

CHAPTER 2 – LITRATURE SURVEY

Exhaustive review of the existing literature on quality, especially in education; total quality management and its application in education including in the field of maritime education and training was carried out. This covered books, journals and periodicals, and different web sites. A detailed survey is given below:

2.1 Quality:

Over the years various authors and quality gurus have defined quality. Some of these definitions are:

Quality is conformance to requirements [Beheiry (12)]. A service that does not meet the agreed upon requirements of the customer cannot be said to have quality [Beheiry (12)]. Quality is not an issue at the time of sale but an issue throughout the product's life [Sivaloganathan (155)].

Summers (166) has compiled the definitions by various prestigious quality gurus as follows:

Feigenbaum – Quality must be defined in terms of customer satisfaction and due to the changing need of the customer, quality is multi-dimensional and dynamic.

Shewart – Quality has two aspects; subjective aiming at what the customer wants. The other is objective and refers to physical, measurable characteristics of goods or service.

Deming – Quality is multi-dimensional and needs to be defined in terms of customer satisfaction.

Jurong – It is fitness for use.

Crossby – It is conformance to requirements.

2.2 Evolution of quality movement:

Mass production of goods and assemblies thereafter led to development of the concept of quality in an organized way. Prior to that the items were made individually and handed over to the customer directly by the person making it and quality issue was resolved between them.

As per Summers (1966) the concept and management of quality developed as manufacturing process developed and different stages can be enumerated as follows:

Inspection:

Inspection refers to those activities designed to detect or find non-conformances existing in already completed products and service. Inspection is carried out by physically examining, measuring, testing of one or more parameters of a product. The results are compared with the pre-established standards and the product is rejected if there is a deviation that is larger than the tolerance set in the standards. This mechanism is only done after the product had been completed. This also gives a false feeling that the responsibility for quality is of the inspection department.

Quality control:

Quality control refers to the use of specifications and inspection of completed parts, sub-assemblies the products of design, produce, review, sustain, and improve the quality of a product or service. Quality control was carried out by individuals who were given the responsibility to inspect the end product and check certain pre-agreed parameters. This data was then compared with the set limit and a nonconforming product was either rejected or reworked on. At times such items could also be delivered as inferior quality goods. This activity eventually grew into the development of inspection and quality control departments in the companies. The inspection was also carried out of incoming material and was not limited to finished products, including assemblies. This obviously could only be carried out on sampling basis and remained as post-production activity.

Statistical quality control was further adopted when the manufactured quantity increased. This system helped in identifying defective parts and actually remained as a controlled technique. It covers more than the inspection and allows for the standards to be set for the products, evaluation of poor quality products, initiate actions in case of nonconformance and implementing plans to prevent such occurrences. This system also used statistical methods for assessing and identifying problem areas.

Quality assurance:

The development in sixties resulted in development of more technical and controlled method of manufacturing with better control system in place. Such systems were known

as “quality systems” or “quality management systems”. Quality assurance is more of a preventive initiative and aims at avoiding faults in production. Quality management considers all activities and management functions in an organization that affects quality.

Total quality control:

It is a management approach that places emphasis on continuous process and system improvement as a means of achieving customer satisfaction to ensure long-term company success.

The total quality control systems integrated the quality development, quality maintenance, and quality improvement aspects in all areas of operations of the organization. These initiatives also led to the development of certain guidelines and standards in U.K. The most significant was the BS 5750 in 1979. The International Organization for Standardization (ISO) developed a similar standard referred as ISO 9000 series.

Rajendran (138) refers to the quality control movement advocated by Ishikawa that ‘quality control begins with education and ends with education’ which really suggests continuous updating and reviewing.

Total quality management:

TQM was initially named as Total Quality Control (TQC) by Feigenbaum (40) and subsequently ideas were added to this concept by various quality gurus.

The TQM philosophy provides overall concepts that foster continuous improvement in the organization. It emphasizes the use of people, usually in multi-functional teams, to bring about improvement from within the organization [Mohitkar (105)].

Although TQM was initially aimed at manufacturing activities its application in service sector, including education is undisputed. Any activity where inputs, outputs and process with sub-processes exist can benefit from TQM philosophy. TQM offers a process and a system that enables colleges and universities to serve better their customers who include students, industry and the community [Mohitkar(105)].

The phrase total quality management can be functionally divided in two separate dimensions. These being ‘total quality’ which is a holistic concept and provides an

indication and presence of quality in all aspects of the institution. The other part is ‘quality management’ which signifies a strategically planned activity using tools of management and encompassing requirements of quality assurance. Therefore TQM, covering both these would be a complete philosophy for overall improvement in the functioning of the institution.

ISO 9001:2000, in its introduction in Section 0.2 requires the organization to demonstrate continual improvement of its processes [ISO9001:2000 (67)]. The difference between continuous and continual is explained by Chakraborty (22) with continuous being “uninterrupted in time or sequence” and continual being “very frequent going on”. This signifies that in continual improvement this is a break after an increase and after sometime again an increase with another break thereafter. The continuous improvement on the other hand, indicates increase continuously. The term continual is more appropriate as in an organization, in real terms, the improvements in overall functioning would only be achieved in steps so that after every increase consolidation is carried out (figure 2.1).

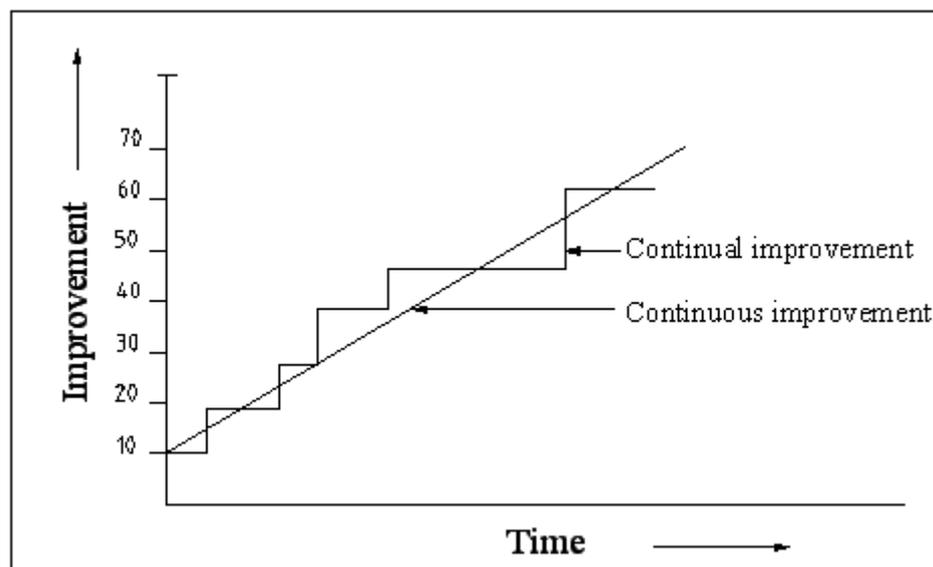


Fig. 2.1 – Continuous and continual improvements

In a service organization (environment) interface between the customer and the service provider is essential and this makes service organizations very different, and complex, than a manufacturing organization. Service is the result of at least one activity necessarily performed at the interface between the supplier and the customer and is generally intangible [Chakraborty (22)].

Rampersad (139) mentions quality as a never-ending activity and describes the progress in different aspects with an aim of improving quality. These improvements and the changes are shown in figure 2.2.

