3.1 INTRODUCTION

The economies of most developing countries are based on agriculture, which accounts for 60 to 80 per cent of their gross national products. Their industries are in various stages of expansion and growth. Manufacturing companies are generally family-owned and professional management is restricted to large companies or to production unit functioning under license from multinationals. As a result, many producers are not aware of the payback of quality systems and their outcome on profitability and enduring growth. The huge mass of the population are poor and, struggling to meet their basic needs, most have to base their purchasing decision on price concerns. In addition, the low levels of literacy make sure that common consumer knowledge of quality and its implications is immaterial. Consumer movements challenging conformity to standards have not yet taken root. In this atmosphere, many manufacturers, particularly the small and medium-sized are
inclined to use cheap materials to produce low-priced goods of minimal quality. Consumers acknowledge these because they are poor, because they do not know any better and for the reason that the substitutes offered by imports are expensive.

For many years, experts have been promoting quality control in organisations, but they were only partially successful. This may be due to operational and conceptual deficiencies. Quality control was limited only to product and manufacture and the improvements were restricted to rejects, reworks etc and the inspection department was the sole custodian of product quality.

The implementation of quality standards will enable the export enterprises in developing countries to offer products that meet the customer needs and expectations and comply with standards and specifications. The quality standards should help them acquire a bigger share of their target markets. To accelerate exports and to get a permanent share in the global markets, organisations should work vigorously to implement quality management system. It is an accepted fact that no organisation can progress, grow and be competitive unless it pays continuous attention to quality for its products and services. Competition from international markets prompted manufacturers to create an industrial environment with enhanced productivity, quality products and services, customer satisfaction, upgraded technology and skills of employees. Though some of the Indian manufacturers have been bestowed with quality awards, still most Indian businesses are yet to attain quality consciousness.
Thus, quality awareness must begin at the beginning when the customer’s requirements are being identified. This conscious quality-building effort must continue through the various stages of development; process planning and development; purchasing; production, or provision of services; verification; packaging and storage; sales and storage; installation and commissioning; technical assistance and servicing; post-sales surveillance; and disposal or recycling at the end of the product’s useful life.

3.2 PROGRESS OF QUALITY THEORIES

The field of quality has its roots in agriculture and the work on standardisation first began in the electro technical sciences and was followed by the discipline of mechanical engineering. The quality management concept could be traced back to early 20th century in Britain where a few quality conscious people conducted statistical research to assist farmers in understanding how to optimally plant and rotate crops.1

Deming, after outlining his ideas on quality control to unresponsive American engineers during World War II, visited Japan in July 1950 to teach a course on statistical control and he became a key facilitator in Japan’s rapid uptake of quality management.2 The Japanese industrialists were receptive to idea of improving quality because they wanted to improve their export performance. Deming’s teaching went well beyond customary statistical control courses and became a management philosophy.

This work subsequently inspired other quality leaders like Joseph M. Juran and Walter Shewhart at Bell Laboratories, whose work motivated W. Edward Deming to
devote his life to the teaching and improvement of quality methods. In essence, Deming took the idea of statistical control and transformed it into a method of management, statistical quality control (SQC). In 1954, Japan saw another improvement with Juran elevating the level of quality management from the factory to the total organisation. Juran provided the move from statistical quality control (SQC) to total quality control (TQC) in Japan. 1968 saw, Kaoru Ishikawa, distinguished as one of the fathers of total quality control (TQC) in Japan, brought out the fundamentals of TQC management.

Various strategies have been tried during the past years. The early attempts used statistical techniques on the factory floor. In the 1960s, companies used management by objectives to try to control quality aspects. 1980s examined the introduction industry standards later translated as management system standards with the establishment of International Organisation for Standardisation.

3.3 EVOLUTION OF QUALITY CONCEPTS

Industrial atmosphere has been witnessing many changes in the last 40 to 45 years, with reference to quality revolution. Before accomplishing the present day concepts of total quality, a great deal of work had taken place over the centuries to arrive at this stage. In 1920’s statistical theory began to be applied to inspection and quality control, but there was little use of these techniques in manufacturing companies until the late 1940’s.

In 1970’s, quality was just the responsibility of quality control department of a company though quality management practices had become a national preoccupation in
Japan. The 1980’s saw a resolution in quality and in the role of the quality control manager. Subsequently, the western countries introduced their own quality programmes and initiatives seeing the Japan’s quality efforts and success. The 1990’s laid emphasis in all other aspects of quality, that is marketing, finance, personnel and other non-manufacturing area.\textsuperscript{5} The end of 20\textsuperscript{th} century manifested the role of International Organisation for Standardisation and the impact of quality certifications.

21\textsuperscript{st} Century witnesses the practice of TQM concepts in holistic frameworks, TQM’s application aims to help organisations achieve excellent performance. TQM is now part of a much wider concept that addresses overall organisational performance and recognises the importance of processes. There is also extensive research evidence that demonstrates the benefits from the approach.

Quality gives competitive edge to the enterprises producing goods and providing services for the global market and the business houses are forced to compete with each other worldwide, on the basis of quality in the globalisation era. The ISO 9000 series of standards have made good impact on business around the world with the concept of quality taking a tangible form. ISO 9000 has almost unanimously received worldwide acceptance and there is a broad consensus about quality system’s minimum requirements.

Figure 3.1 shows a bird’s eye view of the evolution of quality movement during 20\textsuperscript{th} Century and beyond.
3.4 QUALITY MANAGEMENT SYSTEM PRACTICES

The steps forward in the concept of Quality over the past decades had been discussed earlier. If one looks at it carefully, it will be evident that Quality has always been an important element for competitive success. But the initial approach for Quality was final inspection and postproduction adjustment. Quality was not viewed as a responsibility of the entire workforce. Quality function was separated from such areas as planning, design, production and sales. But the QMS practices are put into effect by the industrial organisations constantly over the years in their regular functioning.

