of test takers are consistent over repeated applications of a measurement procedure and hence are inferred to be dependable and repeatable for an individual test taker", (Berkowitz,2004). A reliable test minimizes error and provides repeatable consistent results. To find the reliability of instrument, it was circulated to 10 Industry Manufacturing professionals. The instrument has been sub divided into Six sections to capture data required to meet the objectives. The result was collected. Then the same

set of instrument was given to the same group of personnel after two weeks and result was collected. The coefficient of reliability was found significant and is given below

a) Identifying problems and challenges in the implementation of Quality Management practices : 0.98

b) By which extent organization gained benefits through implementing Quality Management Practices : 0.96

c) Factors that motivate company for implementation of Quality Management Practices : 0.95

d) Leadership Vision (Level of Importance) : 0.80

e) Leadership Vision (Implementation level in the company) : 0.78

f) Various kinds of Quality Management Practices in force and their implementation in the Electronics Industry : 0.85

The results are well within the limit for acceptance.

Incorporating all the changes the final instrument was made consisting of Six sections and one general section about company profile which covered all the areas of objectives.

3.7. Data Analysis:

Following the data collection stage, the responses were coded for further analysis. The researcher used the software package referred to as Statistical Package for the Social Science (SPSS). All completed questionnaires received from the respondents were reviewed for completeness, accuracy and quality data. Usable questionnaires were coded for the observation of frequencies, percentages, frequencies, means and standard deviations as a method of data examination. Comparison between two groups typically used a t-test for means. Bivariate correlation coefficient, also known as the Pearson product-moment correlation coefficient was also used for statistical analysis. The

literature suggests that data should be checked for the underlying assumptions of population of normality and homogeneity of variance. The data were checked for above assumption and was found to be from normal population.

3.8. Structure of the Thesis:

As given in Fig 3.2, the thesis is organized into six chapters.

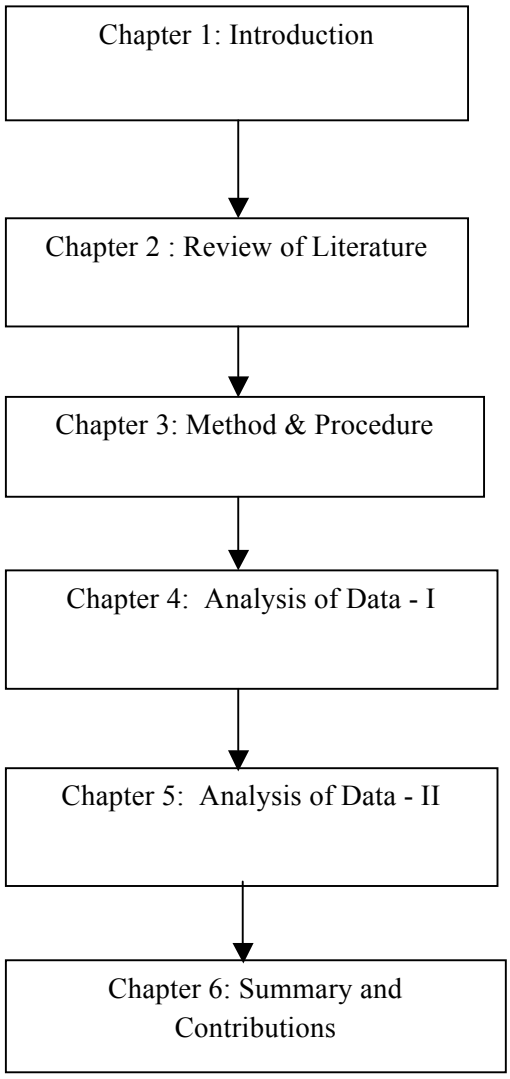

Fig 3.2 Thesis structure

Chapter 1 gives the introduction to the research and reviews the concept of quality and total management. It includes the historical development, the concept and definitions of Quality and Total Quality Management. The three

approaches to quality management i.e. ISO 9000 approach, element approach and quality awards approach were described.

Chapter 2 presents extensive literature review with respect to studies conducted all over the world. Papers from three specialized journals, International Journal of Quality and Reliability Management, The TQM Journal, Total Quality Management and Business Excellence along with the journals of other streams were studied. The issues from some of the books and reports were also included in the literature survey. The literature reviews for finding the motivations of QM, the development of QM frameworks along with the common problems faced during the implementation of TQM.

Chapter 3 describes the methodology to be used as a guideline for the empirical study.

Chapter 4 gives the overview of the surveyed industries. This part of this chapter presents the general profile of the respondent industries.

Chapter 5 discusses the TQM implementation of the surveyed industries. Importance and implementation of Leadership survey in the surveyed industries. This chapter also discusses the motivation for implementation of TQM in the industries along with the challenges faced during implementation phase of TQM.

Chapter 6 is the final chapter of the study. It discusses the achievement of the objectives of the research, the contributions. It depicts the recommendations and discusses the limitations of study. Finally scope of the future work is also discussed.

Chapter 4: Analysis of Data – I

4.1. Introduction:

The main purpose of the chapter is to present the overview of the industries and their quality practices. Responses are grouped with respect to the demographic variables. The descriptive information which involves simple descriptive statistics like percentage and frequencies is presented in the form of figures and tables.

4.2. Characteristics of the Responding Organizations:

In the present study, a list of 50 companies was prepared. The name and addresses are taken from the directory of ELCINA (Electronics Components Association of India) and local directory of Electronic companies. The industries that were selected had at least Rs 10 crores annual turnover and manpower of over 50 employees.

4.2.1. Nature of Industries:

The electronics Industries in India consists of number of sectors. The profile sample with respect to nature of the industry is shown in Table 4.1. Respondents from the electronics equipments manufacturer consist of 52.1% of total respondents. 24.2% respondents are from Consumer Electronics industries, 2.4% are from EMS sector, 12.1% are from Component manufacturing Sector, 2.4% are from Automobile Electronics Sector and the remaining 6.7% respondents are from other Electronics sectors.

Table 4.1 Nature of Industries

Sr. No	Nature of Organization	Frequency	Percentage	Cumulative Percentage
1	Electronics equipments manufacturer	86	52.1	52.1
2	Consumer Electronics	40	24.2	76.4
3	EMS	4	2.4	78.8
4	Component Manufacturing	20	12.1	90.9
5	Automobile Electronics	4	2.4	93.3
6	Any Other	11	6.7	100.0
	Total	165	100.0	

4.2.2. Customer wise:

Customer wise classification means, the type of customer base these Electronics companies serve. It has been observed from the data that 40% of these companies serve exclusively the domestic customer and the remaining 60% companies serve both the domestic as well as the global customers. The result is depicted in Table 4.2.

Table 4.2 Customer wise

Sr. No	Type of Sector	Frequency	Percentage	Cumulative Percentage
1	Domestic	66	40.0	40.0
2	Both	99	60.0	100.0
	Total	165	100.0	

4.2.3. Employee size:

Employee size wise classification depicts the total number of personnel employed by the industry. The scope of study states that the respondent will be selected from the industries having employee strength more than 50. The collected data depicts that out of the total number of respondents, 49.1% are from industries having employee strength within 51 to 100, 4.2% respondents are from the industries having employee strength within 101 to 250. Similarly 20.0%, 12.7%, 7.3% and 6.7% are the respondents from the industries with employee strength between 251 to 500, 501 to 1000, 1001 to 5000 and 5000 or more respectively. The result is shown in Table 4.3.

Table 4.3 Employee size

Employee size				
Sl no	Employee	Frequency	Percent	Cumulative Percent
1	51 – 100	81	49.1	49.1
2	101 – 250	7	4.2	53.3
3	251 – 500	33	20.0	73.3
4	501 – 1000	21	12.7	86.1
5	1001 – 5000	12	7.3	93.3
6	5001 +	11	6.7	100.0
	Total	165	100.0	

4.2.4. Type of Industries:

Type of Industries means whether respondents are from small and medium scale industries or from large scale industries. Out of the total respondents of 165, 94 are from small and medium scale industries and the balance are from large scale industries. The result is shown in Table 4.4.

Table 4.4 Type of Industries

Type of Industry				
Sr. No	Type	Frequency	Percentage	Cumulative Percentage
1	Small & Medium	94	57.0	57.0
2	Large	71	43.0	100.0
	Total	165	100.0	

4.2.5. Type of Ownership:

Respondents are from various types of industries. Demography of industries are categorized into various types of ownership. The result is shown in Table 4.5. Industries from where 165 respondents have been selected, 21 are from Government owned companies which is 12.7% of the total respondents, from family owned companies are 43, which is 26.1% of the total respondents, from sole propriety industries are 19, which is 11.5% of the total and similarly respondents from division of large group, Multinational and any other category are 44, 23 and 15 respectively.

Table 4.5 Type of ownership

Type of Ownership				
Sr. No	Type	Frequency	Percentage	Cumulative Percentage
1	Government	21	12.7	12.7
2	Family	43	26.1	38.8
3	Sole propriety	19	11.5	50.3
4	Division of large group	44	26.7	77.0
5	Multinational	23	13.9	90.9
6	Any Other	15	9.1	100.0
	Total	165	100.0	

4.2.6. Turnover:

Industries selected for the study are classified on the basis of the Annual turnover. Respondents from the organizations with a turnover between Rupees 10 to 50 Crores are 82 in number. This constitutes 49.7% of the total respondents. Respondents from the organizations having annual turnover between Rupees 51 to 100 Crores and Rupees 101 to 250 Crores, Rupees 251 to 500 Crores and Rupees 501 Crores and above are 13,16,18 and 36 respectively and the same in total percentage are 7.9%, 9%, 11.6% and 21.8% respectively. The result is shown in Table 4.6.

Table 4.6 Turnover

Annual Turnover (Rs in Crores)				
Sr. No	Turnover	Frequency	Percentage	Cumulative Percentage
1	10 – 50	82	49.7	49.7
2	51 – 100	13	7.9	57.6
3	101-250	16	9.0	56.6
4	251 – 500	18	11.6	78.2
5	501 +	36	21.8	100.0
	Total	165	100.0	

4.2.7. Nature of origin:

Respondents from the organizations from where responses collected are further classified on the basis of nature of origin of the industries. Respondents from industry of Indian origin are 122 in number and they constitute 73.9% of the total respondents. Similarly, respondents from Foreign industries, Subsidiary of Indian industries and subsidiary of multinational industries are 13,16 and 14 respectively in number and the percentage with respect to the total respondents are 7.9%, 9.7% and 8.5% respectively. The result is depicted in Table 4.7.

Table 4.7 Nature of Origin

Sr. No	Origin	Frequency	Percentage	Cumulative Percentage
1	Indian	122	73.9	73.9
2	Foreign	13	7.9	81.8
3	Subsidiary of Indian company	16	9.7	91.5
4	Subsidiary of Multinational company	14	8.5	100.0
	Total	165	100.0	

4.2.8. Year of Establishment:

Respondent organizations are grouped with respect to number of years of existence/operation in the business. Organizations are grouped on the basis of the number of years of existence, less than 2 years, between 2 years to 5 years, between 6 years to 10 years and 10 years and above. The percentage depictions are 1.2%, 6.7%, 24.2% and 67.9% respectively. The result is shown in Table 4.8.

Table 4.8 Year of Establishment

Establishment (Years)				
Sr. no	Years	Frequency	Percentage	Cumulative Percentage
1	< 2	2	1.2	1.2
2	2 – 5	11	6.7	7.9
3	6 – 10	40	24.2	32.1
4	10+	112	67.9	100.0
	Total	165	100.0	

4.2.9. Quality certification:

Quality certifications of the respondent industries are studied. Quality certifications level are grouped as number responses on ISO 9000:2000, ISO 9000:2008, ISO 14001 and any other certification. The detailed result is shown in Table 4.9. It is noticed that 43.1% of the total respondent industries do not have any quality certification. 1.2% of the total respondent industries are accredited to ISO 9000:2000. Similarly 41.8%, 12.1% and 1.8% of the respondent industries are accredited to ISO 9000:2008, ISO 14001 and other quality certification.

Table 4.9 Quality Certification

Current Certification				
Sr. No	Certification	Frequency	Percentage	Cumulative Percentage
1	No certification	71	43.1	43.1
2	ISO 9000 : 2000	2	1.2	44.3
3	ISO 9000 : 2008	69	41.8	86.1
4	ISO 14001	20	12.1	98.2
5	Other	3	1.8	100.0
Total		165	100.0	

4.2.10. No of year of Quality System Accreditation:

Quality system of respondent of industries is analyzed and grouped based on the duration of use of quality system. Industries are grouped as, no use of quality system, less than 1 year use of quality system, 1 to 3 years use of quality system, 4 to 6 years use of quality system, 7 to 9 years use of quality system and more than 9 years use of quality system. The percentage of industries with respect to the total response is 43.0%, 0.6%, 11.1%, 14.5%, 9.7% and 23.7% respectively. The result is shown in Table 4.10.

Table 4.10 No. of years of Quality System Accreditation

Sr. No	No of Years	Frequency	Percentage	Cumulative Percentage
1	No	71	43.0	43.0
2	Less than 1 year	4	0.6	45.4
3	Between 1 to 3 years	11	11.1	52.1
4	Between 4 to 6 years	24	14.5	66.6
5	Between 7 to 9 years	16	9.7	76.3
6	More than 9 years	37	23.7	100.0
	Total	165	100.0	

4.2.11. Summary:

The data were collated into various types of classification e.g. customer wise, type of industries, type of ownership, turnover, nature of origin etc. These structured data was used for drawing conclusion in the light of objectives and hypotheses.

Chapter 5: Analysis of Data – II

5.1. Introduction:

Organization seeks certification and registration to verify compliance to these standardized management systems. QMS like ISO 9000 requires businesses to state clearly what they are going to do and then do what they state. Although compliance with ISO 9000 is voluntary, the standard has been marketed in such a way that many industries believe that it is a requirement for conducting business. Indeed, any company that lacks a certificate of compliance could be at a significant marketing disadvantage if its competitors do have certification. Juran (1994) believes that this perception may be the most significant reason why there has been such a rush to become certified. Certification is nevertheless highly demanding of time to implementation, money, involvement of top and middle management and capacity to adapt this general standard to the specific context of the firm. Companies spend a lot of resources for initial ISO 9000 registration. Similarly, firms incur considerable amounts of money for auditors and consultants fees while seeking and maintaining the standard. Given such high costs and also considering that the registration has to be done after every three years, there have been doubts whether or not it is beneficial to continually pay for ISO 9000 certification and maintenance. This chapter gives the finding on the motivating factors on adopting quality management systems, Leadership importance and implementation and benefits expected.