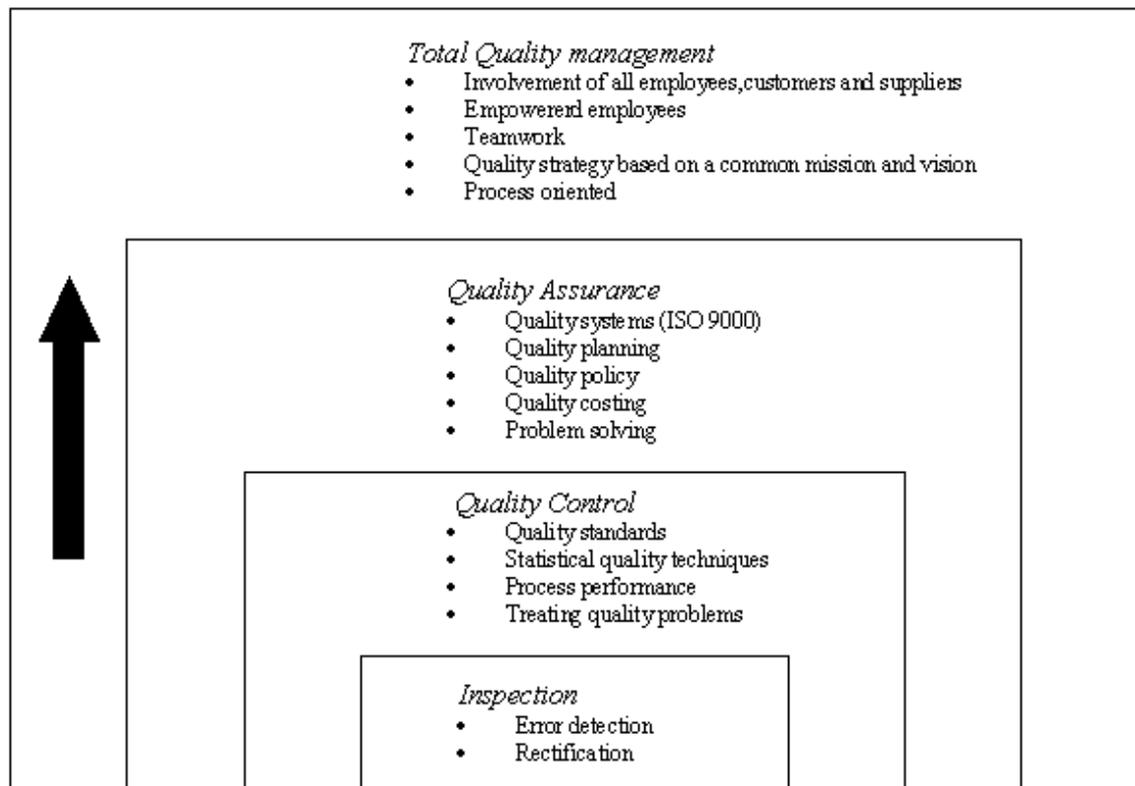


Figure 2.2 – Development in quality movement – Inspection to TQM

2.3 Quality in education:

Quality has been an important issue in the manufacturing area for quite sometime as a necessity. Slowly quality was also considered relevant in service industries. Stakeholders in education sector too started demanding quality. As per Early (35) the main difference between manufacturing and service is the higher variability of the inputs for service. However, these make the measurement in processes and sub-processes more demanding. As per him we must quantify the extent and severity of the quality problem and their analysis would lead to quality improvement. This becomes especially more important in service sector where one must look for indicators that would point to further investigating processes in the service organization.

Entin (38) writes that in 1992 private sector firms found an association of ten educational institutions in the Boston area in USA with a view of helping them adapt quality management techniques that were prevalent in the manufacturing industries. These

institutions found this initiative interesting and started adopting this idea. In his survey, Entin (38) established that the quality management methodology was used in these institutions successfully in the areas dealing with office and academic administration, computer centers, and with some initiatives in the area of curriculum and classroom instructions. There was presence, though in pockets, of believers in the system.

Entin (38) reflects that in higher education there seems to be agreement on the basic ideas of customer satisfaction, continuous improvement, empowerment of employees etc. However, there is less agreement or specific techniques that need to be adapted.

The issue of quality in education has been discussed in various papers. Ori (123) writes that internal quality system was introduced in the Faculty of Computer Sciences and Industrial Management in Holland in 1992. The activities covered under this were admissions, educational process, facilities and utilization of resources. As per Sallis (143) Quality is what the customer wants and not what the institution decides is best for him.

As per Telsang (168) the quality in an institution has aspects of quality of design, process and performance. Newby (119) writes that quality in higher education is assessed at two levels – first by peers within the institution and then by peers outside the institution. Further in both cases persons who are outside that particular study program reach a consensus as to whether it passes the quality threshold.

Prendergast (135) said that the ultimate goal of higher education is the need to invest in continuous improvement of quality of student experience, through staff development, innovation in teaching and learning, research and scholarship.

UK developed a Higher Education Act, 1992 and thereafter the Higher Education Quality Council was established to formalize and operate a process of quality assurance in higher education. Similarly Scottish Quality Management System in Scotland, National Centre of Education and Quality Assurance was started in Denmark and the Netherlands. Similar initiatives were also started in Ireland and some other countries for bringing in quality assurance in higher education [Prendergast (135)].

US National Science Foundation defined quality engineering education as the development of intellectual skills and knowledge that will equip graduates to contribute to

society through productive and satisfying engineering careers as innovators, decision-makers and leaders in the global economy of the twenty first century. It also termed Total Quality Management as a journey to improvement rather than a destination [Natarajan (113)].

Measurement of customers' satisfaction is regarded as one of the greatest challenges by educators with multiple levels of customers [Mahapatra (93)].

Natarajan (113) identifies weaknesses of a traditional engineer as lack of interdisciplinary knowledge; inability to work in a team; lack of inter-personal skills; introspective nature; inadequate communication skills etc. The strengths have been identified as good design and analytical capabilities; discipline; decision-making etc. It is pertinent to mention that most of these are also valid for marine engineers, especially Indian marine engineers.

One primary difference between manufacturing and service industries is that products are tangible and services are intangible. The most important thing to know about intangible products is that the customers do not know what they are getting until they don't get it. Customer standards are usually vague, transitory and changing. [Ho (60)].

Quality in education can be viewed as being 'exceptional', 'consistent', 'purpose of the service', 'value for money through efficiency and effectiveness', and 'transformative'. Further Total quality education is characterized by increased customer satisfaction through continuous improvement [Sahney (141)].

Pillai (131) in a convocation address said that the important components of quality assurance are that every one has a responsibility for maintaining and enhancing the quality of service and everyone must understand its uses and feel ownership of the systems that are in place for maintaining and enhancing quality.

An institution taking the quality initiative surely emerges as a self-critical community of students, teachers, support staff and managers each contributing to and striving for continued improvement [Pillai (131)].

A good institution is known for its good teachers. Addressing the issue of quality of teachers, Gurudev Rabindranath Tagore commented on the selection of the teachers and said that while at junior level they may be selected on the basis of their academic qualification, there should be different guidelines for selecting professors. Professors have to be leaders and directors of thought [Mohanty (103)].

Dr. S. Radhakrishnan said in 1949 that unless the tutor stimulates thinking rather than mere memorizing, deeper intellectual interests rather than aversion to thought, better perception of values rather than in appreciation, he serves no useful purpose, but may nourish wrong habits, which will be difficult to eradicate [Mohanty (103)].

A class taken by the teacher does not mean that the teacher taught the class [Mohanty (103)]. Emphasis should be on tutorial classes where the students can be suitably guided. Dr. S. Radhakrishnan while advocating for tutorials said that the students should not only acquire information and develop habit of independent thinking, but should also learn to present his ideas accurately in the correct language and in an orderly manner [Mohanty (103)].

Most definitions of service quality are customer centered, with customer satisfaction being seen as a function of perceived qualities or perceived quality being a function of customer satisfaction [Sahney (142)].

Is it necessary to manage the education service and needs? Business implies greater teamwork, greater coordination, and empowerment besides other issues [Sharma (151)]. Terms like quality, performance, optimization, product, process, customer, and measurement are industry oriented and it is normally felt that they have no place in the dedicational world of education. Acceptance of these words by the teaching faculty is one of the biggest challenges. The acceptance of different management concepts in the institution is the second challenge. Both these need to be addressed by all concerned.

A centralized decision making system usually exists in an educational institution. This needs to change and the faculty and staff should be included in decision-making. By this they will understand the system and problems better and would be more involved [Sharma (151)].

Aruchami (6) identifies three specific philosophies for ensuring quality in an institution as quality control, quality assurance and quality maintenance. These can best be achieved only if the three key entities demonstrate and deliver the attributes that are necessary for implementing and maintaining the quality system. These entities are the management, the academic head (leader) and the faculty.

Browne (17) in his paper informs about the unique standardization initiative in European universities that started in 1999 with 45 European countries working together to promote student mobility and employability and it is aimed that by 2010 a common European Higher Education Area would be developed.

Academic quality, like beauty, for example, is an elusive characteristic. Institutions of higher learning have a major responsibility if imparting knowledge, developing skills and improving the intellectual capacities of its learners [Natarajan (115)].