3.4.1 Traditional Practices

3.4.1.1 Inspection and Testing by Quality Departments

This includes inspection and testing in the factory right from the raw material to finished products. Having pre-determined standards for incoming raw materials, they are tested and approved by the quality department. They are cleared for production only after approval from quality department. The inspection at different levels at regular intervals with the help of modern testing and inspection instruments is known as ‘In process inspection’. Final inspection includes 100 per cent visual inspection and operational efficiency and before dispatch of goods, a preshipment inspection is carried out to check conformity of goods to the requirements of the customers.

3.4.1.2 Standardisation as a Marketing Function

Standardisation carries the idea on uniformity of quality and it is considered as an ancillary function of marketing. The standardisation movement has already made a beginning in the field of manufactured and agricultural goods. In the era of mass
production, products are standardized because they are produced with standardized equipment, machinery, materials and under standardised working conditions. It includes the establishment of standards, the sorting and grading of products to conform to these standards, repackaging, breaking up large quantities into smaller units of desirable size and product inspection.

3.4.1.3 Quality Control

The operational techniques and activities that are used to fulfill requirements of quality are known as quality control. Ishikawa, one of the quality gurus states that the very purpose of quality control is to develop, design, produce and service a quality product, which is most economical, most useful and always satisfactory to the customer. Though quality control function was limited to production and engineering department earlier, it is an activity that has to be carried out in an integrated manner at all levels from top to bottom, each level taking responsibility for quality in their sphere of activity of an organisation.

3.4.2 Modern Practices

As the custodian of larger interests, top managements have a vital role to play in implementing quality systems for the overall global welfare. Traditionally inward-looking managements have started focusing on larger societal and customer driven issues affecting their businesses. But the marketing environment is bringing a welcome change in their attitudes and approach to improvement. Well-developed tools and approaches are now available.

3.4.2.1 KAIZEN
KAIZEN is an umbrella term covering the key elements of Japanese management practices and is based on the simple principle that, whatever the field in our lives, be it social life, working life, domestic life or even leisure life, we need continuous improvement in order to progress and advance as opposed to status quo and stagnancy. For such an effort we must have participation and involvement of one and all whether it is society or an enterprise. In industry, to stay there and compete, there should be an unending improvement and progress to provide leverage against other competitors. Management has two major functions in KAIZEN - Create a conducive environment and encourage continuous improvement (technological, managerial and operative) and establish standards and maintain the standards established. Kaizen values the process as much as the result. In order to get people involved in continuing their kaizen effort, management must carefully plan, organize and execute the project.

3.4.2.2 Quality Circles

Quality Circle or Quality Control Circle concept was first seen in the United States in the 1950’s. In April 1962, K. Ishikawa presented this idea in the inaugural issue of the JUSE’s journal ‘Gemba to QC’ and he developed the circles in Japan and according to him, “Quality Circle is a small group to perform voluntarily quality control activities within the same workshop”. This small group carries on continuously as a part of company wide quality control activities self development and mutual development and improvement within the workshop, utilizing quality control techniques with all member participating. This small group promotes the activity in such a way as to autonomously administer it, utilize the QC concept and technique and others, display creativity and make self development and mutual development.
In the last 36 years Quality Circle concept was introduced in as many as 130 countries. The Circles were re-exported to the U.S. in the early 1970’s, but Quality Circle concept is well established only in ASEAN countries like Japan, South Korea, Peoples Republic of China, Taiwan etc. In 1980’s countries became aware of the total quality management resulting in the reduction in the use of quality circles.

3.4.2.3 5S – House Keeping

The concept of “5S” has been in operation for a very long time. But practitioners were not aware of them. By looking around the place, whether it is home or our work area there is always lot of room for improvement. The 5S is not a fad, a flavor of the month, but an ongoing part of daily life.7 Five ‘S’ are derived from the first letters of the words. SEIRI means Organisation or sorting, SEITON means systematic arrangement, SEISO means Cleanup or Cleanliness, SEIKETSU means Standardisation and SHITSUKE means Discipline.

3.4.2.4 Total Productive Maintenance

Total productive maintenance (TPM) is the systematic execution of maintenance by all employees through small group activities. The dual goals of TPM are zero breakdowns and zero defects; this obviously improves equipment efficiency rates and reduces costs. It also minimizes inventory costs associated with spare parts. It is claimed that most companies can realize a 15-25 per cent increase in equipment operation rates within three years of adopting TPM. Labour productivity also generally increases by a significant margin, sometimes as high as 40-50 per cent.8

3.4.2.5 Total Quality Management
Total Quality Management means a new approach to improve product Quality and increase customer satisfaction on a continuous basis by restructuring traditional management practices. What we should understand is that TQM is not a concept but a philosophy. It has developed over a period and can be considered as a foundation for the development of all other new concepts, which we are aware of today or can be considered as a broad umbrella under which the new concepts can be fitted in. Hence one should not consider any new idea as a replacement for TQM philosophy. Principles of TQM include 1. Customer focused Organisation, 2. Leadership 3. Involvement of people 4. Process orientation 5. System approach to management, 6. Continuous Improvement, 7. Factual approach to decision making and 8. Mutually beneficial supplier relationships.

3.4.2.6 Benchmarking

In the global movement today, the competition is improving at a faster rate, and the only way to improve your relative quality and move upwards is to find out and implement the best corporate practices. Benchmarking is quality by comparison for achieving better standards. Best practice benchmarking is a technique used by companies around the world in all sectors of business to help them become good or better than the best in the world in the most important aspects of their operations. Benchmarking and self-assessment may be one of the most useful trends to develop in the past twelve years.

3.4.2.7 Business Process Reengineering

Continuous improvement can only take an organisation so far along the quality curve. Then it has to move toward a sharp upward jump into a new orbit and this vertical transition demands a complete redesign of processes known as BPR. Reengineering is
all about reinventing the entire organisation including its people, structures rather than just processes. Organisations looking for thorough improvement need BPR.