5.2. Leadership vision for implementation of TQM in Electronics Industry:

The top management and leadership are also one of the obstacles faced by some of the respondent organizations while implementation of TQM. Top management is one of the several major critical factors or organizational requirements for effective quality management. Successful quality performances require that top management should be dedicated to the goal of

quality management. The response to the questionnaire survey reiterates the commitment and involvement of their top management in the QM process, being essential for its successful implementation.

The leadership vision perception was measured in two ways i.e. importance and implementation. Total 28 statements of the implementation part were subjected to the principal component analysis with varimax rotations and five factors were achieved with the variance information of 68.82%. The rotated component matrix describing the number of statements with factor loadings in each factor is mentioned in Table 5.1. The factor scores were also shown for each five factors obtained from principal component analysis.

Factor1: Leadership Commitment: Statement 2,6,7,8,9,11,12,13,16,20,21,23,24,26,28 (*15 statements*)

Factor 2: Management Initiative: Statement 1, 4, 5 (*3 statements*)

Factor 3: Quality Initiative: Statement 18, 19, 22 (*3 statements*)

Factor 4: Quality Commitment: Statement 14, 15, 17 (*3 statements*)

Factor 5: Customer Focus: Statement 27 (*1 statements*)

Table 5.1 Rotated component matrix for leadership vision data analysis

Rotated Component Matrix					
	Component				
	1	2	3	4	5
Statement 23	.866				
Statement 6	.836				
Statement 7	.834				
Statement 20	.818				
Statement 21	.788				
Statement 13	.787				
Statement 16	.781				
Statement 2	.767				
Statement 26	.760				
Statement 28	.723				
Statement 24	.722				
Statement 11	.719				

Statement 9	.685				
Statement 8	.586				
Statement 12	.513				
Statement 4		.820			
Statement 1		.708			
Statement 5		.650			
Statement 25					
Statement 3					
Statement 10					
Statement 19			.761		
Statement 18			.720		
Statement 22			.624		
Statement 15				.818	
Statement 14				.749	
Statement 17				.524	
Statement 27					.840
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 8 iterations.					

The frequency distribution of the response pattern over the importance of leadership is shown in Table 5.2. The factors wise ranking of statements along with percentage of frequency is depicted. Ranking of statement is decided by combined score of high implementation frequency and very high implementation frequency.

Table 5.2 Frequency table of Leadership statements

Factor 1	Rank	No Implementation (in %)	Low Implementation (in %)	Medium Implementation (in %)	High Implementation (in %)	Very high Implementation (in %)
Statement 2	2	31.9	3.7	5.5	36.8	22.1
Statement 6	9	30.3	15.2	7.9	33.3	13.3
Statement 7	5	27.3	14.9	5.6	42.9	9.3
Statement 8	1	25.6	7.3	6.7	45.1	15.2
Statement 9	10	26.2	14.6	13.4	31.1	14.6
Statement 11	6	29.3	6.7	12.8	34.1	17.1
Statement 12	14	26.2	15.2	1.3	22.0	18.3
Statement 13	12	27.9	15.2	14.5	24.2	18.2
Statement 16	15	20.0	21.8	18.8	13.9	25.5
Statement 20	8	21.3	17.7	14.0	20.7	26.2
Statement 21	7	24.8	15.8	12.1	25.5	21.8

Statement 23	11	27.9	17.6	10.9	21.2	22.4
Statement 24	4	26.1	7.3	10.9	24.2	31.5
Statement 26	13	27.4	15.9	15.9	26.2	14.6
Statement 28	3	27.8	6.8	6.8	42.0	16.7

Factor 2	Rank	No Implementation (in %)	Low Implementation (in %)	Medium Implementation (in %)	High Implementation (in %)	Very high Implementation (in %)
Statement 1	1	31.7	0.6	8.3	31.1	28.0
Statement 4	3	33.5	11.2	8.1	36.0	11.2
Statement 5	2	30.3	1.8	12.1	42.4	13.3

Factor 3	Rank	No Implementation (in %)	Low Implementation (in %)	Medium Implementation (in %)	High Implementation (in %)	Very high Implementation (in %)
Statement 18	3	25.6	12.2	18.3	16.5	27.4
Statement 19	2	21.2	11.5	12.7	21.2	33.3
Statement 22	1	20.6	10.9	8.5	33.3	26.7

Factor 4	Rank	No Implementation (in %)	Low Implementation (in %)	Medium Implementation (in %)	High Implementation (in %)	Very high Implementation (in %)
Statement 14	3	20.7	15.2	19.5	22.6	22.0
Statement 15	2	20.6	12.7	18.2	24.2	24.2
Statement 17	1	24.2	7.3	12.7	29.7	26.1

Factor 5	Rank	No Implementation (in %)	Low Implementation (in %)	Medium Implementation (in %)	High Implementation (in %)	Very high Implementation (in %)
Statement 27	1	24.2	7.9	10.9	40.0	17.0

RESEARCH HYPOTHESIS-I:

H1: There exists no significant relationship between visionary leadership and successful implementation of TQM.

Data are segmented into two categories, where TQM is implemented and TQM is not implemented, from the responses of Leadership vision implementation questionnaire. TQM implemented industries are considered where ISO and other quality system are implemented by the organization. Statement wise average value of implementation score is calculated on both categories of data. A 't-test' is conducted between TQM implemented industries and non TQM implemented industries on each statement based on average implementation level of leadership vision. Result is shown in Table 5.3.

Table 5.3 't-test' between TQM and non TQM industries Leadership Vision Implementation mean Value

	't – test' value	P Value	TQM Accreditation	N	Mean	Std. Deviation
Statement 1	7.989	P < 0.05	No	71	1.96	1.550
			Yes	91	4.25	0.739
Statement 2	8.236	P < 0.05	No	71	1.86	1.465
			Yes	90	4.17	0.723
Statement 3	9.843	P < 0.05	No	70	1.57	1.137
			Yes	92	4.07	0.708
Statement 4	9.249	P < 0.05	No	70	1.56	1.002
			Yes	91	3.76	1.036
Statement 5	8.874	P < 0.05	No	71	1.88	1.333
			Yes	92	4.01	0.719
Statement 6	8.214	P < 0.05	No	71	1.74	1.191
			Yes	92	3.72	1.062
Statement 7	9.516	P < 0.05	No	70	1.66	1.006
			Yes	91	3.89	0.823
Statement 8	8.135	P < 0.05	No	71	2.03	1.404
			Yes	92	4.07	0.676
Statement 9	9.829	P < 0.05	No	71	1.65	0.922
			Yes	92	3.93	0.887
Statement 10	9.320	P < 0.05	No	71	1.68	1.046
			Yes	91	3.90	0.932
Statement 11	7.405	P < 0.05	No	71	1.97	1.482
			Yes	92	3.86	0.884
Statement 12	8.277	P < 0.05	No	71	1.85	1.076
			Yes	91	3.76	1.158
Statement 13	8.208	P < 0.05	No	71	1.79	1.247
			Yes	92	3.77	1.028
Statement 14	8.257	P < 0.05	No	71	2.03	1.291

			Yes	91	3.96	0.881
Statement 15	7.884	P < 0.05	No	71	2.14	1.357
			Yes	92	4.02	0.902
Statement 16	9.332	P < 0.05	No	71	1.84	0.986
			Yes	92	3.98	1.058
Statement 17	7.621	P < 0.05	No	71	2.16	1.491
			Yes	92	4.13	0.841
Statement 18	9.234	P < 0.05	No	71	1.82	1.122
			Yes	91	4.09	1.029
Statement 19	8.885	P < 0.05	No	71	2.10	1.335
			Yes	92	4.33	0.840
Statement 20	8.764	P < 0.05	No	71	1.93	1.214
			Yes	92	4.07	0.959
Statement 21	9.514	P < 0.05	No	71	1.75	0.983
			Yes	92	4.05	0.999
Statement 22	7.187	P < 0.05	No	71	2.27	1.548
			Yes	92	4.20	0.683
Statement 23	9.850	P < 0.05	No	71	1.58	0.815
			Yes	92	4.00	1.089
Statement 24	7.873	P < 0.05	No	71	2.10	1.511
			Yes	92	4.22	0.887
Statement 25	9.143	P < 0.05	No	71	1.81	1.126
			Yes	92	4.00	0.926
Statement 26	8.661	P < 0.05	No	71	1.74	1.041
			Yes	91	3.74	1.063
Statement 27	8.190	P < 0.05	No	71	2.05	1.403
			Yes	92	4.07	0.660
Statement 28	8.788	P < 0.05	No	71	1.86	1.333
			Yes	92	4.10	0.680

Since p value against all statement is less than 0.05, hence it indicates that there is a significant difference between TQM implemented and non TQM implemented industries with respect to the implementation of Leadership vision. As the average of implementation level of TQM industries against each statement is more than non TQM implemented industries, it indicates that leadership vision implementation is more prominent in TQM implemented industries. Hence hypothesis H1 is rejected.

The finding accords with several other studies (Douglas et al., 2003; Rahman et al., 2005; Robert et al., 2008; Saraph et al., 1993; Tata et al., 1999). A recent survey sample of QM driven industries, affiliated with European

Foundation for Quality Management (EFQM) in UK, found a common agreement among all the respondents on a low degree of commitment of CEOs and other top executives to TQM programme and finally followed by negative consequences. Those in top management must provide the initiative for successful quality assurance practices and must support quality programs for them to be successful.

5.3. Quality Management Practices in force & the extent of their Implementation in the Electronic Industry:

The tools and techniques can contribute towards improving the level of QM, if a climate of managerial commitment is created. This means that techniques and tools are a reliable indicator of a superior level of QM and therefore a superior performing industry in terms of quality is expected to exhibit a better financial result. The study unearthed, the extent of the use of quality tools and techniques in the manufacturing sector.

All the 34 statements based on the quality management practices, were divided into scientific and behavioral quality and were subjected to the principal component analysis with Varimax rotation and two factor results yielding 91.50% of the total variance information and the two factors were termed as scientific and behavioral quality. The result is shown in Table 5.4.

Table 5.4 Scientific and behavioral quality tools rotated component matrix

Rotated Component Matrix		
	Component	
	1	2
Scientific Quality 16	.830	.508
Scientific Quality 18	.815	.408
Scientific Quality 19	.809	.538
Scientific Quality 9	.800	.539
Scientific Quality 8	.794	.533
Scientific Quality 6	.786	.557
Scientific Quality 5	.777	.579
Scientific Quality 17	.776	.553
Scientific Quality 20	.769	.574
Scientific Quality 10	.767	.576
Scientific Quality 15	.765	.583
Scientific Quality 21	.753	.607
Scientific Quality 7	.747	.595

Scientific Quality 11	.743	.574
Scientific Quality 13	.726	.595
Scientific Quality 2	.720	.621
Scientific Quality 4	.718	.639
Scientific Quality 14	.713	.617
Scientific Quality 1	.707	.655
Scientific Quality 3	.697	.663
Scientific Quality 12	.695	.643
Scientific Quality 28	.668	.668
Behavioural Quality 4	.519	.814
Behavioural Quality 3	.519	.805
Behavioural Quality 1	.518	.804
Behavioural Quality 2	.509	.799
Behavioural Quality 6	.561	.791
Behavioural Quality 5	.548	.784
Scientific Quality 23	.569	.759
Scientific Quality 25	.614	.740
Scientific Quality 24	.624	.721
Scientific Quality 27	.626	.716
Scientific Quality 26	.630	.707
Scientific Quality 22	.655	.692
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

The respondent organizations were grouped under two categories, 1) Small and Medium Scale industries and 2) Large Scale Industries. All quality management respondent data were organized on the basis of these two classifications. Average score of implementation level on scientific tools and behavioral tools on both categories were calculated. A 't-test' was conducted to find whether the implementation level of both the sectors of the industry with respect to the implementation of Quality tools was same or not and the result is shown in Table 5.5.

Table 5.5 't-test' result between small & medium and large scale industries of scientific and behavioral quality tools

Group Statistics					
	Type	N	Average	Std. Deviation	t- test
Scientific Quality Score	Small & Medium	94	2.0009	1.14212	15.452* P = 0.0001
	Large	71	4.3390	.58869	
Behavioral Quality Score	Small & Medium	94	2.3121	1.32777	12.701* P = 0.0001
	Large	71	4.4789	.63178	

It has been clearly observed that there is significant difference between implementation of quality tools and techniques in the industry segment. In both the cases, e.g., Scientific Tools and behavioral quality tools, average value of implementation of large scale industries are higher than those of small and medium scale industries. It indicates that the extent of enforcement of quality management practices in large scale industries is better than that of small and medium scale industries.

The frequency distribution analysis of the response pattern available on various statements of scientific and behavioral quality is shown in Table 5.6.