While considering the quality in education various terms like ‘value addition in education’; ‘excellence in education’; ‘fitness of educational outcomes and experience for use’ have been described [Mohitkar (105)].

The other exhaustive definition of quality in education was given by Erikson – Quality in education can be defined in relation to the application of value-added service to the students and can be measured by (a) students being transformed and matured by the university experience, which is evidenced by their ability to think, doubt and question; and (b) student performance as measured operationally by students passing their subjects [Mohitkar (105)].

Education quality as excellence is one way of expressing quality though it remains vague and difficult to measure. As per Mahadevappa (92) articulating precisely what excellence is may be difficult, but this definition is conceptually strong. Relating quality with value provides another dimension and can be acceptable for comparing different educational programs being offered. Grading them as per their values i.e. worth can do this.

Quality in education as conformance to curriculum becomes little more specific and meaningful and guides the teachers and students. It also assures the eventual employers regarding the standard of knowledge the student would have after completing the said

program. The problem with this definition is that it is limited to compliance and lacks creativity and acceptance of change. Conformance by its nature relates to static standards and specifications, whereas education quality is a moving target [Mahadevappa (92)].

Another definition that is derived from the idea given by quality gurus is that quality is customer satisfaction and in case of education it is students and stakeholders' satisfaction. This addresses the needs of all concerned and education that meets these condition has highest quality. Here too, the needs turn dynamic and expectation rise. The education provider therefore has to offer services that eventually aim at not only satisfying the needs of all, but exceed these expectations.

Shahin (147) defines service quality as the difference in customer expectations of service and perceived service. Thus if the expectations are greater than performance, then perceived quality is less than satisfactory and customer dissatisfaction occurs. Shahin (147) has further referred to the use of SERVQUAL to assess gaps in a catering service company.

External forces are dramatically challenging the public aspiration and expectations from higher educational institutions and the system's perceived inability to respond effectively is seriously eroding public confidence [Sudheer (165)].

Ugboma (171) opines that service is usually the result of the interaction between the customer and the service system, including the contact staff, equipment, service environment and facilities.

As per Maguad (89) definition of quality can be transcendent, product based, user based, manufacturing based or value based. e.g. Quality is intuitively understood but nearly impossible to communicate (transcendent); quality is found in the components and attribute of a product (product based); quality is determined by the customer and if the customer is satisfied the product has quality (user based); quality means that the product conforms to design specifications (manufacturing based); and the product provides good value for the money spent (value based).

Hegde (58) advocates a system of internal quality assurance to be developed in educational institutions. This should deal with the setting up, maintaining and improving quality and standard of activities by having control mechanisms.

Hegde (58) informs that till 30th June 2007 NAAC had accredited 3,632 institutes and out of this 1,941 have established Internal Quality Assurance Cell (IQAC). The establishment of the cells is recommended by NAAC as a means to ensure qualitative growth of the institution. The Quality Management Committee in TMI carries out somewhat similar work.

The marine engineering education is the third level or tertiary education and on completion the graduates enter the maritime industry as shipboard marine engineer. The industry's requirements, expectations and eventual satisfaction become paramount. The transformation in higher education is necessary as the technology has advanced, education is getting globalized with its cost increasing, the awareness level has also increased and most importantly the needs and the expectations of the stakeholders are significantly high. In MET too, all these factors are applicable. The whole concept of MET has changed today as the emphasis is shifted from more practical skills to acquiring more knowledge with conceptually clear fundamentals. The graduates from MET institutions are seeking more option than just joining sea services and are therefore needed to be suitably equipped. Thus a major transformation is necessary. The reengineering that would be necessary to achieve this transformation would have to include the organizational strategies, curriculum design, teaching learning methods, faculty development initiatives, measurement and analysis of outcomes etc.

2.4 Different Quality Management Systems:

2.4.1 BS 5750 Standards:

In 1972 U.K. developed a standard referred as BS 4891 – A guide to quality assurance and again in 1975 a standard BS 5179 – Guide to quality systems was created. Both these were guidelines and did not address the customer requirements.

In 1979, after much deliberations and inputs from different industrial organizations, U.K. developed the BS 5750 standards. These were in three parts as follows:

BS 5750 Part 1: Specification for design, manufacture and installation.

BS 5750 Part 2: Specification for manufacture and installation.

BS 5750 Part 3: Specification for final inspection and test. [Freeman (43)]

This was the first originally developed quality system designed to cover all manufacturing activities. The initial approach was towards quality assurance and not really on quality management. Harris (56) however, refers to the BS5750 standards as a useful model for adoption for the use in higher education. This was discussed in the Engineering Professors' Conference in UK.

2.4.2 ISO 9000 – Quality Management System Standards:

The BS 5750 was British initiative and was accepted in many parts of the world. The interest in industry on quality management grew and eventually International Organization for Standardization (ISO) developed the ISO 9000 series of quality system standards in 1987. These standards were almost similar to the BS 5750 and were once again revised in 1994. There were three standards against which an organization could be certified. These standards were further amended in 2000 and the applicable standard is ISO 9001:2000 [ISO 9000 QMS (66)].

2.4.2.1 ISO 9000:1994 Standards:

The ISO developed these standards for the first time in 1987 as ISO 9000:1987. These were subsequently revised in 1994 as ISO 9000:1994. The standards were revised based on experience gained during their use in different organizations. The important modification included compulsory documentation of certain key procedures. The responsibility of the management was also more clearly specified. On the whole 1994 version provided more clarity with a special inclusion of use of statistical techniques [ISO 9000 QMS (66)].

The 1994 version was in three sets of standards namely ISO 9001, 9002 and 9003. The organizations, based on their activities, could adopt any one of them, establish and maintain the quality management system and eventually receive relevant certification by a certifying body after an audit. Out of these, similar to the BS 5750, 9001 was applicable for organizations engaged in design, development, production, and installation and

servicing. 9002 without the design and development component was ideal for the service industries. This allowed the design to be created and developed elsewhere and production, installation and servicing could be done in the organization certified under this standard. Further service organizations where design was not important could also opt for this standard. This included insurance companies, law firms, hotels, financial institutions etc and of course educational institutions. ISO 9003 was applicable for organizations engaged in final inspection and testing and was suitable for test houses, laboratories etc [ISO 9000 QMS (66)].

For achieving compliance with the STCW requirements, many MET institutes opted for the ISO 9002 and established their quality systems based on these standards. The design function was not specifically relevant as the courses being conducted were mostly short-term professional courses with syllabus already prescribed by the IMO. Many times the national governments prescribed certain requirements that were taken into consideration while making the syllabus. Only some institutes, which initially designed and then conducted these courses, opted for certification under ISO 9001.

2.4.2.2 Revised ISO 9001:2000 standard:

The standard has once again revised and the new 2000 version is now in use since Dec. 2003. The 2000 version of standards are more clear and simplified. ISO 9001:2000 now supersedes 9001:1994, 9002:1994 and 9003:1994. The new 9001 standard is quite comprehensive and an organization, based on its activities, would decide and declare as to which specific requirement is not applicable to it.

Besides the main standard referred above some other supporting standards have been developed by ISO. These are ISO 9000:2000 – Quality Management Systems – Fundamentals and vocabulary. This has replaced the earlier ISO 8402. One other standard is ISO 9004:2000 – Quality Management Systems – Guidelines for performance improvements. This is to be used as guidelines by the companies that would like to improve beyond ISO 9001, probably TQM [ISO 9001:2000 (67)].

The 1994 versions were based on procedural approach. The emphasis was on documentation and following procedures and this resulted in enormous paper work. This system not only curbed creativity but also led to creation of compartments in the functioning of the organizations. The 2000 version is very reactionary and is based on

process approach. It requires identification of different processes and sub-processes of an organization. These are then kept in mind while developing, implementing and operating the quality management system. The focus therefore has shifted from mere documentation to the result of the process.

The requirements of the new standards are also based on the PDCA methodology:

Plan – Planning of processes and to deliver the results as per the policy of the organization and the customer requirements.

Do – Implementation of the process.

Check – Measuring and analyzing the data, monitoring the processes and production.

Act – Feed back and actions to continually improve.

Therefore now it is imperative that the quality management system is developed and structured based on the above methodology and evidence of meeting these requirements are retained and is available at the time of audit.