3.4.2.8 Total Project Management

The principle behind the concept of TPM is that an enterprise-wide approach in developing a successful project management system best supported in a project-thinking organisation. People, process and technology are the key drivers in this environment. In a project-based background, projects are associated with an organisation’s corporate policy and thus receive support from managers at all levels. Excellent communication and collaboration must be developed as means within the organisation. This management approach will drive accountability into the process and create a platform for continuous corporate and individual performance progress. Successful businesses in all segments have restructured and retooled to respond to the dynamics of a competitive market place and rapid technological advances. In doing so, they have changed the perceptions and guise associated with old school business. TPM and the system of management that it deploys will help guide us through the changes.

3.4.2.9 ISO-9000 Quality Management Systems

The quality system as defined by the International Organisation for Standardisation (ISO) in its 9000 series of standards was developed in response to the challenges of increasing market globalization. It has been widely accepted and adopted by over 70 countries in all regions of the developed and developing worlds. These standards are viewed as powerful tools for effective management not only of product quality but also of all business operations irrespective of their sector. One of the unique features of the ISO 9000 standard is third-party certification of an organisation’s quality system. This enhances its market image and helps establish its credibility among
its customers worldwide. A detailed conceptual framework and analysis is presented later in the chapter.

3.4.2.10 Six Sigma

Six Sigma means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process - from manufacturing to transactional and from product to service. The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects.

3.5 QUALITY AWARDS

Specific awards, where all can participate with equal level playing field can generate quality consciousness. This is a paradigm shift from quality by a few to quality by all. This type of awards if instituted will promote quality by all as everyone who means business and who wants to participate can take active part in quality upgradation.

3.5.1 International

3.5.1.2 Malcolm Baldrige National Quality Award (USA)

The Malcolm Baldrige National Quality Award process is designed to recognize and award those firms with outstanding records of quality performance. The Baldrige Award criteria are results oriented and cover all operations, processes, and work units of a company. The evaluation procedures emphasize the dynamics involved in the
integration of all aspects of a firm's quality system and the firm’s continuous improvements in quality.

3.5.1.2 The European Quality Award

The European Quality Award is Europe's most prestigious Award for organisational Excellence and is the top level of the European Forum for Quality Management Levels of Excellence. It is open to every high performing organisation in Europe and focuses on recognizing Excellence and providing detailed, independent feedback to all Applicants to help them on their continuing journey to Excellence. Award Assessors are all practicing senior managers or, in a few cases, academicians who bring their years of experience and judgement to provide valuable feedback and the evidence on which the different levels of recognition are based.

3.5.1.2 Deming Application Prize

The Deming Application Prize is an annual award presented to a company that has achieved distinctive performance improvements through the application of TQM. Regardless of the types of industries, any organisation can apply for the Prize, be it public or private, large or small, or domestic or overseas. There is no limit to the number of potential recipients of the Prize each year. All organisations that score the passing points or higher upon examination will be awarded the Deming Application Prize. The categories of the Deming Prize are the Deming Prize for Individuals, the Deming Application Prize, and the Quality Control Award for Operations Business Units. Initially, the Deming Prize was restricted to Japanese companies. But the Deming Prize Committee established the Deming Application Prize Administrative Regulation in
1984 to allow overseas companies to apply for and receive the Deming Prize upon successfully passing the examination.

3.5.2 National

3.5.2.1 Rajiv Gandhi National Quality Award

The Bureau of Indian Standards instituted Rajiv Gandhi National Quality award in 1991, with a view to encouraging Indian manufacturing and service organisations to strive for excellence and giving special recognition to those who are considered to be the leaders of quality movement in India. This award is intended to generate interest and involvement of Indian Industry in quality programmes, drive our products and services to higher levels of quality and equip our Industry to meet the challenges of domestic and international markets. The award has been named after our Late Prime Minister Rajiv Gandhi, recognising the new thrust he had given to the quality movement in India so that India could move into 21st Century with pride.

3.5.2.2 Quality Award Scheme by CII

The objectives of this award scheme is 1) Recognising a CII member organisation which can serve as a model to others in methods and systems practiced in pursuing the concept of ‘Total Quality’ and 2) Encouraging competition amongst members for bringing about further improvements in these methods and systems for moving towards ‘Total Quality’. The competition is modeled along the lines of the well-known ‘CII- Exim Bank award for Business Excellence.’

3.5.2.3 National Awards for Quality Products in Small-Scale Sector
Since 1986 a Scheme for giving National Awards to small-scale units producing quality products in 15 selected groups of industries of consumer interests has been introduced. The selection of 15 industries varies from year to year. This Award also consists of a citation, a trophy and lump sum amount of Rs.25,000/- as prize money for each of the 15 selected products. The purpose of this Award is to bring awareness amongst entrepreneurs for manufacturing quality products both of National and International standards.

3.6 QUALITY SYSTEM CERTIFICATIONS

Quality certifications play a key role in the domestic and global business by providing international benchmarks that reduce uncertainty. Certification is not a requirement of the standard themselves, which can be implemented without certification for the benefits that they help user organisations to achieve for themselves and for their customers. Many businesses implement voluntary standards as a strategic planning and marketing tool and many organisations have chosen certification because of the perception that an independent confirmation of conformity adds value.10

3.6.1 Accreditation

A growing interest and expansion in accreditation programmes has occurred worldwide during the past decade as demands for improved quality have increased progressively and as a means to qualify providers for payment under new reform models or to otherwise regulate providers. The concept of accreditation evolved during this century from an approach involving simple, voluntary programmes that
applied a few basic standards to an evaluation process that, when possible, applies evidence-based standards to determine the capability of large, complex organisations to deliver quality products and services.\textsuperscript{11}

According to NABCB (National Accreditation Board for Certification Bodies), ‘Accreditation’ is the formal recognition of competence of certification bodies and inspection bodies. In simple terms, as indicated by BIS (Bureau of Indian Standards), Accreditation is like certification of the certification body. ‘Accreditation’ should not be used as an interchangeable alternative for certification or registration. The International Accreditation Forum (IAF) is the world association of Conformity Assessment Accreditation Bodies. Its primary function is to develop a single worldwide program of conformity assessment that reduces risk for business and its customers by assuring them that accredited certificates may be relied upon. A certification body’s Quality Management Systems Certification activity is accredited by IAF and these IAF members accredit certification or registration bodies that issue certificates attesting that an organisation’s management, products or personnel comply with a specified standard, which is called as conformity assessment.