Table 5.6 Frequency response of scientific and behavioral quality tool statements

		LEVEL OF IMPLEMENTATION (in %)				
Sr. No.	Scientific Tools	No Implementation	Low level of Implementation	Medium level of Implementation	High level of Implementation	Very High level of Implementation
1	Quality Circles	33.1	5.6	10.6	40.0	10.6
2	Suggestion Awards	30.2	11.1	8.0	33.3	17.3
3	Cause and Effect Diagram	32.5	3.8	12.8	32.5	17.5
4	Bench Markings	32.9	3.7	9.9	33.5	19.9
5	Histogram	33.1	8.3	10.2	23.6	24.8
6	Flow Charts	30.4	8.2	8.2	27.8	25.3
7	Check Sheets	29.9	8.9	8.3	20.4	32.5
8	Pareto Analysis	34.0	10.5	9.2	27.5	19.0
9	Scatter Diagram	36.1	9.7	5.8	25.2	23.2
10	Gantt Charts	39.4	9.0	3.9	28.4	19.4
11	Value Stream Mapping	31.6	12.3	9.7	35.5	11.0
12	Cost Benefit Analysis	32.3	7.7	10.3	31.6	18.1
13	Arrow Diagram	28.8	12.2	9.6	29.5	19.9
14	Affinity Diagram	36.8	9.9	9.2	23.0	21.1
15	Six Sigma	38.7	3.2	7.1	25.2	25.8
16	Lean Manufacturing	34.0	9.6	7.7	17.3	31.4
17	JIT	35.4	7.3	6.6	17.9	29.8
18	Poka-Yoke	40.8	5.4	8.8	17.7	27.2
19	Process Mapping	38.7	26.0	5.2	24.5	29.0
20	Quality Function Deployment (QFD)	38.1	1.9	12.9	23.9	23.2
21	Matrix Diagram	37.2	3.8	7.7	18.6	32.7

22	Design of Experiment	37.7	5.0	11.9	18.9	26.4
23	Failure Mode Analysis	26.7	13.7	9.9	24.2	25.5
24	Control Charts	29.8	7.5	9.9	26.7	26.1
25	Failure Mode Effect Analysis	29.1	12.7	7.6	27.8	22.8
26	Statistical Quality Control	28.7	10.2	7.0	35.0	19.1
27	Total Productivity Maintenance	32.3	5.6	4.3	29.8	28.0
28	Cellular Manufacturing	37.3	4.6	5.9	30.1	22.2
	Behavioral tools					
29	Regular training of employees	19.4	16.4	9.7	25.5	29.1
30	Institutionalization of continuous improvement philosophy	22.0	14.6	7.9	28.7	26.8
31	Empowerment of employees	24.4	9.1	13.4	20.7	32.3
32	Customer satisfaction survey	26.7	7.3	10.9	23.0	32.1
33	Encouragement to cultural changes	26.7	11.8	6.8	22.4	32.3
34	Extent of total employee involvement	30.3	6.7	9.1	22.4	31.5

To implement a better QM system into practice, industry needs to adopt the right method and tools of problem-solving for quality improvement to meet customer requirements. These methods and tools should be able to identify the possible root cause as well as provide potential solutions. Researchers have identified a number of tools and techniques for quality improvement. It has come to light during the process of survey that large scale industry employees are more aware of the tools and techniques than small and medium scale industry employees, because the mean value of the score of implementation of tools are higher for the large scale industry.

The survey result reveals that behavior aspect tools are implemented more effectively than scientific tools. The high level of implementation and very high level of implementation for most of the behavior tools are above 55%, which is more than scientific tools responses. Similarly, the study revealed that some of the better response QM tools are TPM, SQC, Flow charts, check sheets, Quality Circle, Suggestion award, where high level implementation and very high level implementation, put together are more than 50% of the total response.

5.4. Factors that motivate implementation of Quality Management Practices:

All 27 statements based on the motivation for implementation of quality management were subjected to the principal component analysis with Varimax rotation and seven factor results yielded 68.48% of the total variance information and the statements falling in each factor were classified in the following rotated component matrix. The result is shown in Table 5.7.

Table 5.7 Rotated component matrix for motivating factor for implementation of quality management practice.

Rotated Component Matrix							
	Component						
	1	2	3	4	5	6	7
Statement 14	.838						
Statement 18	.801						
Statement 17	.797						
Statement 24	.760						
Statement 12	.648						
Statement 2	.613						
Statement 9	.604						
Statement 5	.576						
Statement 11	.532						
Statement 3							
Statement 20		.800					
Statement 22		.766					
Statement 21		.744					
Statement 23		.685					
Statement 26							
Statement 25							
Statement 27							

Statement 8			.830				
Statement 7			.711				
Statement 6			.573				
Statement 19				.728			
Statement 16				.720			
Statement 10							
Statement 1					.740		
Statement 4					.561		
Statement 13						.831	
Statement 15							.640
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 8 iterations.							

The factor scores were also shown for each of the seven factors obtained from principal component analysis.

Motivation Score 1: Product performance, Statement 2,5,9,11,12,14,17,18,24 (9 statements)

Motivation Score 2: Product quality, Statement 20,21,22,23 (4 statements)

Motivation Score 3: Employee's satisfaction, Statement 6,7,8 (3 statements)

Motivation Score 4: Company's strategy, Statement 16,19 (2 statements)

Motivation Score 5: Benefits, Statement 1,4 (2 statements)

Motivation Score 6: Relationship, Statement 13 (1 statement)

Motivation Score 7: Product Image, Statement 15 (1 statement)

The following is the frequency distribution in Table 5.8, for the statements under various factors of motivation.

Table 5.8 Frequency distribution table for motivating factors

SL.No	Motivation Score 1:Product performance	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
2	More defective products.	28.4	49.4	11.1	6.2	4.9
5	Less worker participation.	24.4	51.2	15.2	6.7	2.3
9	Reduction in the performance.	41.8	38.8	7.3	7.9	4.2
11	Decrease in market share.	43.4	37.7	11.9	5.7	1.3
12	Decrease in product service quality.	39.1	34.8	14.3	8.1	3.7
14	Decrease in customer satisfaction.	39.6	37.2	12.2	4.3	6.7
17	Non Cohesiveness among employees.	29.2	49.1	9.9	7.5	4.3
18	Deterioration in group activities.	33.1	40.5	20.9	3.7	1.8
24	Increase in third party Audit.	27.8	45.1	10.5	10.5	6.1

SL No	Motivation Score 2: Product Quality	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
20	Quality Plan are prepared before starting of Job.	0.0	0.7	7.3	51.8	40.2
21	Critical processes are identified.	0.0	0.0	9.2	55.6	35.2
22	Periodic review of all processes.	0.0	0.0	3.7	58.5	37.8
23	To build a quality culture.	0.0	0.6	8.0	54.0	37.4

SL. No	Motivation Score 3: Employee's satisfaction	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
6	Improved job satisfaction.	0.0	1.8	9.7	55.2	33.3
7	Improved process control.	0.0	0.0	11.7	56.2	32.1
8	Improved image of the company.	0.0	1.8	12.3	44.2	41.7

SL. No	Motivation Score 4: Company's strategy	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
16	Long term cost competitiveness.	0.6	4.8	16.5	41.5	36.6
19	Commitment to quality by top management.	0.0	3.1	4.3	58.5	34.1

SL No	Motivation Score 5: Benefit	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1	Improved documentation system.	0.0	0.0	6.0	61.0	32.9
4	Improved profit margin.	0.5	6.1	7.3	56.4	29.7

SL No	Motivation Score 6: Relationship Across Company	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
13	Improved management and employee relation.	0.0	1.9	14.1	42.6	41.4

SL. No	Motivation Score 7: Product Image	IMPORTANCE (in %)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
15	Quality leadership in chosen product	0.0	0.7	9.9	47.2	42.2

Research Hypothesis-II:

Null hypothesis H2: There exists no significant relationship between motivational factors and successful implementation of quality management practices between small & medium scale industries and large scale industries.

Data were collated from the responses of the questionnaire on factors that motivate industries for implementation of Quality management practices, only for the industries where TQM is implemented successfully. Then once again, data were divided into two groups (small & medium scale and large scale industries) and the average motivational score was calculated on each statement wise. The result of average score of various motivational statements for successful TQM implemented is shown in Table 5.9. A 't-test' was calculated on each statement wise between two type of industries.

Table 5.9 Statement wise t-test result of TQM implemented industries and their average motivational score

	t – test	P Value	Type of Industries	N	Average	Std. Deviation
Statement 1	1.135	0.185	Small & Medium	26	4.08	0.528
			Large	66	4.21	0.621
Statement 2	2.142	0.032	Small & Medium	26	3.42	1.206
			Large	66	3.95	1.044
Statement 3	1.97	0.049	Small & Medium	26	3.54	1.029
			Large	65	3.86	0.788
Statement 4	2.547	0.011	Small & Medium	26	3.58	1.065
			Large	66	4.42	0.775
Statement 5	3.061	0.002	Small & Medium	26	3.31	1.123
			Large	66	4.00	0.702

Statement 6	5.95	0.552	Small & Medium	26	4.04	0.774
			Large	66	4.17	0.597
Statement 7	4.20	0.675	Small & Medium	26	4.08	0.796
			Large	66	4.12	0.621
Statement 8	2.272	0.023	Small & Medium	25	3.89	0.866
			Large	66	4.12	0.621
Statement 9	3.166	0.002	Small & Medium	26	3.54	0.948
			Large	66	4.14	1.036
Statement 10	3.113	0.002	Small & Medium	24	3.58	0.974
			Large	66	4.20	0.561
Statement 11	3.566	0.000	Small & Medium	26	3.38	1.098
			Large	63	4.24	0.712
Statement 12	2.529	0.011	Small & Medium	25	3.40	1.100
			Large	66	4.05	0.919
Statement 13	1.985	0.047	Small & Medium	26	3.85	0.834
			Large	66	4.23	0.819
Statement 14	2.908	0.004	Small & Medium	25	3.440	1.325
			Large	66	4.29	0.837
Statement 15	1.720	0.085	Small & Medium	26	4.04	0.774
			Large	65	4.34	0.691
Statement 16	2.104	0.035	Small & Medium	25	3.69	1.030
			Large	66	4.18	0.742
Statement 17	3.533	0.000	Small & Medium	25	3.40	1.041
			Large	66	4.15	0.932
Statement 18	3.603	0.000	Small & Medium	24	3.54	0.932
			Large	66	4.30	0.784
Statement 19	0.907	0.364	Small & Medium	26	4.15	0.675
			Large	66	4.29	0.576
Statement 20	0.952	0.341	Small & Medium	26	4.19	0.694
			Large	66	4.35	0.595
Statement 21	0.326	0.745	Small & Medium	24	4.25	0.608
			Large	66	4.29	0.651
Statement 22	0.842	0.400	Small & Medium	25	4.24	0.597
			Large	66	4.36	0.515
Statement 23	2.23	0.026	Small & Medium	26	4.08	0.688
			Large	66	4.42	0.609
Statement 24	3.414	0.001	Small & Medium	25	3.28	1.061
			Large	66	4.06	1.036
Statement 25	3.521	0.000	Small & Medium	26	3.77	0.908

			Large	65	4.46	0.639
Statement 26	2.728	0.000	Small & Medium	25	4.04	0.841
			Large	66	4.53	0.588
Statement 27	3.797	0.000	Small & Medium	26	3.54	4.41
			Large	66	4.41	0.744

The statement where value of $P < 0.05$, it indicates that there is a significant difference between the average value of motivational score between two sectors of the industries. Out of 27 statements there are only 8 statements where p value is not significant. Since most of the statements wise average values are significant, hence it indicates that, there is a significant difference between the average value of motivational attributes between two sectors of industries. Statement wise, the average value of motivational score of large scale industries is higher than that of small & medium scale industries. Hence hypothesis H2 is rejected. The findings corroborates with Joiner (2007), which mentioned that with the implementation of TQM, the motivating factors improves. Similarly Brah (2002) stated that better QM in large industries lead to more motivational boost than small and medium scale industries.

5.5. Benefits of implementation of Quality Management Practices:

A list of benefits was prepared from literature and the organizations were asked to indicate on 5 point scale how much was the benefit accrued to the industries, by applying quality management practices. The result was tabulated in Table 5.10. The result indicated that high level of benefits and very high level of benefits were, in the nature of improvement in customer relationship (60.0%), reduction in customer complains (59.4%), improvement in process control (59.2%), increase in market share (59.2%), improvement in team activities (59.5%), clear role definition (57.9%), improvement in customer satisfaction (57.6%), improvement in supplier relation (57.5%) and improvement in communication (57.3%). Similarly least perceived benefits were improvement in sales turnover of the company (48.8%) and reduction in cycle time in manufacturing (50.3%). Factor analysis was not being performed as only one factor was retrieved which contained all the 30 factors, so there was no use of considering it.

Table 5.10 Frequency response of factors that organization gained benefits through implementation of quality management practices

Attributes	IMPLEMENTATION (in %)				
	No benefits	Low level of benefits	Medium level of benefits	High level of benefits	Very high level of benefits
Improvement in documentation system.	31.6	1.8	13.3	40.6	12.7
Improvement in product quality.	32.2	0.0	10.6	37.9	19.3
Improvement in productivity.	31.4	3.1	9.3	38.9	17.3
Improvement in profit margin.	30.4	4.8	13.9	30.9	20.0
Improvement in morale.	30.3	3.6	12.7	37.0	16.4
Improvement in customer relationship.	29.7	2.4	7.9	38.2	21.8
Improvement in process control.	30.3	2.5	8.0	43.2	16.0
Increase in market share.	30.5	1.8	8.5	36.6	22.6
Clear role definition.	30.5	1.2	10.4	32.3	25.6
Improvement in new product generation.	30.0	3.7	11.0	34.4	20.9
Improvement in profit margin.	28.9	7.6	11.3	28.3	23.9
Improvement in sales turnover of the company.	29.6	5.6	16.0	21.6	27.2
Reduction in cycle time for manufacturing.	30.2	8.2	11.3	31.4	18.9
Reduction in defects rate of product.	31.9	6.9	10.6	22.5	28.1
Improvement in employee's satisfaction.	28.2	4.9	10.4	25.2	31.3
Improvement in supplier relations.	31.1	2.4	9.8	32.3	24.4
Improvement in process design.	29.0	4.4	16.0	24.7	25.9
Improvement in quality alertness among employees.	30.7	1.8	10.4	35.0	22.1
Improvement in team activities.	27.0	6.8	6.7	37.4	22.1
Increase in export.	30.6	5.6	8.8	31.9	23.1
Improved methods in incoming inspection of items.	30.9	4.2	9.9	27.8	27.2
Improvement in Transparency.	29.9	3.7	11.6	26.8	28.0
Improvement in Communication.	28.7	4.9	9.1	30.5	26.8
Improvement in competitive advantage.	31.7	2.4	11.0	28.7	26.2
Improvement in supplier relations.	30.2	3.8	18.5	25.3	22.2
Improvement in employee relation.	28.2	6.1	17.2	32.5	16.0
Improvement in Customer satisfaction.	26.1	6.0	10.3	32.1	25.5
Reduction in Quality Audit by Customers.	29.9	6.0	11.6	29.3	23.2
Reduction in absenteeism in workers.	29.7	3.6	15.8	30.9	20.0
Reduction in customer complaints.	31.8	1.9	7.9	31.5	27.9

The response (response value was calculated by adding percentage of high level of benefits and very high level of benefits) of small and medium scale industries and large scale industries were analyzed and 't-test' was conducted

and it was observed that there is significant difference between the response of industries within all the parameters. It signifies that benefit perceived by the large sale industries is significantly different from the benefit perceived by small and medium scale industries. It also signifies that the quantum of benefits achieved by large scale Industries is much more than small and medium scale industries, because response parameter of large scale industry is higher in each and every parameter in comparison with the small and medium scale industries. The result is shown in Table 5.11.