The main chapters of this standard, namely management responsibility, recourse management, product realization and, measurement, analysis and improvement are the four phases of the concept of process approach and are intended to function like Plan - Do - Check – Act (PDCA) model for continual improvement, a concept popularized by the quality guru Edwards Deming. This methodology also makes this standard more suitable for the service industries, including the area of MET.

2.4.3 International Workshop Agreement – Quality Management System, Guidelines for the application of ISO 9001:2000 in education:

At times, due to the requirements of the industry, ISO develops documents through a system of workshop mechanism. These documents do not contradict the applicable standards, but supplement them. These are referred as International Workshop Agreements (IWA) and are revised periodically.

IWA 2 (68) was therefore developed by ISO in Oct 2002 after a joint workshop attended by many organizations. This document is referred as Guidelines for the application of ISO 9001:2000 in education, and provides assistance to users of ISO 9001:2000 while

applying it to the educational process. It also takes reference from ISO 9004:2000 Quality Management System- Guidelines for performance improvements.

Various processes and sub-processes in an educational organization are referred and application of all sections of ISO 9001:2000 are suitably translated to the environment of an educational organization. It is pertinent to mention that educational institutions can only be certified as per ISO 9001:2000 and not IWA 2: 2003 (E) which has only guidelines.

The IWA 2 has requirements for design, benchmarking, corrective and preventive actions. IWA 2 also recommends the use of various tools such as flow charts, control charts, Pareto diagrams, cause and effect diagrams, failure mode and effects analysis (FMEA) etc. These are also commonly referred as TQM tools.

2.4.4 Rules for Classification of Maritime Training Centres, 1996 – Det Norske Veritas (DNV):

This was the first initiative of establishing specific standards aiming at quality for maritime training centre. ISO 9001:1994 was available for use by the maritime training institutions; however, this standard was not found directly suitable for the educational organization.

DNV, being one of the premium classification societies, decided to venture into this sector. They were already certifying maritime training institutes under both ISO 9001 and ISO 9002 standards of 1994. Realizing the inadequacies of these standards, DNV developed this specialized standard and also certified few maritime training institutions under this system [DNV (30)].

While these standards were more appropriate, many institutions preferred ISO certificate as it added the brand value. The Rules for Classification of Maritime Training Centres therefore are not used significantly. DNV however, through its subsidiary DNV SeaSkill (31) developed another standard referred as “Standard for Certification of Learning Programs” for assessing the quality of short-term training programs in the maritime industry. A certificate of limited validity is awarded on completion of the assessment

process. This standard is program specific and also requires the MET institution to have in place certain salient aspects of a quality management system.

2.4.5 Standard for Quality Maritime Education and Training. (QMET), Singapore – PSB100:2002:

This standard was developed in 2002 and was aimed to be comparable to the requirements of ISO 9001:2000 with emphasis on education, especially maritime education and training.

The standard was developed in Singapore through an initiative from the Singapore Maritime Academy and PCB certification, an organization in Singapore. The standard was endorsed by Maritime and Port Authority of Singapore and the Danish Maritime Authority. The standard provided for certification after confirming compliance [QMET (136)].

This standard however, did not receive much recognition worldwide.

2.5 Total Quality Management (TQM) and its philosophy:

The TQM philosophy goes beyond the traditional quality assurance and management philosophy where the emphasis was on the quality of the product and this quality was defined as ‘fitness for use’ [Juran (72)]. Present scope of TQM encompasses also the management concepts, economics of costs, benefits to all stakeholders etc. TQM is a goal as well as a philosophy and is a complex function of customer satisfaction, employee empowerment and product quality and resultant of dedicated changes achieved in these areas.

TQM is an approach for continuously improving quality of goods and services delivered through the participation at all levels and functions of the organization. In other words TQM is a philosophy, which allows totally integrated effort for gaining competitive advantage by continuously improving every facet of organization culture. TQM is a philosophy of never-ending improvement availed only by people and is inseparable from general management practice [Prendergast (135)].

TQM can be interpreted as:

TOTAL – Every one associated with the organization is involved in continuous improvement

QUALITY - Customers requirements, both expressed and implied

MANAGEMENT – Commitment from top and senior management and involvement of all employees [Kanji (77)]

The acceptance and adoption of the philosophy of TQM in the manufacturing sector was comparatively easy and many industries have opted for this. In the service sector though, the acceptance of TQM is not so smooth. In the service sector the work being done is the product and the employees of the organization substantially influence the quality of product. The adoption of TQM philosophy has been somewhat slow in the service sector. The intangibility of the services makes it difficult to set standards, monitor the processes and thereafter analyze and measure the performance and compare with the set standards.

In the education sector this adoption becomes still more difficult as the student himself becomes part of the process and therefore has a great impact on the quality of product. The teachers, while curious about the quality jargon, feel threatened by the induction of this new management concept and are naturally averse to the change. However, in the competitive environment of today few schools have voluntarily started working towards achieving TQM. TQM requires empowerment of faculty and staff by being part of the system, sensing problems and suggesting solutions. To achieve this fully it is important that the faculty is given a chance to express its opinion about their work and the operation of the institution [Owens (124)].

In the MET sector, in spite of the international flavour and market driven competitiveness, there is no move to adopt TQM practices. The institutions seem to be satisfied with achieving compliance with STCW requirements about quality.

Total Quality Management helps in eliminating waste, reducing variations and ensures continuous improvement. It is also seen by some as an extension of scientific management, by other in terms of systems theory, and by still others as a new paradigm for management [Shrivastava (153)].

Different TQM models aim at different issues in the organization. These could be process and system approach; customer focus with emphasis on needs and expectations; employee empowerment issues; and fundamental cultural changes that may be necessary. A model integrating these would be the most successful one. Educational institutions have to view TQM as a strategic tool that will help in all aspects of its operations.

2.6 Processes:

Process is a set of interrelated or interacting activities which transform inputs into outputs [Chakraborty (22)]. In service sector the customer is involved in the process unlike the production activity. Service provider and the customer come close in the process and their relationship influences the satisfaction level of the customer. Interpersonal skills of the persons involved therefore become important besides the normal knowledge and skills for the conduct of the activity. In this situation monitoring becomes difficult as behavioural and psychological issues get involved.

As per Stella (162) key issues for benchmarking are the process mapping and process measurement. Process mapping is the effort to highlight process ownership and the distinction between value added and value lost activity. This helps in identifying problem areas, ownership of the process and measuring points. Process measurement, on the other hand, is the development of meaningful indicators to measure effectiveness in the process.

2.6.1 Processes in Education:

Juran (74) has explained the three roles played by any organization or in any department, within an organization in his TRIPROL Diagram. The roles are as customer, as processor and finally as supplier. The role as a customer reflects the relationship wherein the organization receives different inputs e.g. schools/ colleges supplying students that seek admission; library providing knowledge and information inputs to the faculty member. The second role is of processor where different processes in an institution are carried out. Finally the third role is as supplier of the final product to the industry. These roles are depicted in Figure 2.3.

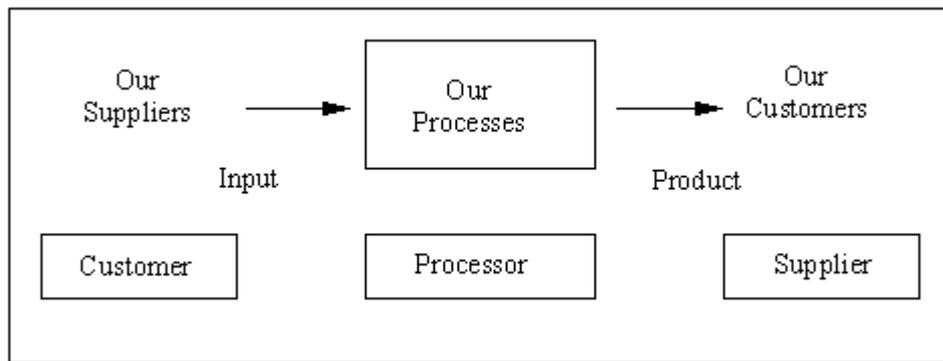


Figure 2.3 – Roles of an organization [Reference – Juran (74)]

As per Telsang (168) the quality in an institution has aspects of quality of design, process and performance. Considering this the processes in a MET institution were identified and their inter-relations studied. These are shown in figure 2.4. It can be seen that processes of design of curriculum; selection of faculty and students; teaching and learning; assessment; placements; hostel and related activities etc. are present.