The Indian member body in IAF is NABCB (National Accreditation Board for Certification Bodies) and NABCB is a constituent of Quality Council of India (QCI). NABCB is also a member of the Pacific Accreditation Cooperation (Association of Accreditation Bodies in the Asia-Pacific Region). The objective of NABCB is to establish and offer accreditation schemes, based on internationally accepted standards, for certification bodies and inspection bodies engaged in providing services of system
certification (ISO 9001, ISO 14001 etc.), product certification and inspection. NABCB offers accreditation in the area of ISO 9001 Quality Management System certification and ISO 14001 Environmental Management System Certification.

3.6.2 Quality Assurance in a Certification System

Total transparency is the key term in the certification process. The quality assurance mechanisms found in the process ensure that the procedures used for certification are carried out in compliance with administrative and technical methodological guidelines devised for such purpose. The quality assurance systems have an internal verification by the assessment centre itself in order to check the consistency of the procedures that are being used, give advice to assessors about the assessment process and create the necessary conditions to handle the information related to assessments and an external verification system done by the certifying body which uses information from internal verification and it also checks the assessment practices used. If non-conformances are found during the verification process, the certifying body will give consultancy services and support to the assessment centre with the purpose of discovering and neutralizing the causes of this situation.

3.6.3 Need for Third Party Certification

- It is an independent proof of compliance to prescribed standards.
- An objective mechanism for acceptance of goods and services in foreign trade.
- A basis for compliance to technical regulations.
For manufacturers, there is improvement and consistency in quality and customer confidence and wider markets.

For organised purchasers, integrity of a product is guaranteed and reduction in costly testing and inspection.

For consumers, brand oriented selection and confidence in the purchase.

For a nation, protection of consumer and environment, improved public purchases and optimum overall economy.

For a global market, it facilitates international trade, mutual recognition and acceptance and costly testing and inspection is avoided.

3.6.4 Benefits of Certification

Organisations are waking up to the fact that management system certification can deliver tangible business benefits that go far beyond the marketing advantage. According to many certified organisations, gone are the days where quality maintenance is the job of production department and applicable only to manufacturing concerns. Now the concept is being expanded to services and traders, uniformity in standards and its application becomes essential especially in the era of globalization. International Standards are vital in the facilitation of international trade. Accredited certification delivers mutual understanding and recognition and acceptance of others’ products and services. A further and growing advantage offered by certification is the international recognition it confers. For outfits concerned with offshore operations or export businesses, this is a benefit that cannot be underestimated.
The primary purpose of an effective quality system is to inspire confidence among customers in a contractual situation. It is also of immense value to the suppliers themselves, because it enables them to achieve customers’ satisfaction cost effectively. If all tasks were carried out correctly the first time, there would be no waste, costs would be minimised and profit maximised. An effective quality system confers the following benefits on the supplier:

- Certification gives an edge in the marketplace and value through increased sales.

- A certification requires adoption of a uniform system, establishing that system has helped achieving efficiencies and cost savings over and above the initial objectives.

- Step-by-step examination of operations has yielded a number of improvements on service side, communication lines to customers; the sales contract process and the interfaces with suppliers.

- It enables them to identify and plan tasks and their method of performance in order to yield the right results.

- It provides the means for identifying and resolving problems and preventing their recurrence, thereby improving conformance.

- It enables staff to control their own operations, thereby reducing firefighting and freeing manager from constant intervention in business operations. This will help to create quality awareness and job satisfaction among employees.
- It provides a means for documenting the company’s experience. This can serve as the basis for training staff and thus for improving their performance.

- It provides data that can be used to determine the performance level of operating process and products, and to effect improvements.

- It generates objective evidence to demonstrate the quality of products and the effectiveness of systems and thus to build confidence among customers.

Implementing a quality system based on ISO 9000 can help transform an ad hoc method of quality control into an organised and cost-effective quality-management system. By combining high quality with low cost, this can give the company a tremendous competitive advantage.

An ever-increasing number of companies all over the world are implementing quality-system standard internally. In addition, the bigger companies are insisting that their suppliers implement certified quality systems based on ISO 9000. This would greatly help in the improvement of their image, their credibility and their acceptability in international markets, factors essential for success in the export trade.

### 3.6.5 Certification Methodology

The certification process of different certification agencies varies considerably despite international criteria being available from ISO. Generally it is focused on quality up gradation and certificates are awarded after proper examination of the organisational ability in implementing the system. The process is value additional activity and paving way for continuous improvement in quality and efficiency. The
Figure 3.2 shows the hierarchical relationship of the organisations and Figure 3.3 shows the universal procedural steps followed in the certification process.
Meeting the “Promise” by the Certified Organisation of their Stakeholder Expectations.

Source: DNV
Figure 3.3
Certification Methodology

Quality System Certification Body

Application Review

Audit Team Appointment

Audit

Submit to the Accreditation Review Panel

Submit to the Accreditation Sub-Committee

Submit to the National Accreditation Council

Issue of Certificates
Surveillance

↓

Re-assessment every 3 years
3.6.6 Quality Management Systems Certification Schemes

As a rule, all organisations operate a management system and virtually all employ a ‘formal’ management system of some sort. Few organisations do not issue documented invoices, retain accounts and issue contracts of employment and job descriptions/specifications to their employees. Implementing quality management amounts to building the organisation with the quality management principles particularly adopted from ISO, which is the world’s largest developer of voluntary standards. Paul Gregson who is the Assistant General Manager of Internal Audit and Quality Assurance at Canon, Australia cites the sales and marketing edge as one of the major motivators for achieving ISO 9000 quality certification.