Table 5.11 't-test' result of Small & medium scale industry responses vs large scale industry responses

	Small & Medium scale Industry response	Large scale industry response	Z Score	p value
Improvement in documentation system.	28.7	85.9	7.31	< 0.05
Improvement in product quality.	33.0	85.9	6.80	<0.05
Improvement in productivity.	29.8	88.7	7.56	< 0.05
Improvement in profit margin.	22.3	88.7	8.47	< 0.05
Improvement in morale.	33.0	80.3	6.05	<0.05
Improvement in customer relationship.	37.2	90.1	6.89	< 0.05
Improvement in process control.	38.3	84.5	5.97	< 0.05
Increase in market share.	35.1	90.1	7.13	<0.05
Clear role definition.	28.7	95.8	8.65	< 0.05
Improvement in new product generation.	31.9	84.5	6.73	< 0.05
Improvement in profit margin.	22.3	87.3	8.29	<0.05
Improvement in sales turnover of the company.	22.3	81.7	7.57	< 0.05
Reduction in cycle time for manufacturing.	21.3	84.5	8.07	< 0.05
Reduction in defects rate of product.	23.4	83.1	7.61	<0.05
Improvement in employee satisfaction.	31.9	87.3	7.11	< 0.05
Improvement in supplier relations.	31.9	88.7	7.30	< 0.05
Improvement in process design.	26.6	80.3	6.85	<0.05
Improvement in quality alertness among employees.	33.0	87.3	6.99	< 0.05
Improvement in team activities.	35.1	90.1	7.13	< 0.05
Increase in export.	29.8	84.5	6.99	<0.05
Improved methods in incoming inspection of items.	25.5	91.5	8.44	< 0.05
Improvement in Transparency.	26.6	91.5	8.32	< 0.05
Improvement in Communication.	33.0	88.7	7.18	<0.05

Improvement in competitive advantage.	27.7	90.1	8.00	< 0.05
Improvement in supplier relations.	22.3	78.9	7.22	< 0.05
Improvement in employee relation.	21.3	83.1	7.89	<0.05
Improvement in Customer satisfaction.	34.0	88.7	7.06	< 0.05
Reduction in Quality Audit by Customers.	22.3	91.5	8.83	< 0.05
Reduction in absenteeism in workers.	22.3	88.7	8.47	<0.05
Reduction in customer complaints.	33.0	94.4	7.97	< 0.05

Research Hypothesis-III:

The null hypothesis H3: There exist no benefits accrued to organizations implementing TQM practices in Electronics Industries as compared to the organizations with non existence of TQM practices.

The hypothesis above was analyzed by using 't – test'. The data were divided into two groups i.e. industries with TQM implementation and industries without TQM implementation. These two groups were subjected to t – test for the significant difference in benefits by taking the average of score on individual benefits statement wise. The result is shown in Table 5.12.

Table 5.12 't-test' result of average score of individual benefits of TQM & non TQM industries.

	t – test	P value	TQM Accreditation	N	Average	Std. Deviation	Std. Error Mean
Benefits 1	3.526*	P < 0.05	No	71	1.90	1.259	.151
			Yes	92	3.89	1.554	.159
Benefits 2	3.329*	P < 0.05	No	71	1.96	1.292	.154
			Yes	90	4.30	1.667	.175
Benefits 3	3.262*	P < 0.05	No	71	1.96	1.316	.157
			Yes	91	4.08	1.623	.169
Benefits 4	3.730*	P < 0.05	No	71	1.81	1.337	.160
			Yes	92	4.33	1.586	.163
Benefits 5	3.816*	P < 0.05	No	71	1.97	1.293	.154
			Yes	92	3.91	1.559	.160
Benefits 6	2.672*	P < 0.05	No	71	2.05	1.281	.153
			Yes	92	4.11	1.696	.174
Benefits 7	2.923*	P < 0.05	No	71	1.93	1.236	.148
			Yes	91	4.05	1.648	.172
Benefits 8	3.524*	P < 0.05	No	71	2.0	1.323	.159
			Yes	91	4.14	1.654	.170
Benefits 9	3.622*	P < 0.05	No	71	1.99	1.360	.164
			Yes	92	4.15	1.659	.170
Benefits 10	3.746*	P < 0.05	No	71	1.86	1.374	.164

			Yes	92	4.10	1.580	.164
Benefits 11	4.726*	P < 0.05	No	71	1.95	1.411	.170
			Yes	86	4.09	1.526	.161
Benefits 12	4.771*	P < 0.05	No	70	1.87	1.431	.171
			Yes	92	4.05	1.553	.162
Benefits 13	5.750*	P < 0.05	No	69	1.68	1.361	.163
			Yes	92	3.93	1.438	.152
Benefits 14	5.394*	P < 0.05	No	69	1.68	1.427	.171
			Yes	92	4.07	1.581	.167
Benefits 15	3.594*	P < 0.05	No	71	2.15	1.416	.169
			Yes	90	4.17	1.667	.173
Benefits 16	3.743*	P < 0.05	No	71	2.0	1.378	.165
			Yes	92	4.05	1.647	.170
Benefits 17	4.719*	P < 0.05	No	71	1.92	1.436	.172
			Yes	92	4.06	1.514	.158
Benefits 18	3.778*	P < 0.05	No	71	2.0	1.345	.162
			Yes	92	4.03	1.621	.167
Benefits 19	4.495*	P < 0.05	No	71	2.01	1.358	.162
			Yes	92	4.11	1.528	.158
Benefits 20	4.830*	P < 0.05	No	69	1.81	1.367	.163
			Yes	90	4.14	1.577	.166
Benefits 21	4.414*	P < 0.05	No	71	1.86	1.416	.169
			Yes	91	4.18	1.622	.169
Benefits 22	4.028*	P < 0.05	No	71	1.94	1.439	.172
			Yes	91	4.17	1.614	.166
Benefits 23	3.440*	P < 0.05	No	71	2.05	1.408	.168
			Yes	92	4.11	1.637	.169
Benefits 24	3.567*	P < 0.05	No	71	1.99	1.382	.165
			Yes	92	4.04	1.686	.174
Benefits 25	3.852*	P < 0.05	No	71	1.97	1.357	.162
			Yes	92	3.82	1.578	.165
Benefits 26	3.417*	P < 0.05	No	71	1.97	1.132	.136
			Yes	92	3.77	1.607	.166
Benefits 27	3.426*	P < 0.05	No	71	2.08	1.276	.152
			Yes	92	4.17	1.644	.169
Benefits 28	3.998*	P < 0.05	No	71	1.94	1.373	.164
			Yes	92	4.00	1.600	.165
Benefits 29	4.763*	P < 0.05	No	71	1.93	1.355	.162
			Yes	92	3.99	1.496	.153
Benefits 30	3.370*	P < 0.05	No	71	1.95	1.364	.163
			Yes	92	2.87	4.25	.177

It is noticed that there is a significant difference between industries, where TQM has been implemented and the industries where TQM has not been implemented. On every benefit statements, P value is less than 0.05 (95% confidence limit). The average of benefit for each statement of the industry, where TQM has been implemented, is more than that average of the industry where TQM has not been implemented. Hence the null Hypothesis is rejected.

It means that there is a significant difference between benefit accrued to an organization implementing TQM practices in Electronics Industry as compared to that with nonexistent TQM practices.

The findings are in line with Gupta (2000), stated that there is significant difference in benefit exists between ISO and non ISO industries. Sohail et al. (2003) narrated that SME's those who adopted TQM perform better than those who were not adopted TQM.

5.6. Problems and Challenges in the Implementation of Quality Management Practices:

This section aims to discuss the findings and results about the obstacles associated with the QM implementation in Electronics Industry of Northern India. Being aware of some of the obstacles experienced by industries within the same or different sectors, industries are contemplating, implementation of QM and can accordingly prepare themselves to meet and address those challenges. It will make the process of implementation of QM faster and smoother. The respondents were asked about the main impediments to the adoption of QM in their companies. They were required to rate the implementation barrier statement on the basis of i.e (1= strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree). A higher rating implies a more significant barrier to QM implementation (calculation is done using SPSS).

All the 25 statements based on the problems and challenges were subjected to the principal component analysis with Varimax rotation and three factor results yielded 77.35% of the total variance information and the statements falling in each factor were classified in the following rotated component matrix, The result is shown in Table 5.13.

Table 5.13 Rotated component matrix result for problem and challenges in the implementation of Quality Management practices

Rotated Component Matrix			
	Factors		
	1	2	3
Problem & Challenge 4	.849		
Problem & Challenge 8	.846		
Problem & Challenge 9	.832		
Problem & Challenge 1	.782		
Problem & Challenge 11	.753		
Problem & Challenge 12	.747	.544	
Problem & Challenge 24	.725	.529	
Problem & Challenge 6	.683	.529	
Problem & Challenge 5	.677		
Problem & Challenge 10	.662		
Problem & Challenge 21	.649	.624	
Problem & Challenge 3	.643	.520	
Problem & Challenge 22		.853	
Problem & Challenge 23		.795	
Problem & Challenge 20		.788	
Problem & Challenge 17		.777	
Problem & Challenge 25		.747	
Problem & Challenge 19	.534	.705	
Problem & Challenge 18		.695	
Problem & Challenge 16		.681	
Problem & Challenge 13	.512	.646	
Problem & Challenge 14	.579	.619	
Problem & Challenge 15	.549	.567	
Problem & Challenge 2		.534	
Problem & Challenge 7			.909
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

The problems and challenges can be classified into three categories

1. Related to Employees
2. Related to Management
3. Lack of Empowerment.

Table 5.14 Problems & Challenges: Related to Employees

1	Employees are not trained for Quality Management practices.
4	Responsibility and accountability is not defined.
5	Resistant to change among employees.
8	Inadequate commitment from top and middle management.
9	Focused training is not adequate.
10	Employees are not well equipped to tackle problems.
11	Quality action procedures are not clear.
12	Cross functional teams are not active.
15	Inadequate training for the employees.

Table 5.15 Problems & Challenges: Related to Management

2	Time constraint.
3	Inadequate resources for implementation of Quality Management practices.
6	Inadequate Customer focus.
13	Inadequate focus on the customer.
14	Improper coordination with supplier.
16	Workforce is not committed to the quality.
17	Frequent turnover of the employees.
18	Employees are not adequately rewarded/recognized for their contribution towards quality improvement.
19	Lack of understanding regarding implementing aspect of Quality Management tools by middle level managers.
20	Difficulty in changing quality culture of the organization.
21	Processes are not benchmarked.
22	High cost of implementation QM outweigh benefits.
23	Frequent turnover of middle and top management.
24	The best practices / products are not benchmarked.
25	Quality activities are driven more on cost reduction than on customer satisfaction.

Table 5.16 Lack of Empowerment

7	Inadequate empowerment of employees.

5.6.1. Related to Employees:

The factor related to employees is shown in Table 5.14.

1. The present study revealed that attitude of the people towards quality is one of the greatest barriers in the respondent industry. Some

respondents found that it was very difficult to change the mindset of the employees with regard to quality.

2. At times middle management provided only lip service towards QM. They may profess to quality and take some actions, but the employees observe their behavior and can see through a façade. The middle management manages staffs and runs departments according to the old, tried and tested methods.

3. Behaviors and attitudes of the workforce within the organizations can act as a determining factor for successful implementation of QM and its maintenance. It is common knowledge that nobody likes to change their old ways of doing things.

4. Implementing new system, even updating existing procedures can involve substantial changes. It is thus sometimes challenging and frustrating for people to communicate and explain their system requirements to others and explain how their system may be best integrated with the other system. Some resistances are thus expected during the integration of the system. It can generally be addressed by educating and training the employees. Some resistance may also be experienced from people who lose ownership.

5. This organizational politics sometimes becomes a hurdle to implementation of quality management.

5.6.2. Related to Management:

Factors related to management is shown in Table 5.15

1. The top management and leadership are also few of obstacles faced by some of the responding organization. There is a degree of high positive association between the quality of management and the performance of the industry.

2. In recent times, there has been an unprecedented preoccupation of managers with quality. Non co-operation of top management is one of the several major critical factors for non implementation of effective

quality management. Successful quality performance requires top management to be dedicated to the goal.

5.6.3. Lack of Empowerment:

1. Quality practices start at the grass-root level. To build a culture of quality across the industry, it is highly essential to be encouraged at all levels. Everyone is aware that quality of majority of Japanese product is superior to any of the contemporary country's product. Such a culture can be established by giving due importance to quality at every level.

2. In Japanese industry, during the production process, in case of non conformity of process/product, even a worker is empowered to stop any production line. Similar type of empowerment is required in related Indian industry, to be successful in quality management practices.

Factors related to lack of empowerment is given in Table 5.16

5.6.4. Response Analysis:

The responses of all participants were collated and analysed and shown in Table 5.17. The result showed that based on the level response of agree and strongly agree. Most critical challenges are quality objectives being driven more on cost reduction than on customer satisfaction (67.9%), cross functional teams are not active (65.5%), quality action procedure are not clear (65.3%), process are not benchmark (64.7%) and improper coordination with supplier (63.7%). Similarly comparatively fewer challenges based on the responses, were workforce not committed to quality (49.7%), difficulty in changing quality culture of the organization (52.5%), employees are not adequately rewarded/recognized for their contribution towards quality system (52.7%), frequent turnover of employee (53.4%) and higher cost of implementation of QM outweighed its benefits (54.6 %).