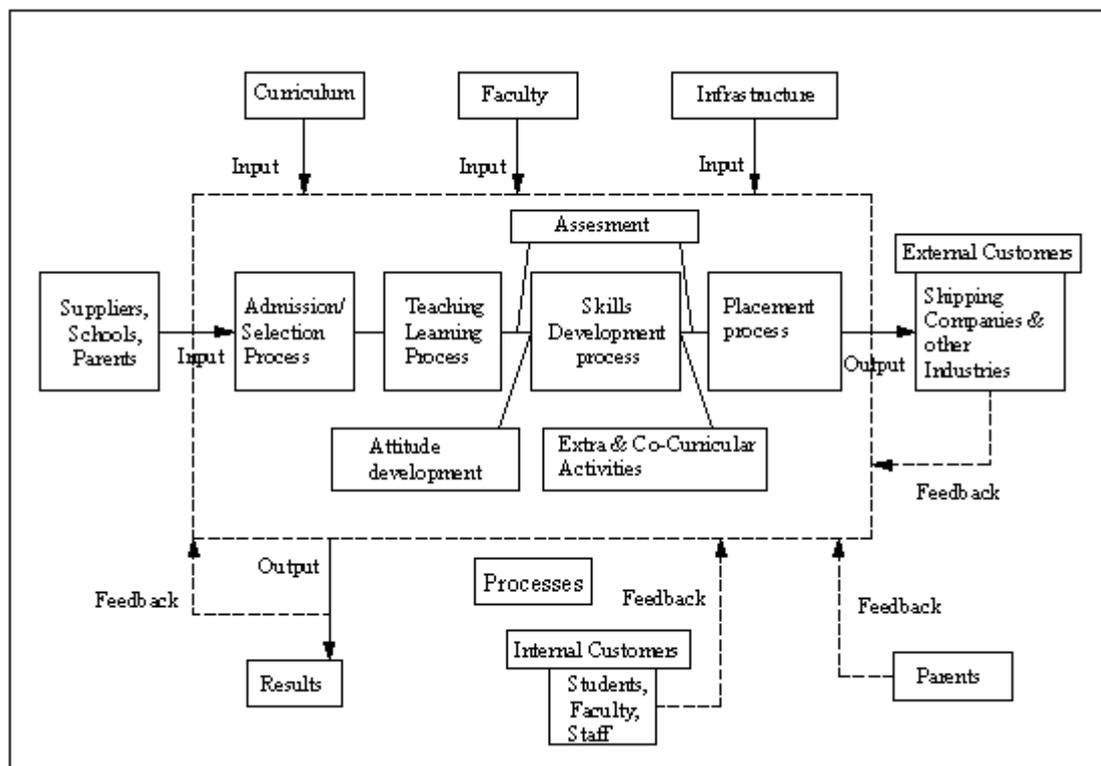


Figure 2.4 – Processes in MET institution

2.6.2 Role of students in the process:

Students are primarily considered as the customer in higher education. However, if we compare process of education with an industrial process the role of the student is quite complex, peculiar and multi-facet.

Student as raw material – The student is one of the main input ingredient in the process of learning. The educational institution converts this raw material into a knowledgeable and skilled professional after the successful completion of the program. It is further pertinent to note that the institution selects the prospective students based on the set admission criteria, which again can be compared with the established acceptable criteria for accepting raw material in an industry.

Student as work-in-progress – The students undergo various courses and necessary assignments and examinations before they are awarded their degree. They are periodically tested and may have to repeat some portion if they are not successful.

Students as products – The students are active recipients of the knowledge and skills and leave the institution as the product that may be used in the industry.

Student as co-workers – Students' active participation is imperative for the success of the program. Similarly their view also contributes in redesigning the program. Therefore they perform the function of co-worker in this process.

Students as customers – Students are the prime beneficiaries of this process and therefore their needs must be satisfied. This results in a complex situation as students may still be not competent enough or mature enough to identify and state their needs. In fact the ultimate outcome of a student's education is not known until many years later. Thus, views of the student may be worth noting and considering few years after graduation.

2.6.3 Design of curriculum:

Design should reflect needs of the customer and can only be finalized after due consideration is given to the output criteria/ characteristics, the scope of the services being offered and the complete environment. Output is the actual product or service that is received by the customer. Customer is therefore interested in the output and not directly in the design.

Design is probably the most significant process in any production/ service organization. The design has to be correct and appropriate for the purpose and then only the other

processes can result in creation of a quality product or service. The characteristics and specific requirements that go in developing the design ought to aim at achieving attributes that are needed by the educational institution to satisfy the needs and expectations of the customers.

Sahney (142) conducted a comparative study of some selected institutions in Delhi area imparting professional education. The aim was to assess different design characteristics of TQM in education. These were the attributes that the institutions must possess in order to satisfy the needs of the stakeholders. The survey indicated that there is no significant difference in the importance assigned to different design characteristics by the teachers and the students.

Mahadevappa (91) writes that the educational quality is conformance to curriculum and as such a higher education institution can monitor progress in achieving its quality goals by measuring how well it is conforming to its curriculum.

2.6.3.1 Quality function deployment:

The technique of quality function deployment (QFD) was initiated by Japanese researchers Yoji Akoo and Shingeru Mizuno. This technique aims at creating the design of the product that would ensure customer satisfaction. The technique allows the translation of the needs of customer into product characteristics that would ensure fulfillment of these needs. The use of quality function deployment in shipping was introduced in 1972 in Kobe Shipyard of Mitsubishi Heavy Industries for the design of an oil tanker. The main tool of the QFD is the matrix, also referred as the house of quality. It provides a powerful graphical display condensing all information and displaying the interrelationships.

Sivaloganathan (155) states that the quality is not an issue at the time of sale but an issue throughout the product's life. Planning is determining what to make and designing is deciding how to make it. He further writes that QFD is converting of the customer's demand into "quality characteristics" and developing a design quality for the finished product by systematically deploying the relationships between the demand and the characteristics.

Morris (108) states that the QFD was adopted by US firms to decrease the cost of design and manufacture and increase overall product quality. As per him the house of quality analysis is a useful tool for communicating customer needs to other functions in the firm and assists in translating those needs into product characteristics.

Bier (13) writes that RainStar University, USA used the technique of QFD in constructing the curriculum for the master's degree program in acupuncture and oriental medicine and some other programs. This work included identifying the oriental medicine practitioners, being the customers of the university, and noting the terminal competencies necessary. These competencies were ranked and curriculum requirements for these were identified. By using a system of suitable matrices optimum solution was found and subsequently established.

Mahapatra (93) states that the QFD eases out the process of translating customer attributes into quality characteristics. He further states that QFD serves as a powerful process, which is highly successful in eliciting the strengths and areas that require attention.

Gonzalez (49) refers to QFD as a system engineering process, which transforms the desires of the customer into a language required for implementing a product. It is also an excellent method for assuring that the customer obtains high value from the product. He used the mechanism of QFD for designing and developing school furniture in Costa Rica by identifying the desirable product design, safety and service features. This resulted not only in development of good design and customer satisfaction but also in reducing the cost by about 50%.

As per Yang (183) the needs of the customer and correct assessment of the requirements have to be translated into the design. As per him the QFD has the attainment of shortest development cycle.

As per Cohen (25) QFD was used in US in large organizations like Ford, Xerox etc in the 80s. The Japanese referred this as Hinshitsu – quality, features, attributes; Kino – function, mechanization; Tenkai – deployment, development or evaluation. Cohen suggests that the QFD is not used only in conventional product design but can also be suitable in service situations e.g. course design, telephone response service etc.

QFD is a methodology that drives the transformation of customers' demands into quality characteristics by developing design quality for the finished product by systematically deploying the relationship between the requirements and the specific quality characteristics [Pinto (132)]. He used the QFD technique in the Department of Information Sciences, University of Granada, Spain for developing the requirements in a prioritizing method that can be used for quality planning and design of information products.