3.6.7 The ISO 9000 Family of Standards

ISO 9000 is a generic system that specifies, in very broad terms, the necessary components of a quality management system. Rather than being specific to any one industry, it details the basic requirements of the quality function for all industries and it is accepted worldwide as a one-stop assessment. ISO (International Organisation for Standardisation) is the world’s largest developer of voluntary standards.

ISO 9000 was originally published in 1987 by the International Organisation for Standardisation, a worldwide federation of national standards body, headquartered in Geneva, Switzerland. The organisation was founded in 1946 to develop a common set of standards for manufacturing, trade and communications. By the end of 2004, its membership consists of 146 countries, each with a representative. Of these, 99 are member bodies (have full voting rights), 36 are correspondent members (entitled to
attend meeting as observers) and 11 are subscription members (only contacts). The representative for India is Bureau of Indian Standards (BIS), which is one among the member bodies.

The concept of ISO 9000 was developed in part because of the European countries pushing towards a fully integrated common market. It was recognised that for the common market to exist, there would have to be assurance of quality across borders. The European Economic Community, (now the European Union, or EU), adopted ISO 9000 as the basic minimal quality management system for selling certain products (electronic components and construction equipment) within the European Union.

ISO 9000 is not a product standard, but it is a system standard. Its primary purpose is to provide suppliers with useful internationally recognized models for operating a quality management system. Many industries have taken ISO 9000 to new levels, including it as a genuine requirement to supply services to certain major manufacturers, which resulted in sector specific standards like automotive (QS-9000), Telecom (TL 9000), and Aerospace (AS9000).

The new ISO 9001: 2000 was issued on 15th December 2000 as an International Standard by the ISO/TC -176 subcommittee, at Geneva, Switzerland. The new ISO 9001: 2000 enables one to structure Quality Management Systems in their organisation simply and efficiently. It has been introduced as a new method for delimiting, comprehending and controlling complex procedures. On account of the usefulness of such a concept, today 154 economies worldwide have adopted ISO 9000 as the standard for assuring consistent quality. Any organisation can apply for certification against ISO

The ISO 9000 series consists of four primary standards supported by several other documents.

ISO 9000:2000, Quality Management Systems-Fundamentals and Vocabulary

This standard describes the concepts of a quality management system (QMS) and defines the fundamental terms used in the ISO 9000 family. The standard also includes the eight quality management principles, which were used to develop ISO 9001 and ISO 9004. This standard replaces ISO 8402:1994 and ISO 9000-1:1994.


This is the current version of standard, which was published on 15th December 2000 replacing three earlier versions. It specifies the requirements for a QMS, whereby an organisation needs to assess and demonstrate its ability to provide products that meet customer and applicable regulatory requirements, and thereby enhance customer satisfaction. This standard replaces ISO 9001:1994, ISO 9002:1994 and ISO 9003:1994.


This standard provides guidance for continual improvement and can be used for performance improvement of an organisation. While ISO 9001 aims to give quality assurance to the manufacturing processes for products and to enhance customer

**ISO 19011 – Guidelines for Auditing Management Systems (Draft)**

ISO 19011 provides guidance on conducting internal and external audits of quality and environmental management systems. This new combined standard released in October 2002 will make it easier for companies and other organisations to implement integrated quality and environmental management systems. Additionally, combined and joint ISO 9000/14000 audits will provide savings to companies in time and resources.

**Sector Specific Standards**

**ISO/TS 16949:2002**

ISO/TS 16949 forms the requirements or the application of ISO 9001 for automotive production and relevant service part organisations. ISO/TS 16949 used the ISO 9001 Standard as the basis for their development and included the requirements from these Standards with specific ‘adders’ for the automotive supply chain. The 2002 revision of Technical Standards builds off the ISO9001: 2000 document. The basis for the certification audits for ISO/TS 16949 include the standard itself, customer specific requirements and the organisation’s quality system.

**QS 9000**

QS 9000 is a set of quality system requirements jointly published by big 3 American automobile manufacturers i.e. Ford Motor Co., Chrysler Corporation and General Motors Corporation for the adherence of their main suppliers. This is applicable to the
direct suppliers of production or service parts, production materials and heat-treating, painting, plating or other finishing services and also to some suppliers who are supplying to the direct suppliers. Requirements are to ensure that suppliers product meet his specification and product description, the suppliers quality system is consistently implemented and verified and the suppliers have systems for continuous improvement so that they are in a position to meet the changing needs of the company.

**TL 9000**

TL9000 is a quality management system developed for the telecommunications industry published by QuEST (The Quality Excellence for suppliers of Telecommunication. Its development was driven by the Regional Bell Operating Companies (RBOCs) and other service providers who suffer millions of dollars in losses per year due to quality related issues. Several of the service providers have already announced plans to require TL9000 registration from all of their equipment vendors. TL9000 was revised in March 2001 to align it with ISO 9001: 2001

**AS 9001**

AS 9001 is the aerospace version of ISO 9000. The Society of Automotive Engineers has released its aerospace standard AS 9100, Revision A, still referred to as 9001 in August 2001. This standard now includes the aerospace unique requirements and ASQ Q9001: 2000 and the original AS 9110 based on the Q9001: 1994 quality system requirements. The quality system requirements specified in this standard are complementary to the contractual and applicable law and regulatory requirements for
the aerospace industry. Standard AS 9100 contains approximately 80 unique requirements and 18 amplifications of the ISO 9000 requirements.

**TickIT**

TickIT is a guide to software quality systems. TickIT was designed by the United Kingdom information technology industry for use in areas such as software production and services. It can only be used in combination with ISO 9001. TickIT covers the assessment and certification of an organisation’s software quality management system to ISO 9000.

**ISO 13485:2003**

ISO 13485 is a set of quality system requirements for medical devices and provides particular requirements relating to the design/development, production, installation and servicing of medical devices. This standard embraces the principles of Good Manufacturing Practices (GMP) and is widely used in the manufacture of medical devices. It can only be used in combination with ISO 9001:2000.