Table 5.17 Frequency response of factors for identifying Problems and Challenges in the Implementation of Quality Management Practices

Sr. No	Attribute	Level of Challenge (in %)				
1		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Employees are not trained for Quality Management practices.	7.3	4.8	24.2	49.1	14.5
2	Time constraint.	3.7	9.1	28.5	44.2	14.5
3	Inadequate resources for implementation of Quality Management practices.	7.4	11.0	25.2	41.7	14.7
4	Responsibility and accountability is not defined.	7.3	9.1	23.8	37.2	22.6
5	Resistant to change among employees.	3.0	12.7	27.9	40.6	15.8
6	Inadequate Customer focus.	9.8	11.6	21.3	38.4	18.9
7	Inadequate empowerment of employees.	6.2	7.3	28.5	40.6	16.4
8	Inadequate commitment from top and middle management.	6.6	8.5	28.5	38.8	17.6
9	Focused training is not adequate.	3.6	13.4	22.6	42.1	18.3
10	Employees are not well equipped to tackle problems.	5.4	12.3	20.9	38.7	22.7
11	Quality action procedures are not clear.	4.8	11.6	18.3	47.0	18.3
12	Cross functional teams are not active.	4.9	8.6	21.0	41.4	24.1
13	Inadequate focus on the customer.	11.0	8.6	22.1	34.4	23.9
14	Improper coordination with supplier.	9.0	9.7	17.6	38.2	25.5
15	Inadequate training for the employees.	9.7	7.3	22.4	32.1	28.5
16	Workforce is not committed to the quality.	3.0	12.3	35.0	23.3	26.4
17	Frequent turnover of the employees.	4.3	9.2	33.1	34.4	19.0
18	Employees are not adequately rewarded/recognized for their contribution towards quality improvement.	3.7	4.8	38.8	30.9	21.8
19	Lack of understanding regarding implementing aspect of Quality Management tools by middle	3.7	8.6	28.8	33.1	25.8

	level managers.					
20	Difficulty in changing quality culture of the organization.	2.4	14.6	30.5	28.7	23.8
21	Processes are not benchmarked.	3.0	15.8	16.5	41.5	23.2
22	High cost of implementation QM outweigh benefits.	3.1	11.9	30.4	33.5	21.1
23	Frequent turnover of middle and top management.	7.3	13.9	20.0	38.8	20.0
24	The best practices / products are not benchmarked.	7.3	7.3	24.4	39.0	22.0
25	Quality activities are driven more on cost reduction than on customer satisfaction.	7.3	15.1	9.7	37.6	30.3

Research Hypothesis-IV:

Null hypothesis H4: There exists no significant difference of problems in the implementation of TQM between small & medium scale industry and large scale industry.

The data were collated for each problem and challenge, for small and medium scale industries and large scale industries. Average score of problems and challenges for each statement was calculated. A 't-test' was conducted based on average score between two categories of industries and its value was calculated, which is shown in Table 5.18.

Table 5.18 't-test' result of problems and challenges for small & medium scale and large scale industry.

	t – test Value	Type of Industries	N	Average	Std. Deviation	Std. Error Mean
Problem & Challenge 1	3.072*	Small & Medium	94	3.80	.968	.100
		Large	71	3.31	1.064	.126
Problem & Challenge 2	3.966*	Small & Medium	94	3.82	.950	.098
		Large	71	3.24	.902	.107
Problem & Challenge 3	4.093*	Small & Medium	92	3.75	1.116	.116
		Large	71	3.07	.961	.114
Problem & Challenge 4	4.417*	Small & Medium	93	3.91	1.100	.114
		Large	71	3.15	1.078	.128

Problem & Challenge 5	2.257*	Small & Medium	94	3.70	1.035	.107
		Large	71	3.31	.919	.109
Problem & Challenge 6	2.120*	Small & Medium	93	3.62	1.233	.128
		Large	71	3.23	1.136	.135
Problem & Challenge 7	1.556	Small & Medium	94	3.83	2.148	.222
		Large	71	3.39	1.115	.132
Problem & Challenge 8	2.655*	Small & Medium	94	3.71	1.064	.110
		Large	71	3.27	1.068	.127
Problem & Challenge 9	2.299*	Small & Medium	93	3.74	1.042	.108
		Large	71	3.37	1.031	.122
Problem & Challenge 10	1.848	Small & Medium	92	3.75	1.183	.123
		Large	71	3.42	1.037	.123
Problem & Challenge 11	1.873	Small & Medium	93	3.75	1.110	.115
		Large	71	3.45	.983	.117
Problem & Challenge 12	3.072*	Small & Medium	91	3.93	1.133	.119
		Large	71	3.42	.936	.111
Problem & Challenge 13	1.593	Small & Medium	92	3.65	1.370	.143
		Large	71	3.34	1.068	.127
Problem & Challenge 14	0.316	Small & Medium	94	3.64	1.208	.125
		Large	71	3.58	1.250	.148
Problem & Challenge 15	0.088	Small & Medium	94	3.62	1.219	.126
		Large	71	3.63	1.279	.152
Problem & Challenge 16	0.772	Small & Medium	93	3.63	1.071	.111
		Large	70	3.50	1.139	.136
Problem & Challenge 17	2.923*	Small & Medium	92	3.75	1.044	.109
		Large	71	3.28	.974	.116
Problem & Challenge 18	3.478*	Small & Medium	94	3.85	1.037	.107
		Large	71	3.32	.858	.102
Problem & Challenge 19	1.763	Small & Medium	92	3.82	1.068	.111
		Large	71	3.52	1.040	.123
Problem & Challenge 20	2.872*	Small & Medium	93	3.77	1.124	.117
		Large	71	3.30	.962	.114
Problem & Challenge 21	3.868*	Small & Medium	93	3.94	1.061	.110
		Large	71	3.30	1.034	.123

Problem & Challenge 22	3.283*	Small & Medium	90	3.81	1.101	.116
		Large	71	3.28	.897	.106
Problem & Challenge 23	1.716	Small & Medium	94	3.64	1.269	.131
		Large	71	3.32	1.011	.120
Problem & Challenge 24	3.205*	Small & Medium	93	3.85	1.122	.116
		Large	71	3.30	1.061	.126
Problem & Challenge 25	1.209	Small & Medium	94	3.79	1.343	.139
		Large	71	3.55	1.119	.133

It has been observed that in the all 25 statements for problems and challenges, the average score of small and medium scale industries was more than the average score of large scale industry. It implies that challenges for implementation of TQM in small and medium scale industry were more. Result showed that 15 out of 25 statements of problems and challenges were significantly different between from small & medium scale industry and large scale industry (* indicates $p < 0.05$). Since most of the statement problems and challenges were significantly different between the two different scale of industry hence the Null hypothesis is rejected. It means that, there exists significant difference of problems and challenges in the implementation of TQM between small & medium scale industries and large scale industries.

The result corroborates with kaynak et al. (2005) narrated that implementation of TQM in high performing industry is better than low performing industries.

Chapter 6: Summary and Contribution

6.1. Introduction:

The Electronics Industry segment is aware of the importance of quality management practices and they are practicing for improving the product and service quality. The benefit of implementation of quality management practices are more in large scale industries than small and medium scale industries.

Discussions on quality management issues are becoming a necessity in the Indian context and are worthwhile investment because of external and internal pressures. The quality movement in India has undergone healthy changes from time to time. It is called by many names like Quality systems, Quality awards, Total quality Management, Six sigma etc. The present study was undertaken to understand the benefits of implementation of Quality management practices in manufacturing industries. The initiative for this study originated, to unravel the difficulties faced during the implementation of quality management practices in the manufacturing industry in India. The specific research problem was identified through an extensive review of literature of quality management and the researcher's own experienced in production arena, in a large Government of India multiunit Public sector Electronics industry.

The main aim of this study was to identify the QM practices in use, the implementation barriers for the adoption of QM in Indian Electronics Industry.

The concept of Quality management was first introduced as a statistical approach (Quality Control) to industry during 1920s in the USA. This was followed by quality assurance (QA) and Total Quality Control (TQC), which was later introduced to corporate manager in Japan in 1950s. The most significant factors that have contributed to the development of QM are

1. Influence of writing and teaching of quality Gurus such as Crosby, Deming, Juran, who are the pioneer in the quality movement in the world.

2. Definition of quality and various issues related to improve quality of manufacturing has been addressed in many ways by various quality gurus and different quality awards models. However the ultimate objective is to meet customer expectation by cutting waste and improving quality of the product.

3. Introduction of various types of Quality awards like Demming's award, Malcom Baldrage National quality award, European Foundation of Quality award etc has given fillip to the quality movement. The concept of quality received impetus by globalization of products in late 1980s.

4. The impact of QM movement on the Japanese economy has directly affected in whole industry. Industry started realizing that quality in isolation is very difficult to survive for years together, unless there is change in culture in the industry. It leads change in the mind set of people to orient everything towards customer centric. Further this development finally leads to Total Quality Management.

6.2. Need of the Study:

Managing operation in developing countries requires familiarization of a set of complexities which are less common in the developed countries. It is likely that MNCs will find the process of implementing modern operation procedures in the developing world to be uncertain and uneven. Various studies revels that QM practices have strong bearing upon the manufacturing organizations across the world. These QM practices vary from culture to culture, country to country and industry to industry. Currently in USA, Six Sigma and TQM are the most preferred concepts; while in the UK, Six sigma, ISO 9000 and TQM are popular. In Asia suggestion systems, 5S, Kaizen and ISO 9000 are well trodden paths to quality improvement, while TQM is popular in many countries, such as Malaysia and Thailand. To cater to the challenging day to day demands of the organizations, these TQM practices are made accustomed for given situations, ISO 9000:2008 is the latest version of the quality standard developed by the International Organization for Standards

(ISO). The standards aim to evaluate a firm's ability to effectively design, produce and deliver quality products and services. This version of the standard enhances customer satisfaction by including more top management involvement and continual improvement. The new standard also surrounded by controversy similar to its predecessor, the 1994 version, despite wide spread international acceptance. The literature is clearly divided in the assessment of ISO 9000:2008, which is viewed as either a quality management (QM) based system or as another paper driven process that increases risk, uncertainty and costs. The manufacturing industry in India is exploring various alternatives to QM practices for production and operation management of the organizations. Based upon the literature review, there is a serious gap of TQM research in Northern Indian states. The researcher analyzed all the facts through review of literature.

According to the Quazi et al. (1998), while three-quarters of American and British Firms have some form of total quality programme, two third of these programmes simply ground to halt. Not surprisingly, total quality management programmes are seen as yet another management fad (Anderson et al, 2008). Recent literature suggests that there is need of QM research in India. As Kakkar et al. (2007) noted that "It is yet to be seen whether Indians, with their less aggressive and more complacent attitude, have gained more or less from TQM, when compared with US organizations, which want quick result".

Some authors have pointed out that Quality Management programmes and practices are primarily embraced in large multinational organizations. Little has been written on how TQM has been applied in Indian organizations (Karrupusami et al. 2007). International research also emphasizes the need to recognize the different motives that exist in organizations (Prajago, 2011).

In order to comprehend a more fundamental level of understanding of these quality management practices, a deeper level of analysis is needed. This type of analysis is needed particularly in India as pointed by Crosby that India is still in the bottom ladder of quality (Crosby, 1984). Indian Industries are passing through a difficult phase due to globalization of economy. Specially

electronics industry, where technological change, takes place at a rapid phase. To sustain competitive environment and to cope up with the technological pace and threats from multinational companies, local electronics industry equip themselves with improvement of productivity along with the quality. Quality management practices are adopted both by small and medium scale industry as well as large scale industry. Adoption of quality management practices for the industry is not at all a smooth affair. There are difficulties in adaptation of quality management practices.

This study investigated the current state of adoption and implementation of quality management in the Indian industry via a questionnaire survey targeted at general and prime organizations. The purpose of survey research is to find out which situations, events, attitudes or opinions are occurring within group of the population. Survey research aimed at description asks simply about the distribution of some phenomena on a population or among subgroups of a population. The literature suggested the existence of different practices in different industry because of the unique business environment, in terms of customer expectations, competition and technology changes; which are expected to create different opportunities and threats. Therefore different corporate and manufacturing strategies among industrial sectors should be expected. Curkovic et al. (2000) argues that the dimension of quality may differ in number or identity from one industry to another. So this study will also be directed to find out the difference between automotive and other manufacturing industry w.r.t to QM implementation. Data will be collected to fulfil all the above objectives. The major obstacles to implement QM in the industry as cited in the literature are found to be lack of expertise/resources in QM, rigid attitude and behaviour of executive management towards quality, minimal employees' commitment towards quality and lack of education and training to drive the improvement process.

Since there is little information available regarding the extent of QM usages in Indian Industry is available, the investigation of the adoption and implementation of QM in the Indian Industry is carried out through questionnaire survey.

6.3. Statement of the problem:

A STUDY OF QUALITY MANAGEMENT PRACTICES IN ELECTRONICS INDUSTRY OF NORTHERN INDIA.

6.4. Objectives of the study:

1. To study the leadership visions for implementation of TQM in Electronics Industry.
2. To study various kinds of Quality Management practices in force & extent of their implementation in the Electronics Industry.
3. To study the factors that motivates for the implementation of quality management practices.
4. To study the extent to which organizations have gained benefits through implementing Quality management practices.
5. To identify the problems and challenges faced in the implementation of quality management practices.

6.5. Hypotheses of the study:

1. There exists no significant relationship between visionary leadership and successful implementation of TQM.
2. There exists no significant relationship between motivational factors and successful implementation of Quality Management practices between small and medium scale industries and large scale industries.
3. There exists no benefit accrued to organizations implementing TQM practices in Electronics Industry as compared to non existence of TQM practices.
4. There exists no significant difference of problems in the implementation of TQM between small & medium scale industry and large scale industry

6.6. Delimitations of the study:

1. Only 50 Electronics Industries having annual turnover more than Rs 10 Crores and having employee strength more than 50.
2. Responses were collected from either shop floor manager or quality control manager.
3. Questionnaires were from QM practices of the Electronics Industries.

6.7. Sampling:

1. Random sampling technique was used to draw the sample in which member of the population to be studied has an equal and independent chance of being chosen to participate in the sample.
2. The respondent industries are from Electronics Industry sector. The respondent industries are mostly from North Indian states namely Punjab, Haryana, Himachal Pradesh, Uttar Pradesh and NCR region.
3. A sample of 200 respondents from 50 Electronics Industry was selected having annual turnover more than Rupees 10 crores. At least three responses were collected from each and every industry as per proposal of the study.