2.6.3.2 Description of curriculum:

It is important to develop the syllabus into general and specific learning objectives. General learning objectives (GLO) can be for a module whereas the specific learning objectives (SLO) should be for individual topics that are included in a module. These objectives should be unambiguous and can be as follows:

'At the end of these (chapter/ module), the student should be able to'. The space should have verbs like list, describe, explain, learn, appreciate, understand, calculate etc. [Felder (42)]. Complete curriculum should be divided in categories that may be necessary for a certain course. These categories are referred as cognitive domain levels as per Bloom's Taxonomy of educational objectives. These are knowledge, comprehension, application, analysis, synthesis and evaluation [Felder (42)]. This exercise would make the GLOs and SLOs more specific and thereafter easier to implement and monitor.

Curriculum should be in line with the present needs and requirements. Imparting knowledge strictly as per the syllabus can no longer be continued if today's needs of employment market are to be taken into cognizance [Srivastava (160)].

A dynamic curriculum is essential to meet the demand of fast changing environment. The inputs for revision may come from different sources including industry, technological development, research outcome, faculty members, management, best practices from other institutions etc. A systematic methodology for periodic curriculum development is desirable.

The curriculum should aim for higher education for marine engineers as that will not only help in developing them for their career better but will also result in better shipboard management with better appreciation of their work and a motivation for their further engagement [Solanki (156)].

2.6.4 Intake of students:

The quality of intake can be compared to the quality of raw material in a production process. The problem in education is the varied levels of knowledge, interest, motivation, intelligence and many other traits in the incoming students. The success of an educational program therefore also depends on the quality of intake.

Murthy (111) writes that more than 30% of selected candidates in the IITJEE have succeeded in second attempt. This increases the average age of the first year students. While in general engineering this may not be a very important issue, in MET this has a significant bearing on the attitude of the student. It is felt that younger students can be easily molded to the regimented system of the institution.

TMI has an elaborate method of selection that is based on on-line test, interview with certain weights for sports and extra curricular activities, and also on the 12th marks in Physics, Chemistry and Mathematics. The students are from different national and state educational boards.

2.6.5 Teaching process:

Allen (3) had collected information and views from all concerned in some institutions of higher education that were involved in implementing process re-engineering. He found the motion of academic freedom ever present and an attempt to re-engineer teaching and learning be undermined by unclear accountabilities. The teaching and learning system are now under pressure to change. This pressure is due to the change in environment with increased requirements and expectations from the industry, changing student profile, increased competition etc.

Application of PDCA cycle for improving the teaching was demonstrated by Felder (42) with following steps being implemented by the teachers and administrators of an educational institution:

1. Define knowledge, skills and values that the graduates should have at the time of graduation.
2. Instructional methods and resources identified and method for assessing effectiveness put in place.
3. Administration provides the necessary resources.
4. Plan implemented by the faculty.
5. Results assessed and plan modified as necessary.

Jagadeesh (69) points to the faculty difficulty in management education in India indicating that the visiting faculty outnumbers the permanent faculty. He also refers to the absence of clear guidelines for the course contents and depth of topics and the absence of common method of assessment. Some of these issues are also relevant to the MET institutions, especially the non-availability of competent seagoing faculty members. The institutions therefore have to rely on visiting faculty members. Further many of the competent professionals do not really like to take teaching as a career.

Jagadeesh (69) refers that while the business is in a dynamic mood, most business schools appear to be in static mood. This statement is also relevant for the MET institutions. Shipping is a very dynamic industry with quick changes in the technology, operational environment, legislation etc. MET institutions therefore need to be cognizant to these aspects, and adjust their programs accordingly. This however, is not achieved as promptly as desired.

Nakazawa (112) referred to the undergraduate courses at the university level and established that there was a difference in a maritime training centre, which was task specific as against traditional educational institution that addressed various issues and is more broad based.

DNV (29) developed guidelines for the ‘Delivery of courses in MET institutions’ in July 2005. These guidelines supplement the Standards for certification of maritime academies and may be used internally as a tool for improvement.

Nakazawa (112) also argued that even if the syllabus as well as the text book was same, lectures given by different lecturers would be different. This is because different professional teachers from the maritime sector would have different experience, background and personal preferences. Therefore all factors needed to be considered for assessing the teaching potential of the teachers and also of the institute. Nakazawa suggested that the teaching potential of the faculty of the institution can be assessed by taking into consideration the qualifications and experience of all teachers and developing a numerical figure. This exercise can also lead to identifying areas for further improvements.

2.6.6 Faculty development:

A teacher is selected based on the qualifications and experience. It is however important that the teaching abilities are developed and further continuous inputs are given for receiving current developments.

The STCW Convention (161) requires that the teachers in MET institutions should be adequately trained. The DGS has expanded this and as per their guidelines a teacher in a MET institution should complete the Training of Trainers and Assessors (TOTA) course, which is, based on the Model Course No. 6.09 of IMO. This is a 10-day course, which deals with development of curriculum/ lesson plans, handling of teaching aids and development of teaching techniques. Many of the teachers are ex-seafaring professionals and it is extremely unlikely that they can be converted to good teachers just by attending a 10-day course. It is therefore imperative that adequate efforts are made by the management to continuously work in this area by organizing courses and workshops and identifying training and academic needs of an individual teacher.

Gupta (52), in his paper, points on some of the perceptions of the industry representatives about institutions. These include unwillingness to take initiatives to find information about new technologies; teachers lacking industrial experience; lack of representation of industry personnel on the board of the institutions; theoretical teaching with less emphasis on the ground realities; non-availability of continued education opportunities etc. Usually the only time the industry people visit the institution is when they come for placement interviews.

It is not so much the personal qualities of the leaders, which make or mar academic excellence, but the way they approach the situation with a view of securing the change required which ultimately matters. It would be better to appoint a willing and competent teacher as an ethical ombudsman who could work towards elevating the moral standards of teachers and student community [Menon (98)].

Quality engineering education is the development of intellectual skills and knowledge that will equip graduates to contribute to society through productive and satisfying engineering careers as innovators, decision-makers and leaders in the global economy of the twenty first century [Natarajan (115)].

The technology is ever changing in all aspects of life, including on ships. More complicated and reliable instrumentation and control systems are being used. Material selection for use in ships has advanced. The international legislation and regulatory regimes have also undergone changes as necessary. It becomes therefore necessary that faculty members of a MET institution be continuously updated on the relevant issues, including teaching skills development. Continuing education has thus become a necessity.

An engineer would spend about 20% of working time in continuing education and training. The organization may not be able to give this opportunity for such a long time and thus it becomes necessary that the engineers achieve this during their spare time and for that be adequately motivated [Natarajan (115)].

In the present educational system a person having the highest academic qualification is considered to be fit to be a teacher. However, acquiring such qualification does not automatically convert this person to a teacher, especially a good teacher. In the past and even today, effective teaching is accidental and not by science of learning [Maheshwari (94)].

Maheshwari (94) write that BITS, Pilani regularly conducts Intensive Teaching Workshops, which are organized by the senior faculty members working as mentors for the newly joined faulty members. It is a participative activity with trial lectures, discussions on finer points of teaching methodology etc. Subject specific workshops are also organized.

Up-gradation of qualification is an important part of faculty development and faculty members should be encouraged to enroll for higher level programs and conducive atmosphere created in the institutes to achieve this. In BITS faculty member are given opportunities to work for higher qualification and reward system is linked with the attainment of such higher degrees [Maheshwari (94)].

Newer technologies and systems are being added on newer ships and it is imperative that the students studying marine engineering are introduced to these recent developments in the institution. However, this information can be easily made available to the teaching staff if there is a vibrant industry-institution interaction. The industry support can come in the form of making technical information available; sending specialists as guest speakers; promoting ship visits for the teaching staff; and finally allowing some of marine teaching staff to sail for few days on their ships as a refresher exercise.

2.6.7 Assessment and evaluation:

Evaluating the students as a means to confirm that they have acquired the requisite knowledge and skills is an integral part of the teaching learning process. This also remains an area where major reforms are necessary if eventual quality is to be achieved.

The maritime education and training program, especially the pre-sea four-year degree programs are part of a university system and therefore applicable rules of the university are also applied. In most institutions it is already changed over to the semester system with emphasis on continuous evaluation. A survey carried out by Kumar (81) of 140 institutions offering general education only 48.57% institutions had a system of semesters. The system of grading was used only in 17.57% of respondents. It is noteworthy that 94.9% of students preferred the continuous evaluation approach.