**ISO 14001**

Though ISO 14001 is an environment management system standard, the factors like safety, quality and environment by and large go together to provide a foundation and build a more effective management system and create internal mechanisms to improve business performance. ISO 9001 has been developed to be “compatible” with ISO 14001 Environmental management systems-Requirements with guidance for use, particularly with regard to terminology and content. ISO 14000 is the

**Integrated Management System**

An integrated management system is a single documented management system, designed and implemented to satisfy the requirements of all the relevant management system standards that are required by an organisation (that is Quality, Environmental and Health and Safety). An integrated management system will allow an organisation to incorporate the requirements of additional management system standards, into the pre-existing documented systems, without undue amounts of duplication, documentation and bureaucracy. An integrated system for ISO –9000, ISO-14000 and SA-8000 is picking up very fast in South Indian textile clusters mainly because of insistence of foreign buyers. The integrated management systems are proved to be a powerful tool for market access and better business opportunities.
3.6.8 Certification in India

India is one of the complex economies having private, mixed and government undertakings from under developed zones to fully developed zones. India was among the first few countries to develop a national standard IS 10201—quality systems in six parts, in 1982. Similarly BIS had formulated a standard IS13967: 1993 on EMS before ISO 14001. Provision for environmental protection exists in India’s constitution through articles 48a and 51a (g).14

The most popular quality certification in India is ISO 9001 of International Organisation for Standardisation.15 When the first edition of ISO standards was published in 1987, BIS, the national standards body of India adopted the same and brought out as IS14000 series of standards in 1988 and later as IS/ISO 9000. In addition to the above standards, BIS has formulated standards in the following fields also:

- Analysis of quality cost – IS 10708
- Development of supplier rating system – IS 12040
- Complaints handling – IS 15400
- Handbook on statistical quality control – SP 28
- Quality circles – IS 12301
- Quality management for hospital services

3.6.9 Government’s Initiatives to Promote Quality
The Prime Minister of India launched the National Quality Campaign in April 1992 with nation-wide programmes on quality awareness and quality formed part of the IMPORT – EXPORT POLICY – (1992 – 97).

The Bureau of Indian Standards instituted Rajiv Gandhi National Quality Award in 1991. The award has been designed in line with similar awards in other developed countries, like Malcolm Baldrige National Quality Award in USA, Deming Prize in Japan and European Quality Award.

European expert group invited by govt. of India in 1992 to establish a national quality council in India and the Quality Council of India was set up in 1997.

Reimbursement of 75 per cent of the amount spent for acquiring ISO-9000/ISO-14001 certification (or its equivalent) up to a maximum of Rs.75,000/- to each small-scale unit as one time assistance. The scheme has been in operation since March 1994 and has been extended up to 31st March 2007.

3.6.10 Key Milestones in the Indian Quality Certification Process

- Ralli Wolf - first organisation in India to get certified in the year 1988 by BSI, U.K.
- 1992 - rapid upsurge in certified companies.
- Engineering sector’s initiative to lead the front.

One among the top ten countries for worldwide ISO 9001 certificates by December 2004 (as published by ISO).

95% increase in ISO 9001 Certifications over the previous year by Dec 2005.

3.6.11 Growth in India

The success of the ISO 9000 family of standards is still growing worldwide and India is not an exception to it. The number of domestic and export oriented industrial units where ISO 9000 is being implemented has increased. ISO 9000 and ISO 14000 are two of the best-known families of standards and used widely by business organisations large and small. A year wise breakdown of ISO 9000 before and after revision and ISO 14000 is shown in tables with key findings.

TABLE 3.1
Growth of Management System Certification in India
ISO 9000 (Before Revision)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Certifications</th>
<th>Growth</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec.1995</td>
<td>1023</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dec.1996</td>
<td>1665</td>
<td>642</td>
<td>62.76</td>
</tr>
<tr>
<td>Dec.1997</td>
<td>2865</td>
<td>1200</td>
<td>72.07</td>
</tr>
<tr>
<td>Dec.1998</td>
<td>3344</td>
<td>479</td>
<td>16.72</td>
</tr>
<tr>
<td>Dec.1999</td>
<td>5200</td>
<td>1856</td>
<td>55.50</td>
</tr>
<tr>
<td>Dec.2000</td>
<td>5682</td>
<td>482</td>
<td>9.27</td>
</tr>
</tbody>
</table>
It is observed that up to the end of Dec. 2000, a total number of 5682 ISO 9000 certificates had been awarded in India showing an increase of over 450 per cent compared to the year 1995 and 9 per cent over the previous year, the year in which the transition to the rigorous ISO 9001:2000 was introduced. The highest increase was recorded in the year 1997 with 72 per cent and lowest of 9 per cent in the year 2000. India’s higher growth during 1997 could perhaps be due to the introduction of new EXIM policy and growing popularity of ISO certificates among exporters. The lowest growth does not indicate a declining trend, but it is due to the revision of ISO standards on 15th December 2000 and a three-year transition period was given to move to the new ISO 9001.

Figure 3.4
Growth of Management System Certifications in India - ISO 9000 (Before Revision)

TABLE 3.2
Growth of Management System Certification In India - (After Revision) - ISO 9001:2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Growth</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>544</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002</td>
<td>2247</td>
<td>1703</td>
<td>313.05</td>
</tr>
<tr>
<td>2003</td>
<td>8367</td>
<td>6120</td>
<td>272.37</td>
</tr>
<tr>
<td>2004</td>
<td>12558</td>
<td>4191</td>
<td>50.09</td>
</tr>
<tr>
<td>Year</td>
<td>ISO 9001:2000</td>
<td>ISO 9000</td>
<td>Increase (%)</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>2005</td>
<td>24660</td>
<td>12102</td>
<td>96.37</td>
</tr>
</tbody>
</table>