6.8. Tools used:

In the context of present study, seven set of questionnaires were developed by the investigator to collect the following information:

1. The extent organization gained benefits through implementation of quality management practices.
2. Problems and challenges in the implementation of Quality Management practices.
3. Factors that motivate company for implementation of Quality Management practices.

4. Leadership vision implementation in the industry.
5. Leadership vision importance in the industry.
6. Kinds of Quality Management practices in force and their implementation in the Electronics industry.
7. General information of the industry.

6.9. Data collection:

A covering letter accompanied by the questionnaire, explaining the nature of the study, requesting the participants to fill in and return the questionnaire in the self addressed envelope provided. Based on the survey of organization about 200 questionnaires were sent to personnel mailing by post and by direct contact with friends and relatives who were working for these organizations and were asked to send the questionnaires to target respondent in their organization. Through personal contact, reminders, phone calls etc., about 167 responses were received, yielding 82.5% response rate. However of,165 respondent was complete in all respect and the same was taken for data analysis.

6.10. Statistical Analysis of Data:

The following statistical techniques were employed to analyse the data obtained for further analysis;

The researcher used the software package referred to as Statistical Package for the Social Science (SPSS) for analysis of data. Usable questionnaires were coded for the observation of frequencies and percentages. The data was analyzed using descriptive statistics like mean, standard deviations

't – test' is used to compare between two groups means. Bivariate correlation coefficient, also known as the Pearson product-moment correlation coefficient was also used for statistical analysis.

6.11. Conclusion:

Based on the analysis of data, result were drawn and presented as below.

6.11.1. Fulfillment of first objective:

The first objective is to study Leadership vision for implementation of TQM in Electronics Industry;

To achieve above objective, 28 statements were subjected to the principal component analysis with varimax rotations and five factors are achieved with the variance information of 68.82%. Through varimax rotations items were subgrouped into five categories; 1. Leadership commitment. 2. Management Initiative. 3. Quality initiative. 4. Quality Commitment and 5. Customer focus.

6.11.2. Fulfillment of second objective:

The second objective is to study various kinds of Quality Management practices in force & extent of their implementation in Electronics Industry;

To achieve above objective 't-test' was conducted and observed that there is significant difference between application of QM tools in small and medium scale industries and large scale industries (Table 5.5). The average of implementation of QM tools for all the cases for large scale industries is more than average implementation of small and medium scale industries.

6.11.3. Fulfillment of third objective:

The third objective is to study the factors motivates for implementing Quality Management practices;

To achieve above objective, the statement for motivating factors were categorized into sub groups by using principal component analysis and varimax rotation. The motivational subgroups are **1: Product performance 2: Product Quality 3: Employee's satisfaction 4: Company's strategy 5: Benefits 6: Relationship 7: Product Image.** Statement wise, the average value of motivational score of large scale industries is higher than that of small & medium scale industries.

6.11.4. Fulfillment of fourth objective:

The fourth objective is to study the extent to which organizations have gained benefits through implementing Quality Management practices.

The result reveals that among all benefits, high level of benefits and very high level of benefits are; improvement in customer relationship (60.0%), reduction in customer complains (59.4%), improvement in process control (59.2%), Similarly lower most perceived benefits are improvement in sales turnover of the company (48.8%), reduction in cycle time in manufacturing (50.3%).

't-test' result reveals that benefit achieved by large scale industries is more than small and medium scale industries.

6.11.5. Fulfilment of fifth objective:

The fifth objective is to identify the problems and challenges faced in the implementation of Quality Management practices.

To achieve above objective by categorizing statement of problems and challenges into to three sub group by applying principal component analysis with varimix rotation. Three factors are 1. Related to Employees 2. Related to Management and 3. Lack of Empowerment.

Result shows that 15 out of 25 statements, the average score of challenges are significantly different between small & medium scale industry and large scale industry. It implies that challenges for implementation of TQM in small & medium scale industry are more than that of large scale industry.

6.11.6. Fulfilment of Ist Hypothesis:

A 't-test' is conducted between TQM implemented industries and non TQM implemented industries on each statement wise, based on average implementation level of leadership vision. Result is shown in Table 5.3. "p" value against all statement is less than 0.05, hence it indicates that there is a significant difference between TQM implemented and non TQM implemented industries with respect to the implementation of Leadership vision.

6.11.7. Fulfilment of 2nd Hypothesis:

Responses are divided into two groups (small & medium scale and large scale industries) and the average motivational score was calculated on each statement wise. 't'-test result of average score among various motivational statements for successful TQM implemented industries between small and medium scale and large scale industries is shown in Table 5.9. Out of 27 statements there are only 8 statements where p value is not significant. Since most of the statements wise average values are significant, hence it indicates that, there is a significant difference between the average value of motivational attributes between two sectors of industries.

6.11.8. Fulfilment of 3rd Hypothesis:

The data are divided into two groups i.e. industries with TQM implementation and industries without TQM implementation. The average of score on individual benefits statement wise is calculated and based on that statement wise 't'-test is conducted between these two groups. It is noticed that there is a significant difference between industries, where TQM has been implemented and the industries where TQM has not been implemented. On every benefit statements, P value is less than 0.05 (95% confidence limit).

6.11.9. Fulfilment of 4th Hypothesis:

Average score of problems and challenges for each statement is calculated. Based on average score of each statement, 't-test' is conducted between two categories of industries and its value is calculated, which is shown in Table 5.18. All 25 statements of problems and challenges, the average score of small and medium scale industries is more than the average score of large scale industry. It indicates that challenges for implementation of TQM in small and medium scale industry are more than large scale industries.

6.12. Quality Management Implementation Model Proposed:

The model presented is designed to help organizations get started and continue with transition to full TQM. Data analysis clearly depicts that there is benefit

accrued for implementation of TQM in the industries (refer objective no 4). Because of protective environment, a lack of vision, waste of expensive resources, ignored customer and insisted on avoiding modern approaches to management. One Indian researcher has recently stated "The biggest challenge for an Indian organization today is to be competitive, not only in the country but globally also. Competitiveness, being a multi-dimensional concept, can be enhanced through many ways. An effective and proven way is through the quality way, which is a major source for creating sustainable competitive advantage for organizations. There are prominent example among countries and their organizations that have become competitive through the quality way" (Dutta, 2007).

Administrating quality in the organization yields higher productivity, better quality and agility to survive competition. Due to liberization of Indian economy, Indian industries are finding difficulty in competition with multinational industries. Some of the Indian industries urgently need a large scale change and transformation in the way business is performed particularly in the area of benchmarking, standardization and quality management. Adopting proposed model of TQM requires a significant change in management philosophy and culture. Movement from one phase to other depends upon the maturity level, knowledge harness, and expertise gained in the previous stage and fulfilling each phase assessment criteria.

Proposed model is depicted in Fig 6.1 which get started and move Indian industries from one stage to another stage towards TQM culture.

6.12.1. First Step:

Organization to plan for implementation of TQM:

At this stage, the organization mostly run by the traditional way and does not have the skill or knowledge how to improve systems and procedures. It is having significant problem such as lack of managerial skill, weak administration system, low morale, process are poorly controlled and ultimate success depends upon the dedicated effort of the employees. Organization at this stage sincerely introspect that whether switching over to TQM would improve overall performance of the company. **The reported failure in literature have been related to inadequate implementation of leadership**

(refer objective no 1) or non willingness to change the culture. The first thing is to adopt the philosophy of quality tools and secondly is adopting continuous improvement to put in action to improve overall quality level. **The study reveals that adopting TQM certainly provide benefit to the industries (Refer Hypothesis III).**

6.12.2. Second Step:

Assessment of existing system:

Once the organization is convinced that TQM is path for improvement of quality, then the organization undertakes SWOT analysis to understand strength, weakness, opportunity and threats. Organization must be able to manage its weakness. The managers must be committed toward continuous learning. The top management must be committed to learning and provide a role model in seeking knowledge and create learning ambience in the organization. The top management should aware on the latest happening in the business scenario, attend awareness courses, seminar, workshops and conferences etc.

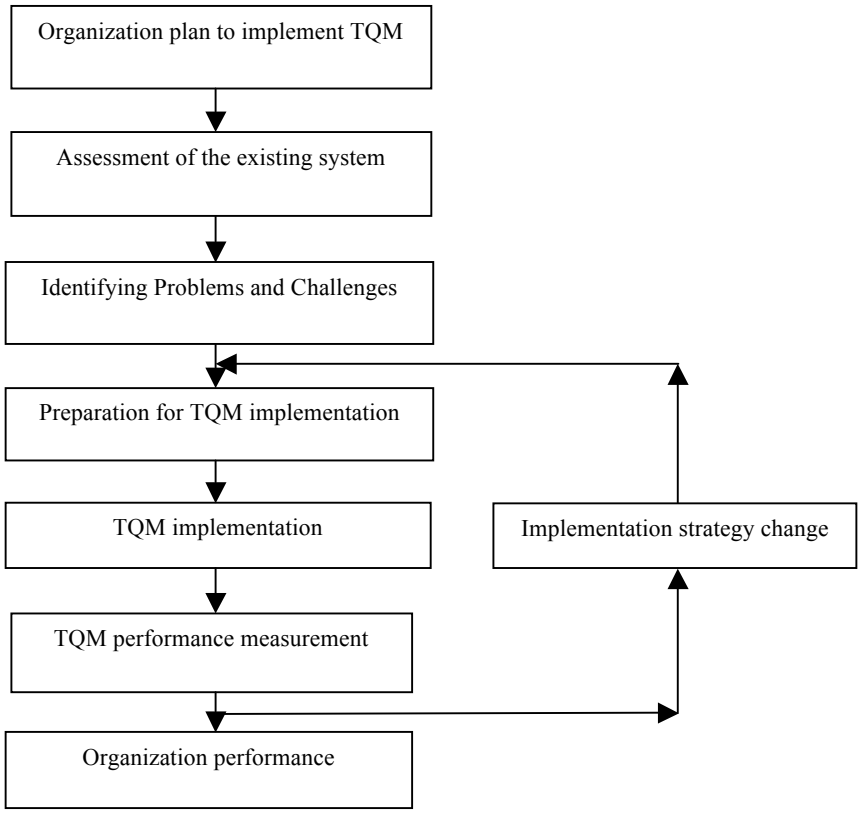

Fig. 6.1: Quality Management Implementation Model

6.12.3. Third Step:

Identifying Problems and Challenges:

Organization need to understand clearly what is needed to be achieved and what are the forth coming problems and challenges. Organizations should introspect thoroughly to understand its strengths and weaknesses. To achieve target, the possible barriers to be listed down and from top to bottom every employee need to be involved to surmount the problems and for all possible challenges suitable strategy need to be evolved. **In the study it has clearly immerged that while embracing TQM, problem and challenges faced by small and medium scale industries are more than problem and challenges faced by large scale industries (refer objective no 5).**

6.12.4. Fourth Step:

Preparation for TQM:

The objective of this stage is to develop Vision and Mission statements along with strategy quality plan. This is the most critical phase of the model. Following actions are to be taken;

A. TQM awareness to all level of organizations is essential. Based on the level of organization, all employees should have awareness of business/quality. The more senior a person the greater should be the assumed knowledge on business strategy. Similarly lower level person should have greater need of knowledge of day to day work practices. It is imperative that middle management fits between two extremes. The top management team should keenly monitor and encourage TQM awareness programme.

B. In order to be successful in implementing of TQM process, it is very important that a dedicated group should be responsible for implementation of the process. The steering group acts as a foundation. The group should consist of all senior members across all departments, who should matter for the running of the business. The function of the group will as follows;

1. The group will ensure active participation of all employees.

2. The group will have authority to allocate resources for improvement activities.
3. Ensure benchmarking and allocation of resources for quality improvement activities.
4. Provide guidance to all departments for improvement of Product and process related activities.
5. Develop process to monitor improvement activities and adequately reward them.

C. Appoint Quality Manager:

Quality manager need to be appointed to oversee the implementation of Quality movement. Quality Manager job is to primarily support quality enhancement programme of the organization. This means that they can no longer impose changed plan on the business, rather he has to persuade and facilitate change in the organization. The Quality manager role varies from organization to organization. He works closely with senior management and serves as spokesperson of Quality in the organization. He should be a key player in the organization strategic planning and champion of quality process. The quality manager neither write Quality Policy nor Quality Manual of the organization, rather encourages and involves all stakeholders in the development of quality policy and quality related manuals.

Appointed quality manager or facilitator usually have full time job for dealing with quality otherwise additional job along with other portfolio, which invariably means the quality is marginalised due to business pressure. Most of the time quality meetings are often not happening because of various reasons like sudden increase of work pressure etc. Quality function needs to be allocated with staff and proper business time which should not to avoid due to business pressure. Leader, team members are to be trained properly to have adequate knowledge of problem solving tools and techniques.

D. Identify TQM trainer:

Team training and functioning is regarded as the most significant step and most necessary element of team effectiveness and success (Thiagarajan et. al, 1998). Team building skills are needed to be developed in the organization, for

that necessary climate and culture need to be created by the top management. Employees need to be picked up from all areas and train them in quality programme by external facilities, such that they will able to teach other employees in a group. Exhaustive external training giving to all employees by external facilities may not possible for the organization. In house trainer to be developed to offer training to all employees. In house trainer will discover their own capabilities and value of their experience. When someone trains other personnel they become more informed with latest knowledge and become more confident about training of people for whom they are responsible and ensuring that their own commitment is communicated.

Once management is convinced to embrace TQM for the organization, then it is always better to go for professional approach to extract maximum benefit. In order to get the same, external professional trainers are available who can guide the journey successfully. Firstly by bringing external facilities for training on quality management it gives professional look. Secondly it gives clear cut message to all section of employees about seriousness of the management about the programme.

E. Prepare Vision, Mission and TQM objectives:

Top management commitment does not just happen, it is hard to build and sustain. It is a combination of honest leadership, vision, enthusiasm, teamwork and continued training. A top management participation to TQM is usually positive and supportive in the long run. **This study also reveals the importance leadership vision in the successful implementation of TQM in the organization (Refer Hypothesis-I).** Once the commitment to implementing TQM is established, it is best to start to create a corporate TQM vision, mission, review the motivations for such a system, formulate TQM objectives, strategies and to launch a quality campaign.