In TMI a system of continuous evaluation is already in place where different components for assessment are pre-decided and informed to the students. There are class tests, assignments, case studies, practical and oral examinations and mid-semester and comprehensive examinations. Each of these has a certain weight totaling to 100%. Class tests are conducted every week and this system is welcomed by the students, though leads to issue of frequent corrections of answer sheets by the teachers.

Felder (41) presents important criteria for checking the achievement of learning objectives. This is by assessment and evaluation where assessment is to decide on the data that will be used as a basis for making the judgment and the procedures like observations, measurements etc. that will be used to obtain the data, use procedures and perform analytical operations to put the data into a form. The evaluation, on the other hand, is using the assessment outcomes and pre-established criteria to draw inferences and make evaluated judgments. He further writes that both these are very important in engineering education and are used by prestigious accreditation bodies like Accreditation Board for Engineering & Technology (ABET) in USA.

The concept of open book examination, partly, has been tried in TMI and occasionally some courses have this component. The preparation of question papers for such examination requires substantial creativity. In the survey carried out by Kumar (81) the mean achievement of students in open book examination was 16.68 whereas for the traditional closed book section it was 15.83 out of the maximum of 20.

In open book examinations the questions should have capacity to assess higher mental abilities, viz. understanding, application, analysis, synthesis etc. [Chhapparwal (23)].

The use of information technology can be encouraged especially in the area of developing question banks and conduct of on-line examinations. This would reduce the uninteresting workload on the teachers. The weekly test in TMI is one area where this system could be immensely of help. The development of the question bank, though, would be difficult and time consuming, but once created it will suffice for sometime with periodic additions.

The assessment system should be aimed at assisting teachers and leaders in the institution to improve the process of teaching learning. The system should not only be fair and transparent but should also be continuously reviewed.

2.6.8 Evaluation by students:

During the literature survey it was established that many institutions follow system of evaluating the performance of teachers by the students. Some of these are appended below:

The student satisfaction approach goes hand in hand with the development of a culture of continuous quality improvement [Aldridge (2)]. The feedback from the students can focus two broad areas viz teaching learning activity and other being total student experience in the institution. The later would cover many processes that would be especially important in a residential program like an undergraduate program in marine engineering in a MET institution. Some of the areas for which feedback could be looked into are hostel facilities, medical, extra-curricular and sports, food, transportation etc. Aldridge (2) suggests that teaching and learning is not something that occurs solely in the classroom and the total student experience is becoming even more central to the students' attitudes to the institution.

University of Tennessee (173) follows three general criteria for the evaluation of the teaching staff. These include teaching ability and effectiveness; research and creative achievement; and service to the university. Considering these criteria, the evaluation of teaching effectiveness is based on self-assessment, peer evaluation, and student ratings.

Allen (3) advocates that the reward system in organizations often is based on productivity goals rather than on quality or customer satisfaction goals and therefore this system does not support the development of a corporate culture based on quality, teamwork and customer focus.

Allen (3) refers to a survey conducted in USA with diverse organizations, both manufacturing and service, where there are usually two types of rewards, namely extrinsic and intrinsic. Extrinsic rewards refer to the pay or compensation whereas intrinsic are those that do not deal directly with money. Intrinsic rewards are important motivators as these provide a feeling of accomplishment. It was found in the study that organizations that used intrinsic reward system extensively reported significantly higher levels of performance. The study therefore concludes that organizations implementing TQM should also provide non-monetary forms of recognition like certificates, letters of appreciation etc at an appropriate occasion.

Mathew (97) writes that while teacher evaluation by students seems a theoretically sound proposition, the extent to which it can be practiced for positive ends depends on taking

teachers into confidence. Preferably the teachers should also be involved in the process of framing the tools of evaluation.

In the study conducted by Mathew (97), in a college of the University of Kerala, 86.5% of the respondents opined that the students are but qualified to judge their performance as teachers. It was interesting that 55.4% wanted the result of the student evaluation be kept confidential suggesting that it should not be known to the students, their peers and others. The timing of such evaluation was also raised in the survey and 80% preferred it to be carried out in the end and not during half yearly period. Two aims of the student evaluation were suggested in the study, namely to identify the better teachers and to assess if all teachers are performing at least at a minimum satisfactory level. 32.4% believe that both are important and a further 32.4% preferred the second aim to the earlier one. 78.4% felt that positive students' evaluation would have positive impact on the motivation level of the teachers. In spite of the entire positive signs only 37.8% favoured teachers' promotions being linked with the outcome of the evaluation by students.

Queen's University, Canada conducts a survey of student assessment of teaching and is carried out every term for all the courses that are taught. This is referred as QUEST. The system is in two parts with the first being department specific and the statements are fixed. The other part has over 200 statements in the bank and the teachers may select the appropriate statements, which are then printed and given to students for submission. The teachers can also indicate if they want the results to be released to the students. The outcomes of these assessments are statistically evaluated and provide information to the authorities, including the stakeholders. The outcomes also become part of the teacher's performance records.

The most preferred statement is "The instructor was enthusiastic in presenting course material". In 2000/01, 57% of the instructors authorized release of these results to the students whereas the figures for the earlier year were higher – 1996/97- 96% and 1997/98 – 70%. The overall student participation in this exercise is 2000/01 was 65% [QUEST (137)].

The timing of the exercise when such feedbacks are taken from the students is also important. As per QUEST experience evaluations taken just prior to the examination tend to yield lower participation rates. Correct timing is also important if any corrective

measures are to be implemented and therefore ideally the exercise should be around half way into the course so that the students are able to evaluate the process correctly [QUEST (137)].

Student evaluation of teachers would be meaningful if the student is really interested to learn, is of good academic standard and is regular in attending classes [Mohanty (102)]. A survey carried out by Mohanty (102) in a postgraduate college, majority of teachers opined that students might intentionally underrate a teacher who is very strict. This may affect the morale of teachers.

In a study conducted by Mohanty (104) majority of teachers did not favour evaluation of teaching by peers. As a remedial measure the teachers should be encouraged to attend lectures of a senior teacher and the experience should be mutually discussed. This initiative will strongly lead to acceptance of review of the quality of teaching by peers. At times it may not be possible that the Principal or the head of the institution is able to do the evaluation of teaching and in such cases a group of senior peers may be entrusted to do this very significant work.

The Quality Assurance Agency (QAA) suggests that it is essential that there is a dialogue between student and the teachers who teach them and supervise their work [Love (86)].

Personal interviews may be conducted to receive more detailed feedback. Though time consuming, this technique may often bring out strengths and weaknesses of the course material and delivery. The drawback of this technique is the loss of anonymity and therefore possibility of not receiving true feedback. Love (86) suggests that the student feedback through a method of questionnaire may be taken at the end of the term. This allows coverage of all the activities and also the complete course. Another view is that if it is done half way, then certain corrective measures can be implemented, if necessary. TMI has adopted this method.

Students' feedback is important to gauge whether curriculum, teaching and learning method, facilities, quality and commitment of teachers are effective [Srivastava (160)].

Gupta (53) suggests that the students may not have the capabilities to give meaningful feedback and thus it would be advisable to cross-validate their feedback with indicators

from other sources. This aspect has been considered in TMI and besides students' feedback due consideration is also given to peer review.

Gupta (53) further warns that students' feedback should only be taken for the components of institutional functioning in which they are involved. They should not pass judgment on issues like organizational structure, financial situation, administration working, research work etc.

Traditionally in India students have not been considered competent to give feedback on the performance of teachers who are supposed to be on a higher status. However, this is now changing and in many educational institutions, right from schools to universities, the students are asked to provide feedback on their teaching learning experience.

2.7 Customers in education:

The identification and understanding as to who the customers are and what their needs are is necessary for establishing system that would lead to customer satisfaction. The notion of a 'customer' in higher education is both more complex and problematic than it is in commercial world [Newby (119)].

As Southern Polytechnic State University, USA started the application of quality management system it came to the realization that it simply did not have a good operational definition of the student as customer. Essentially, most colleges and universities (and many businesses) make the same mistake of assuming that "customer" is equated with "consumer." Furthermore, most businesses don't have a good understanding of the definition of consumer as customer. It is easy to identify a customer as one who pays money for goods or services. But identifying and defining a customer are two different things. What usually get left out of the definition of customer are the responsibilities of the customer [Wallace (177)].