It is found that up to December 2005, at least 24660 ISO 9001:2000 certificates are issued and it represent an increase of 96 per cent over the previous year and increased gradually from 2001. The number shown in 2001 denotes the new ISO 9001 certificates only and does not include ISO 9000 certificates issued till December 2000. The organisations were given three years until 15th December 2003 to make the transition to the new version. The higher growth during 2002 and 2003 show that many organisations in India were able to meet the transition period and the growth rate in 2002 (313% over the previous year) show the Indian organisations’ commitment towards quality, though the transition continued till 2005. India was able to move into the top 10 countries with most ISO 9001 certificates in the year 2004 and by the end of 2005, it has improved its position to 8 in the world results.
**Figure 3.5**
Growth of Management System Certifications in India (After Revision) ISO 9001-2001

**TABLE 3.3**
Growth of Management System Certifications in India - ISO 14000

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Certifications</th>
<th>Growth</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec.1995</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dec.1996</td>
<td>2</td>
<td>1</td>
<td>100.00</td>
</tr>
<tr>
<td>Dec.1997</td>
<td>28</td>
<td>2</td>
<td>1300.00</td>
</tr>
<tr>
<td>Dec.1998</td>
<td>40</td>
<td>12</td>
<td>42.86</td>
</tr>
<tr>
<td>---------</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
</tr>
<tr>
<td>Dec.1999</td>
<td>111</td>
<td>71</td>
<td>177.50</td>
</tr>
<tr>
<td>Dec.2000</td>
<td>257</td>
<td>146</td>
<td>131.53</td>
</tr>
<tr>
<td>Dec.2001</td>
<td>400</td>
<td>143</td>
<td>55.64</td>
</tr>
<tr>
<td>Dec.2002</td>
<td>605</td>
<td>205</td>
<td>51.25</td>
</tr>
<tr>
<td>Dec.2003</td>
<td>879</td>
<td>274</td>
<td>45.29</td>
</tr>
<tr>
<td>Dec.2004</td>
<td>1250</td>
<td>371</td>
<td>42.21</td>
</tr>
<tr>
<td>Dec.2005</td>
<td>1698</td>
<td>448</td>
<td>35.84</td>
</tr>
</tbody>
</table>


It is clear that at the end of December 2005, a total number of 1658 certificates were issued. Though ISO 14000 family standards were first published in September 1996, some organisations were certified to draft versions prior to this date. The 2005 total represent an increase of 35 per cent over the previous year and the number after 2000 shows an increase of 35 to 55 per cent but shows a decline in the growth. But the CGR during the period of 11 years is 106.9 per cent. The increase shows the environmental concern and commitment of the Indian firms and the gaining momentum for integrated management system.
Indian industries are aware of the prerequisites of the global market and taken initiatives to obtain third party certification as a confirmation to adherence to quality management systems. Though India witnesses a fair and reasonable growth, a survey conducted by the Quality Council of India revealed that certification to companies has not added value to companies. And another reason is the mushroom growth of certification agencies and their independent working with their accreditation bodies without a national focus and strategy. An apex body to take the lead is the need of the hour and NABCB can play a key role to bring uniformity in the certification process. A
code of conduct or ethics should be evolved and their strict adherence ensured among the certifying bodies. This attempt will make the certification as a value added activity in increasing the quality system practices and efficiency of Indian industries.

3.7 REVIEW OF CERTIFICATION IN TAMILNADU

Tamil Nadu has always shown an impressive growth in industry during the post-reform span. Tamilnadu’s industrial strength relies upon its quick accommodation of modernization, technical upgradation, usage of information technology and Standardisation techniques.

The review does not claim to be exhaustive and one should consider the conclusion keeping in mind the following remarks. There is no official central database on ISO Certification in Tamil Nadu and there are over 125 certifying bodies issuing ISO certificates in the state. More than one accreditation body has accredited them. Due to the confidential nature of information and their diffidence to give the number of licenses, the findings are limited to available information given by the certifying bodies that responded to the call. A holistic picture of Tamil Nadu is not derived. The following tables are presented with its findings and limited to a particular certifying body only and cannot be concluded that one performs better than another as the clientage pattern of Certifying Body varies from state to state.

\[\textbf{TABLE 3.4} \]

\textbf{Certification in Tamil Nadu – BIS}

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2000</td>
<td>15</td>
<td>7.32</td>
</tr>
</tbody>
</table>
2. 2001 | 22 | 10.73  
3. 2002 | 59 | 28.78  
4. 2003 | 51 | 24.88  
5. 2004 | 18 |  8.78  
6. 2005 | 40 | 19.51  

Total | 205 | 100.00  


It is observed that Bureau of Indian standards had issued more number of certificates during the year 2002 (28%) and the total number indicates a significant increase compared to the year 2001. The higher percentage during 2002 and 2003 (28% and 24%) shows that more organisations in Tamil Nadu were able to meet the transition to the new ISO 9001.

**TABLE 3.5**  
*Certification by Registro Italiano Navale India Pvt.Ltd. (RINA) in Tamil Nadu*  

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Certification</th>
<th>Number of Licenses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ISO 9001</td>
<td>83</td>
<td>86.46</td>
</tr>
<tr>
<td>2.</td>
<td>ISO 14001</td>
<td>4</td>
<td>4.17</td>
</tr>
<tr>
<td>3.</td>
<td>SA 8000</td>
<td>5</td>
<td>5.21</td>
</tr>
<tr>
<td>4.</td>
<td>Best 4</td>
<td>2</td>
<td>2.08</td>
</tr>
<tr>
<td>5.</td>
<td>Integrate</td>
<td>2</td>
<td>2.08</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>96</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Source: RINA, 2005.
The certification standing of RINA shows that it has issued more number of ISO 9001 certificates (86%) than any other certificates.
The sector-wise distribution of certificates of DNV indicates that it has issued more certificates in the engineering sector (17%) followed by software and services (12.5%).
### Table 3.7