F. Select areas for TQM implementation:

In consultation with the top management, the steering group will finalise the areas where TQM implementation to be done and decide about the strategy of implementation.

G. Launch of TQM programme:

Organization may start with small improvements project to show result and prove the advantage of the new improvement schemes, so that employees and decision maker starts believing in the new programme. After experiencing success in some pockets, organization will embark for full fledged implementing of TQM as per plan and review its result.

6.12.5. Fifth Step:

TQM implementation:

The implementation process is shown in Fig 6.1. The implementation process starts with Root cause analysis, corrective actions. Quality improvement teams are trained with problem solving techniques, statistical process control etc. This phase represents the real test for other phases and the work to be put in the success of the quality journey. It requires the implementation of quality techniques and implementation of critical factors of the proposed framework for TQM implementation in the Indian context, given in Fig 6.2 and Fig 6.3.

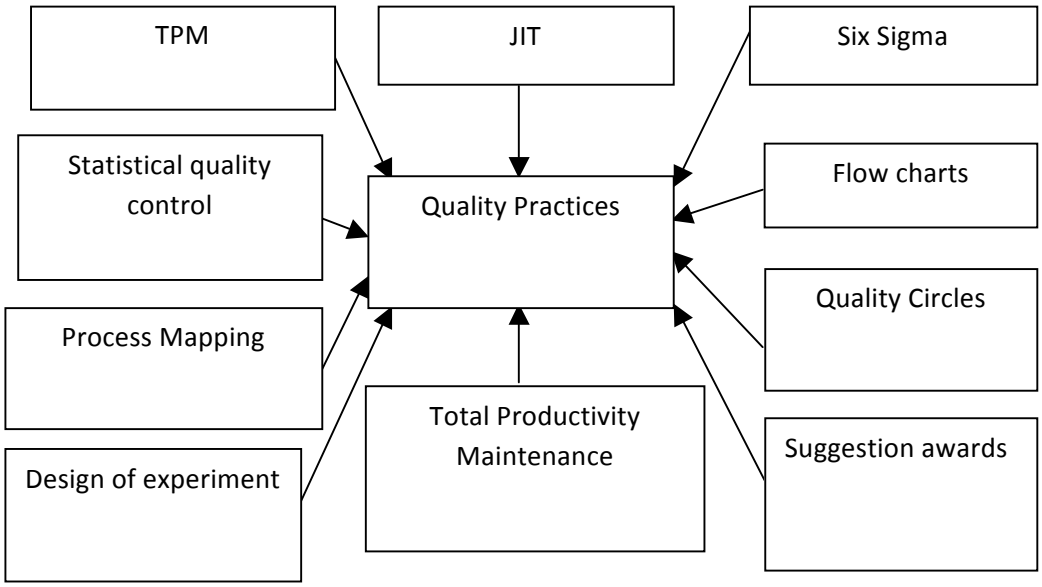

Fig 6.2 Quality Tools & Techniques

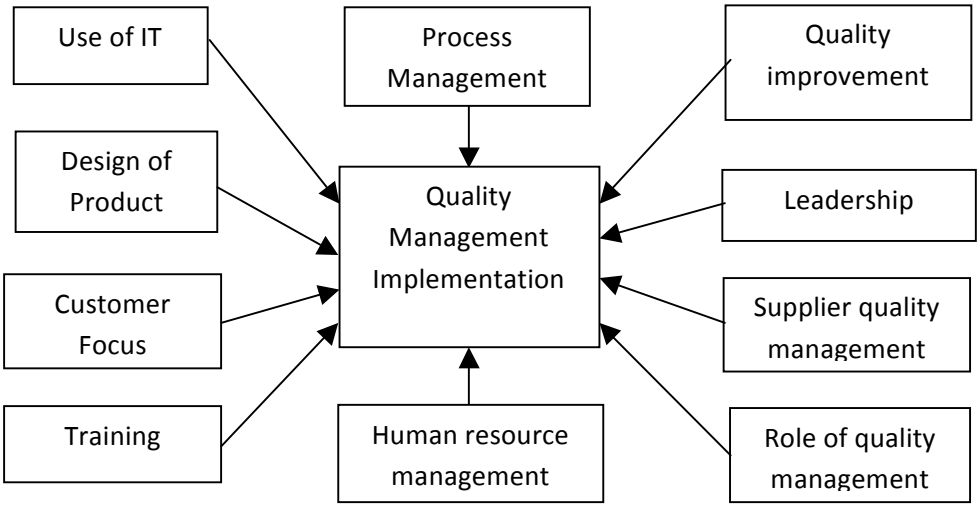

Fig 6.3 Critical success factors

A. Application of tools and techniques:

The effective use of tools and techniques enhances productivity and quality of the products. The list of some tools and techniques is mentioned in Table 6.1. The finding suggests that at the initial stages of implementation of QM practices, generally simple tools are used and towards maturity level of implementation of TQM, complex level of tools and techniques are used. Managers must show that they are serious by establishing a systematic approach providing tools and techniques support required. **This study reveals that behavioural tools (soft tools) are used more predominantly than quality tools (hard tools) across the industry (Refer Objective no 2).** The list behavioural tool is shown in Fig 6.4.

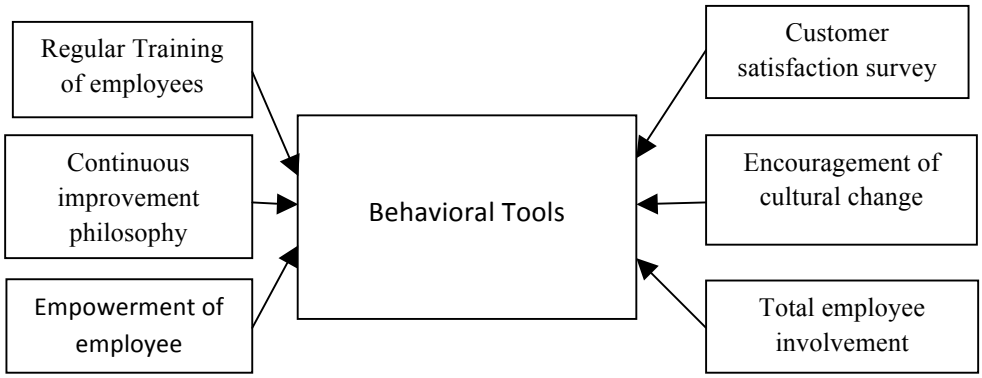

Fig 6.4 Behavioral Tools

B. Critical Success Factors:

Organization evaluates its performances and comes out with a set of factors which are critical to the success of business. These factors are known as critical success factors. Adoption of TQM is mainly to enhance critical success factors such that organization can perform at the optimum level.

6.12.6. Sixth Step:

TQM performance measurement:

The success of TQM depends upon commitment towards continuous improvement by the organization. Continuous improvement can be done through the process of self assessment and appropriate stage wise corrections. This characteristic allows organization to continuously measure and improve its position with respect to previous performance level. It is important to sustain measure and monitor its progress. The ultimate objective is to improve quality, customer satisfaction and organization need to know how well these objectives are fulfilled. Successful organizations continuously change and adopt new things, based upon customer needs and feedback. Ability to meet customer expectations has a direct impact on the organization's financial performance. It is all the more essential to survey customer satisfaction periodically. There are various ways to conduct customer satisfaction survey. Once customer feedback is received, input should be carefully evaluated and mechanism to be established to enhance overall customer satisfaction.

6.12.7. Seventh Step:

Organization performance:

Overall business performance consists of customer satisfaction (internal & external), product quality, employee satisfaction and strategic business performances. Organization should have latest benchmarking data of contemporary organizations which need to be compared and comparison data to be generated. By this process, entire organization will move down the

quality roads with clear plan and performances indicators. The ability to react to the shortcomings and address to customer complain will lead to higher customer retention as well as increased customer loyalty.

The objective of quality management is to transform the culture of the organization to one that emphasis a commitment to excellence, a continuous improvement in process, products and services, a focus on customer by everyone and employees satisfaction. The organization need to migrate into quality culture. The organization must satisfy internal and external customer by continuously improving its process. Organization may apply for Quality awards once it reaches at quality maturity phase.

6.13. Recommendations:

Recommendation of the study is as follows:

1. A culture of quality to be created in the industry sector. Proactive approach should be developed and implemented to educate all employees regarding quality. Further awareness needs to be communicated that developing quality products is the prime responsibility of workforce.

2. The study reinforces that Indian industries are committed theoretically to implement TQM philosophy in the working culture, and most of them have failed to realize full potential. Main reason is the failure to convert management strategies into working actions. Given the growing importance of TQM in the industry sector, the researcher feels that awareness of the TQM profile need to be increased to support Indian Electronics industry to harness its full potential. QMI model may be followed for proper implementation of TQM.

3. The availability of Tools and Techniques are plenty in TQM philosophy. Leadership of Small and Medium scale and large scale industries should have proper knowledge of the same and implement them accordingly.

4. There should be constant learning process in the industry. Management should appraise employees time to time regarding quality policy and its relevant activities. Continues learning in the form of training programme must exist. Reward and recognition for the employees should be present. Employees will participate in quality related activities so that it will provide impetus to bring quality culture in the organization.

5. Management should try to adopt participative work culture. There should be focus on people participation. Most of the high performing industry collectively decide their goal, develop plan to realize goal and accomplish goal with enthusiasm. In this type of organization, people are enthusiastic, dynamic and creative. The organization becomes full of activities and vibrant.

6. Organization should be vibrant with all sort of quality activities. It should support, proactive effort to embrace new quality initiatives like AS9100C, ISO 9000:2015 version etc.

7. The linearization of Indian economy forces industries to become competitive and quality conscious. To increase the competiveness all industry is trying to reduce operational cost. A few Indian industries are taken step as an integrated approach to embrace quality, safety and environmental standards. These industries are certified with International standards so that it will help to capture global market. It should continue to have more global Indian industries to compete in world market.

8. All senior management should continuously rededicate themselves for the improvement of quality culture in the organization. Communication should flow across all departments regarding quality movement.

9. More emphasises are to be given on Quality tools as the study reveals that behaviour tools are prevailing better in both small and medium and large scale industries.

10. SQC, Benchmarking, Flow charts, Check sheet, Quality circle suggestion awards need to be implemented successfully as they are more

predominant quality tools to have value addition to the existing QMS process.

11. The study amply defines the advantages of quality management practices in the industry over non adoption of the same and therefore, those who have not follow quality management practices must embrace the same at the earliest. This will certainly help to perform work in better and cost effective manner.

12. The study reveals that implementation of QM certification is low in the industries that too in small & medium scale industries (no implementation of QM certification 43%). Small & medium scale industries should go for QM certification.

13. Leadership implementation is one of the critical factors for the success of QM implementation. Hence top management must take cognizant of the fact during implementation of QM.

6.14. Contribution of the study:

Contribution of the study is as follows:

1. A few studies were taken place to find out the impact of quality management tools in Electronics Industry. The study may be considered an attempt to unearth some information regarding implementation of QM practices in Northern India Electronics Industry.

2. The study provides attention to use QM as one of the factor to enhance performance, the factor has hardly been taken into consideration by researcher in India previously.

3. The review of literatures in this field revealed that a few empirical studies were initiated. Therefore this study refines, integrates and extends the work conducted in these field and fill some gap.

4. The study enhances the level of awareness of the significance of QM practices as important and strategic, which could help industries to have better understanding of QM practices and effective implementation.

5. The study reveals various motivating factors that encourage implementation of QM practices in small & medium and large scale industry. This will certainly give impetus, industries to adopt quality management tools & techniques.

6. The study brings out problems and challenges faced by different sectors of industry during implementation of QM practices. So that industries can take appropriate action during implementation of quality management practices.

7. The study states the importance of leadership in overall implementation of QM practices in Electronics Industry.

6.15. Future scope of work:

Future course of the work is as follows:

1. Future study may seek to validate the research by collecting more data across all over India.

2. Time dimension of QM implementation may be incorporated in future study which will indicate short term and long term affect of QM programme.

3. Competitiveness data of QM practices like benchmarking may be incorporated while comparing among industries.

4. Future study may incorporate impact of business data like change of stock market price while implementing QM practices in the industry,

5. Quality Management Implementation model approach proposed may be used for Indian small & medium scale industry for smooth transition to TQM, which can be tried out for further refinements.

6. Future study may take consideration influence of the external environment in order to explore how the external environment affects the style of management and QM implementation.

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Annexure - I

QUESTIONNAIRE

1 Name of the Organization :

2 Address : _____
_____
_____
_____
_____

3 Nature of the organization (Please tick)

a. Electrical b. Electronics c. Consumer Electronics

d. EMS e. Component manufacturing f. Automobile Electronics

g. Any other (Please specify) _____

4 Major Products / Product segments :

5 Major customer of the product : (Put tick mark)

a. Only domestic market :
b. Only Export market :
c. Domestic as well as Export market :

6 Size of the company (No of employees)

a. (0 - 50) b. (51 - 100) c. (101 - 250) d. d. (251 - 500)

e. (501 - 1000) f. (1001 - 5000) g. more than 5001

7 Type of Company :

a. Small and Medium
b. Large

8 Type of ownership

a. Government owned.
b. Family owned.
c. Sole propriety.
d. Division of a large group.
e. Multinational Company.

f. Any other (Please specify)

9 Annual Turnover of the company
a. less than 10 Crores
b. 10 - 50 Crores
c. 51 - 100 Crores
d. 101 - 250 Crores
e. 251 - 500 Crores
f. 501 Crores and above

10 Number of Years of establishment
a. Less than 2 years.
b. 2 to 5 years.
c. 6 to 10 years
d. more than 10 years

11 Nature of origin :
a. Indian Company
b. Foreign Company
c. Subsidiary of a large Indian company.
d. Subsidiary of a Multinational company.
e. Any other (Please Specify) :

12 Export from the company accounts to :
a. 0%
b. upto 10%
c. 11 to 25%
d. 26% to 50 %
e. 51% to 75%
f. 75% to 100%

13 Current Certifications (can be more than one) :
a. ISO 9000 : 2000
b. ISO 9000 : 2008
c: ISO 14001
d. Other (Please specify) :

14 How long has the organization accredited with ISO certification
a. No accreditation.
b. 0 - 2 years
c. 3 - 5 years
d. 6 - 10 years
e. More than 10 years

15 How much time company took for ISO certification

a. Yet to get.
b. Less than 6 months.
c. 6 months to 1 Year.
d. 1 year to 2 years.
e. 2 years to 3 years.

16 Name ISO certifying agency :

17 Position of respondent in the company :

18 Company's awareness about TQM principles

a. Very much b. Much c. Somewhat d. Little

19 How long has been TQM implemented in the company :
a. Less than 1 year.
b. 1-3 Years
c. 4 - 6 Years
d. 7 - 9 Years
e. 9 years and above.

20 Major source of Inspiration for implementation of TQM in the company:

a. Expanding Business.
b. Influence of Foreign partners.
c. Improving Internal system and procedures.
d. Attract foreign business.

Questionnaire by which extent organization gained benefits through implementing Quality Management Practices

Following is the list of attributes to measure the extent organization gained benefits by implementing Quality management practices. Please indicate the level of implementation with respect to the benefit achieved by the organization.

1 - No Benefits, 2 - Low Level of Benefits, 3 - Medium Level of Benefits, 4 - High Level of Benefits, 5- Very High Level of Benefits

Sl No	Attributes	IMPLEMENTATION				
1	Improvement in documentation system.	1	2	3	4	5
2	Improvement in product quality.	1	2	3	4	5
3	Improvement in productivity.	1	2	3	4	5
4	Improvement in profit margin.	1	2	3	4	5
5	Improvement in morale.	1	2	3	4	5
6	Improvement in customer relationship.	1	2	3	4	5
7	Improvement in process control.	1	2	3	4	5
8	Increase in market share.	1	2	3	4	5
9	Clear role definition.	1	2	3	4	5
10	Improvement in new product generation.	1	2	3	4	5
11	Improvement in profit margin.	1	2	3	4	5
12	Improvement in sales turnover of the company.	1	2	3	4	5
13	Reduction in cycle time for manufacturing.	1	2	3	4	5
14	Reduction in defects rate of product.	1	2	3	4	5
15	Improvement in employee satisfaction.	1	2	3	4	5
16	Improvement in supplier relations.	1	2	3	4	5
17	Improvement in process design.	1	2	3	4	5
18	Improvement in quality alertness among employees.	1	2	3	4	5
19	Improvement in team activities.	1	2	3	4	5
20	Increase in export.	1	2	3	4	5
21	Improved methods in incoming inspection of items.	1	2	3	4	5
22	Improvement in Transparency.	1	2	3	4	5
23	Improvement in Communication.	1	2	3	4	5
24	Improvement in competitive advantage.	1	2	3	4	5
25	Improvement in supplier relations.	1	2	3	4	5
26	Improvement in employee relation.	1	2	3	4	5
27	Improvement in Customer satisfaction.	1	2	3	4	5
28	Reduction in Quality Audit by Customers.	1	2	3	4	5
29	Reduction in absenteeism in workers.	1	2	3	4	5
30	Reduction in customer complaints.	1	2	3	4	5

Questionnaire for identifying problems and challenges in the implementation of Quality Management practices

Following is the list of attributes to identify problems and challenges in the implementation of Quality Management practices. Please indicate the level of challenges against each attributes.

1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4- Agree, 5- Strongly Agree

Sl No	Attribute	Level of Challenge				
1	Employees are not trained for Quality Management practices.	1	2	3	4	5
2	Time constraint.	1	2	3	4	5
3	Inadequate resources for implementation of Quality Management practices.	1	2	3	4	5
4	Responsibility and accountability is not defined.	1	2	3	4	5
5	Resistant to change among employees.	1	2	3	4	5
6	Inadequate Customer focus.	1	2	3	4	5
7	Inadequate empowerment of employees.	1	2	3	4	5
8	Inadequate commitment from top and middle management.	1	2	3	4	5
9	Focused training is not adequate.	1	2	3	4	5
10	Employees are not well equipped to tackle problems.	1	2	3	4	5
11	Quality action procedures are not clear.	1	2	3	4	5
12	Cross functional teams are not active.	1	2	3	4	5
13	Inadequate focus on the customer.	1	2	3	4	5
14	Improper coordination with supplier.	1	2	3	4	5
15	Inadequate training for the employees.	1	2	3	4	5
16	Workforce is not committed to the quality.	1	2	3	4	5
17	Frequent turnover of the employees.	1	2	3	4	5
18	Employees are not adequately rewarded/recognised for their contribution towards quality improvement.	1	2	3	4	5
19	Lack of understanding regarding implementing aspect of Quality Management tools by middle level managers.	1	2	3	4	5
20	Difficulty in changing quality culture of the organization.	1	2	3	4	5
21	Processes are not benchmarked.	1	2	3	4	5
22	High cost of implementation QM outweigh benefits.	1	2	3	4	5
23	Frequent turnover of middle and top management.	1	2	3	4	5
24	The best practices / products are not benchmarked.	1	2	3	4	5
25	Quality activities are driven more on cost reduction than on customer satisfaction.	1	2	3	4	5

Questionnaire on Factors that motivate Company for Implementation of Quality Management Practices

Following is the list of attributes which motivates organization to implement quality practices. Please indicate the degree at which these attributes motivates the organization for implementation of Quality Management practices.

1- Strongly disagree , 2 - Disagree , 3- Neutral, 4 - Agree, 5 - Strongly agree

SL No	Attributes	IMPORTANCE				
1	Improved documentation system.	1	2	3	4	5
2	More defective products.	1	2	3	4	5
3	Less quality cost.	1	2	3	4	5
4	Improved profit margin.	1	2	3	4	5
5	Less worker participation.	1	2	3	4	5
6	Improved job satisfaction.	1	2	3	4	5
7	Improved process control.	1	2	3	4	5
8	Improved image of the company.	1	2	3	4	5
9	Reduction in the performance.	1	2	3	4	5
10	Improve prospect for Export market.	1	2	3	4	5
11	Decrease in market share.	1	2	3	4	5
12	Decrease in product service quality.	1	2	3	4	5
13	Improve Management and employees relation.	1	2	3	4	5
14	Decrease in customer satisfaction.	1	2	3	4	5
15	Quality leadership in chosen product.	1	2	3	4	5
16	Long term cost competitiveness.	1	2	3	4	5
17	Non Cohesiveness among employees.	1	2	3	4	5
18	Deterioration in group activities.	1	2	3	4	5
19	Commitment to quality by top management.	1	2	3	4	5
20	Quality Plan are prepared before starting of Job.	1	2	3	4	5
21	Critical processes are identified.	1	2	3	4	5
22	Periodic review of all processes.	1	2	3	4	5
23	To build a quality culture.	1	2	3	4	5
24	Increase in third party Audit.	1	2	3	4	5
25	Avoid duplication of procedures.	1	2	3	4	5
26	Thrust on continual improvement.	1	2	3	4	5
27	Reduction in cost of product.	1	2	3	4	5

Questionnaire on Leadership Vision

Following attributes are the qualities of Visionary leadership. Please indicate the level at which these attributes have been implemented in the organization.

1- No Implementation 2- Low Level of Implementation 3- Medium Level of Implementation 4- High Level of Implementation 5- Very High Level of Implementation

SL No	Attribute	IMPLEMENTATION LEVEL IN THE COMPANY				
1	Leaders participate in Management Reviews.	1	2	3	4	5
2	Leaders take up responsibilities in quality performance.	1	2	3	4	5
3	Leadership by example in the company by top management.	1	2	3	4	5
4	Leaders seldom participate in quality related meetings.	1	2	3	4	5
5	Leaders ensure that everyone in the organization has customer focus.	1	2	3	4	5
6	Leaders seldom encourage training of employees.	1	2	3	4	5
7	Leaders seldom participate in Quality Circle presentations/suggestion awards functions.	1	2	3	4	5
8	Leaders encourage the use of quality Management tools for solving day to day problems.	1	2	3	4	5
9	Leaders seldom encourage leadership development programmes in the company.	1	2	3	4	5
10	Leaders seldom encourage improvement in quality system continually.	1	2	3	4	5
11	Leaders regularly meet customers.	1	2	3	4	5
12	Leaders seldom participate in leadership survey programmes to understand Leadership effectiveness.	1	2	3	4	5
13	Leaders seldom allow members complete freedom of work.	1	2	3	4	5
14	Leaders communicate quality policy and goals of the company.	1	2	3	4	5
15	Leaders allow the group a high degree of initiative.	1	2	3	4	5
16	leaders seldom prepare to explain about any changes.	1	2	3	4	5
17	Leaders would permit the employee to use their own judgement in solving their problems.	1	2	3	4	5
18	Leaders seldom encourage for competitive benchmarking.	1	2	3	4	5
19	Leaders recognise quality as most important competitive priority.	1	2	3	4	5
20	Leaders seldom participate in TQM activities.	1	2	3	4	5
21	Leaders seldom encourage succession building programme.	1	2	3	4	5
22	Leaders encourage Team building activities.	1	2	3	4	5
23	Leaders seldom take feedback open mindly.	1	2	3	4	5
24	Leaders act as a 'Role Model' for the employees.	1	2	3	4	5
25	Leaders allow valid whistle blowing.	1	2	3	4	5
26	Leaders seldom evaluate themselves based on quality performances.	1	2	3	4	5
27	Leaders define the Company's plan, objective, targets w.r.t customer requirement.	1	2	3	4	5
28	Leaders define specific quality for each division.	1	2	3	4	5

Questionnaire on various kinds of Quality Management Practices in force and their implementation in the Electronics Industry

Following is the list of Quality Management tools. Kindly indicate whether the respective tools are used in the organization or not. If it is used, please indicate level of implementation of tools

1 - No Implementation, 2 - Low Level of Implementation, 3 - Medium Level of Implementation, 4 - High Level of Implementation, 5 - Very High Level of Implementation.

Sl No	Scientific Tools	Whether used in the organisation (Yes/No)	LEVEL OF IMPLEMENTATION				
1	Quality Circles		1	2	3	4	5
2	Suggestion Awards		1	2	3	4	5
3	Cause and Effect Diagram		1	2	3	4	5
4	Bench Markings		1	2	3	4	5
5	Histogram		1	2	3	4	5
6	Flow Charts		1	2	3	4	5
7	Check Sheets		1	2	3	4	5
8	Pareto Analysis		1	2	3	4	5
9	Scatter Diagram		1	2	3	4	5
10	Gantt Charts		1	2	3	4	5
11	Value Stream Mapping		1	2	3	4	5
12	Cost Benefit Analysis		1	2	3	4	5
13	Arrow Diagram		1	2	3	4	5
14	Affinity Diagram		1	2	3	4	5
15	Six Sigma		1	2	3	4	5
16	Lean Manufacturing		1	2	3	4	5
17	JIT		1	2	3	4	5
18	Poka-Yoke		1	2	3	4	5
19	Process Mapping		1	2	3	4	5
20	Quality Function Deployment (QFD)		1	2	3	4	5
21	Matrix Diagram		1	2	3	4	5
22	Design of Experiment		1	2	3	4	5
23	Failure Mode Analysis		1	2	3	4	5
24	Control Charts		1	2	3	4	5
25	Failure Mode Effect Analysis		1	2	3	4	5
26	Statistical Quality Control		1	2	3	4	5
27	Total Productivity Maintenance		1	2	3	4	5
28	Cellular Manufacturing		1	2	3	4	5

Behavioural Tools

29	Regular training of employees		1	2	3	4	5
30	Institutionalization of continuous improvement philosophy		1	2	3	4	5
31	Empowerment of employees		1	2	3	4	5
32	Customer satisfaction survey		1	2	3	4	5
33	Encouragement to cultural changes		1	2	3	4	5
34	Extent of total employee involvement		1	2	3	4	5

Questionnaire on Leadership Vision

Following are attributes for Leadership Vision of an organization. Please indicate the level of each attributes
which you consider essential for the organization.

1-No Importance 2- Low Level of Importance 3- Medium Level of Importance 4- High Level of Importance 5- Very high level of Importance

Sl No	Attribute	LEVEL OF IMPORTANCE				
1	Leaders participate in Management Reviews.	1	2	3	4	5
2	Leaders do not take up responsibilities in quality performance.	1	2	3	4	5
3	Leadership by example in the company.	1	2	3	4	5
4	Leaders participate in quality related meetings.	1	2	3	4	5
5	Leaders ensure that everyone in the organization has customer focus.	1	2	3	4	5
6	Leaders do not encourage training of employees.	1	2	3	4	5
7	Leaders do not participate in Quality Circle presentations / suggestion awards functions.	1	2	3	4	5
8	Leaders encourage quality Management tools for solving day to day problems.	1	2	3	4	5
9	Leaders do not encourage leadership development programmes in the company.	1	2	3	4	5
10	Leaders encourage improvement in quality systems continually.	1	2	3	4	5
11	Leaders seldom meet customers.	1	2	3	4	5
12	Leaders participate in leadership survey programmes to understand Leadership effectiveness.	1	2	3	4	5
13	Leaders do not allow member complete freedom of work.	1	2	3	4	5
14	Leaders communicate quality policy and goals of the company.	1	2	3	4	5
15	Leaders allow the group a high degree of initiative.	1	2	3	4	5
16	Leaders do not always prepare to explain about any changes.	1	2	3	4	5
17	Leaders permit the employees to use their own judgement in solving their problems.	1	2	3	4	5
18	Leaders encourage for competitive benchmarking.	1	2	3	4	5
19	Leaders recognise quality as most important competitive priority.	1	2	3	4	5
20	Leaders seldom not participate in TQM activities.	1	2	3	4	5
21	Leaders seldom encourages succession building programme.	1	2	3	4	5
22	Leaders encourage Team building activities.	1	2	3	4	5
23	Leaders seldom take feedback open mindly.	1	2	3	4	5
24	Leaders seldom act as a 'Role Model' for the employees.	1	2	3	4	5
25	Leaders allow valid whistleblowing.	1	2	3	4	5
26	Leaders seldom evaluate themselves based on quality performances.	1	2	3	4	5
27	Leaders define the Company's plan, objectives, targets w.r.t customer requirement.	1	2	3	4	5
28	Leaders seldom define specific quality for each division.	1	2	3	4	5