**Sector wise Certification of Intal Quality Certifications Pvt.Ltd. in Tamil Nadu**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Sector</th>
<th>Number of Licenses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Basic Metals and Fabrication</td>
<td>53</td>
<td>62.35</td>
</tr>
<tr>
<td>2.</td>
<td>Banking Services</td>
<td>4</td>
<td>4.71</td>
</tr>
<tr>
<td>3.</td>
<td>Trading</td>
<td>3</td>
<td>3.53</td>
</tr>
<tr>
<td>4.</td>
<td>Packing Industries</td>
<td>2</td>
<td>2.35</td>
</tr>
<tr>
<td>5.</td>
<td>Plastic and Rubber Products</td>
<td>9</td>
<td>10.59</td>
</tr>
<tr>
<td>6.</td>
<td>Chemical Products</td>
<td>4</td>
<td>4.71</td>
</tr>
<tr>
<td>7.</td>
<td>Textile Sector</td>
<td>2</td>
<td>2.35</td>
</tr>
<tr>
<td>8.</td>
<td>Trading (Engineering Components)</td>
<td>3</td>
<td>3.53</td>
</tr>
<tr>
<td>9.</td>
<td>Others</td>
<td>5</td>
<td>5.88</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>85</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>


The certification position of INTAL in Tamilnadu shows that it has issued more number of ISO 9001 certificates (62%) to Basic Metals and Fabrication sector than any other sector.
### TABLE 3.8

Year-wise ISO 9000 Certification in Tamil Nadu – NVT Quality Certification Pvt.Ltd.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>7</td>
<td>21.88</td>
</tr>
<tr>
<td>2001</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td>2003</td>
<td>10</td>
<td>31.25</td>
</tr>
<tr>
<td>2004</td>
<td>7</td>
<td>21.88</td>
</tr>
<tr>
<td>2005</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Source: NVTQ, 2005.

NVTQ has issued more licenses during the year 2003 (31%), which is, the deadline fixed by ISO for transition to ISO 9001.

### TABLE 3.9

Certification Body-wise Licenses in Tamilnadu (as on Dec.2005)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Certification Body</th>
<th>Number of Licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bureau of Indian Standards</td>
<td>205</td>
</tr>
<tr>
<td>2.</td>
<td>Lloyd’s Register Quality Assurance</td>
<td>70</td>
</tr>
<tr>
<td>3.</td>
<td>TUV South Asia</td>
<td>600</td>
</tr>
<tr>
<td>4.</td>
<td>Bureau Veritas Quality International (BVQI)</td>
<td>625</td>
</tr>
<tr>
<td>5.</td>
<td>NVT Quality Certification Pvt.Ltd</td>
<td>32</td>
</tr>
<tr>
<td>6.</td>
<td>Registro Italiano Navale India Pvt.Ltd</td>
<td>82</td>
</tr>
<tr>
<td>7.</td>
<td>American Quality Assessors India Pvt.Ltd</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>International Certifications Limited</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Certification Bodies, 2005.

Among the certifying bodies shown above, BVQI (625) has more licenses followed by TUV South Asia (600). This shows that BVQI and TUV have more clients.
in Tamilnadu. It can also be said that there are also many other certifying bodies that might have more clients for whom the data is not available.

3.8 **MEETING QUALITY REQUIREMENTS FOR EXPORT**

Export enterprises can be grouped into two broad categories:

a. Units manufacturing exclusively for export (100% EOU)

b. Companies catering to both domestic and export markets.

Companies that are wholly export oriented normally have a limited range of products requiring specialized plant and machinery to meet the specified quality requirements of overseas customers. While it is easy to install new plant and equipment, it is difficult to change the work culture and quality attitudes of personnel. If this issue is not properly addressed, a significant percentage of a company’s output may not meet specifications and may have to be sold as export surplus in the domestic market at considerable loss. For some products such as components for major equipment manufacturers, there may be no domestic market at all, and the scrapping of nonconforming products will entail total loss.

As export markets are highly competitive, exporters often have to work with low profit margins. When nonconforming products make up a high percentage of their output, they may incur heavy losses, rendering them financially unviable. It is therefore extremely important for export units to control all factors that can pose a risk to the quality of their end products.

Companies manufacturing for both domestic and export market face another set of problems. Exporters to the sophisticated markets of Europe and North America
generally have to install plant and equipment capable of meeting high specifications. Their entire production run is planned according to these higher-cost specifications. Elaborate inspection procedures are carried out and conforming products are consigned for export and nonconforming goods are shunted off to the domestic markets.

As prices obtainable in local markets are usually lower than the price levels that would be demanded by the production method used, the above mode of operation has a built-in cost disadvantage. The lower domestic sales figure would have to be compensated for by higher export prices. This could price the company out of its overseas markets, which are becoming increasingly competitive.

Another adverse effect of relying on inspection techniques for sorting out export-worthy products is that one can never be sure of the yield of exportable quality from a production run. Slippage on delivery commitments may therefore occur, which can have serious consequences for the credibility of a company and its long-term business prospects.

Thus, manufacturers and particularly exporters need to take particular care to manage appropriately all activities, which affect the quality and timely delivery of their product. The implementation of proper and relevant quality management systems greatly assists in effective quality assurance and cost reduction. These, in turn, can give the entrepreneurs a competitive edge in export markets.

3.9 CONCLUSION

There are many different ways of applying these quality management principles. The nature of the organisation and the specific challenges it faces will determine how
to implement them. Many organisations will find it beneficial to set up quality management systems based on these principles. Quality is essential to the success of business. To make a difference, good quality practice must be embraced not only by senior management but also by the whole organisation and instilled within an organisation’s culture. Quality is not just about implementing a system or working towards a standard set, it is an attitude, a way of working, which not only improves businesses but the way people work and live.

REFERENCES

CHAPTER III

QUALITY MANAGEMENT SYSTEMS – A CONCEPTUAL FRAMEWORK

3.1 Introduction

3.2 Progress of Quality Theories

3.3 Evolution of Quality Concepts

3.4 Quality Management System Practices

3.5 Quality Awards

3.6 Quality System Certifications