Roles taken by multiple stakeholders (customers) in higher education are usually multiple [Hwarng (62)]. Students and lecturers, customers and business are all in the same boat in the long term – they are all lifelong learners [Kemenade (78)].

Customers for the third level education can be students, parents, second level educational system, national and international organizations, employers and society in general [Prendergast (135)].

While students are customers, they are not necessarily in a position to easily assess the quality of the service (education) they receive. On the other hand accreditation bodies and external auditors can assess this work.

Mahadevappa (92) cautions the institutions that before they progress along the quality path, they must accept the realistic model of today's higher education, in which the student is a the product and the employer is the customer.

According to Peiting (127) the concept that student is a product of the university is no more valid today. The product is special and is the comprehensive exaltation of students' knowledge, ability, morals quality and psychological and physical health etc.

Potential customers for an institution are both internal and external, including alumni, potential employers, other higher-level educational institutions etc. The potential customers for an individual class, on the other hand, would also include faculty that are responsible for teaching subsequent course work e.g. faculty teaching Applied Mechanics II is an internal customer for the course on Applied Mechanics I. The understanding and acceptance of this concept would help in percolating the TQM concept in all parts of the institution.

2.7.1 Internal customers in an educational institution:

The concept of internal customer was realized by Oakland (120) and was referred as internal customer chain. The chain involves three roles namely customer, processor and further supplier. Each part of this chain works towards external customer satisfaction. The internal customers are as follows:

Faculty members – as users of library, computer centre, administration office, recreational facilities, including medical and other infrastructure in the campus.

Non-teaching staff – as users of the facilities mentioned above. Besides their performance their own needs for further development should also be considered.

Different departments – no department can function in isolation and for the successful operation of the institution each department has to work as a member of the team. This interdependence must be respected. Barriers would always emerge; however, they must be broken.

Students – they too are users for all non-academic activities existing in the residential campus and therefore should be treated as internal customers. Besides the facilities and infrastructure their main interaction with the non-academic staff may be quite important as provider of student services.

2.7.2 External customers in an educational institution:

Employers – There are the organizations that absorb the graduates coming from the educational institutions. In MET institutions, the employers would mean the shipping and ship management companies. They expect that the MET institutions would produce knowledgeable and skillful marine engineers who can then perform the desired tasks on board their ships. Some graduates do not join the shipping industry but may opt for some other jobs. Those industries too, become the customers of the MET institutions.

Other colleges/universities providing higher education – Many graduates pursue higher studies by taking postgraduate programs in technical or management field. Such institutions of higher learning obviously desire better intake and therefore are interested parties in the MET institutions.

Parents – Parents pay substantial amount of fees for their wards that undertake education in a MET institution. Their needs and expectations are therefore of significant importance and must be considered.

Funding agencies – These would include government, private charitable trusts, organizations/ individuals providing scholarships and loans etc. All these entities are also interacted in the success and welfare of the MET institution and their inputs also become important.

Alumni – The MET institution connects to the industry and society at large through its graduates. The real success of the institution is indicated in the achievements of its alumni and its continuous involvement with the institution. Any good institution therefore must cultivate this source for its continual growth.

Accrediting agencies – The program of marine engineering is approved by the Maritime Administration of the country. This is the branch of the government that is responsible for the proper conduct of the program as per the standards provided in STCW Convention (161). In India this role is performed by the DGS (34). Besides this the affiliating university or any other agency that is providing accreditation to the MET institution would also be the intended parties for the efficient conduct of the program.

2.7.3 Students as customers:

Student as consumers of knowledge and services are considered to be the main customer. Harvard University states that ‘the customer is defined as any one to whom we provide information on service’. Northwest Missouri State University bases its customer focus as ‘in the classroom, the students along with the instructors are supplier who produce a product (knowledge). Student can be considered a product, worker and customer of educational systems and does in fact play each of these roles [Sommi (157)].

Sallis (98) identifies the learner as the primary customer with parents and employer as secondary customers. The labour market, government and society are the tertiary customers. These are all external customers whereas the teachers and other staff in the institute are the internal customers. Next-in-line analysis decides who are the direct customers of a person, whether internal or external [Sallis (43)].

Many institutions do not accept that students are involved in the process as customers and find this a threat to the autonomy of faculty [Motwani (109)].

As per Willis (179), students are both the end product and one of the customers, which creates a unique dilemma for the educational server. The educators should understand the needs of the students as a customer a few years after graduation and thereby help shape their needs during college to make a positive contribution to future society.

Students as customers are not necessarily capable of judging whether their education is being properly imparted and delivered [Mahapatra (93)].

Customer has a distinctly commercial tone. The word stakeholder may be more suitable. A stakeholder is someone who has an interest in the institution and who can contribute to its development and success. Students are no longer passive participants of the education system; they determine the very existence of the institution [Pillai (130)].

The idea of considering students as customers is not acceptable to many in the educational field especially to the teachers who see this concept threatening the traditional academic role of the provider of knowledge. This teaching community and even the administrative staff in the educational institutions fail to accept customer driven operating environment for their institutes for achieving their eventual goals. Therefore in spite of increased quality awareness in the industry, very few educational institutions acknowledge that they serve customers. Furthermore what students want from their educational institutions may not be what they need.

Within the environment of higher education, responsibilities can vary from class to class (one may require a special project where another may not, for example) and can also vary based on what the student ultimately wants to get out of the class. The work required to get a C grade is probably different from what is required to get a B. Of course students are also customers of housing, food services, the bookstore, and on and on. Each must define the customer, including the responsibilities, as well as understand what the customer expects from each supplier. Therefore it really isn't possible to have a standard operational definition of the student as customer.

Most customers don't know what they need because they are not very sure themselves. One of the roles of a supplier is to provide expertise to guide a customer on this. Expertise can be a powerful competitive edge in satisfying customers. Ultimately, suppliers set the expectations of customers. MET institutions with in-depth, sound expertise in a field have a real advantage in selling potential students on what they can expect to learn.

Many institutions do not accept the need for change. Further the requirement of TQM that students are involved as customers and part of teamwork is accepted as a threat to the faculty's autonomy.

2.7.4 Customer satisfaction:

A service that does not meet the agreed upon requirements of the customer cannot be said to have quality [Beheiry (12)].

In the production sector customer is mostly interested in the end product only and may never really come across the activities in the factory. In the service sector, however, the customer is involved right through the process of service delivery. The service quality therefore has two concepts namely technical quality and functional quality. Technical quality refers to what the customer receives whereas the functional quality refers to how the customer receives it. For eventual satisfaction both are important. Customers do not evaluate service quality solely on the outcome of a service; they also consider the process of service delivery. The manner in which the service is delivered and the customer's relations with the organization must also meet customer expectations [Edvardsson (36)].

Satisfaction measurement is not only a survey process but also an invitation to correspond with the organization seeking views. While purely from the practical reasons sample survey is accepted, measuring satisfaction of all customers is a good investment [Vavra (174)].

As per Brown (16) the themes prevalent in assessing the educational standards achieved in vocational education are assessment of standards for learning and performance (student and employer) and the assessment of education/ management process and design (educational institution and industry).

Mok (106) has written that educational institutions in China have adapted a customer – oriented approach. As per this, classes for same course using different teachers and teaching methods are conducted at different times and the students may choose whichever teachers they like best. This allows immense competition for the classes of excellent teachers. This scheme raises the teachers' standards and their sense of responsibility towards teaching.

Expressions of student satisfaction are of little value unless students have understood and accepted the purpose of the educational process [Newby (119)]. It is important that the curriculum is clearly stated and the outcomes are well defined so that all teaching learning activities, including overall development activities, are well linked to each other.

Product characteristics are very specific in the production environment and may be physical e.g. dimension etc. with qualitative characteristics too, at times. In the service environment, though, the service providers are in contact with each other during the service activity and different non-quantitative aspects, like emotions, feelings, change in expectations etc. affect the service outcomes. Customers' requirements change very frequently due to customer awareness, media, government policies etc. and the service provider should respond to these changes promptly [Chakraborty (22)].

As per Mahadevappa (91) educational quality must ultimately be evaluated from the customers' perception and an institution can have competitive advantage if it can consistently discover the expectations of its stakeholders and meet them.

Ugboma (171) has also indicated that research on the determinants of customer satisfaction often assumes that there is no difference between the causes of satisfaction and dissatisfaction.

2.7.4.1 Service quality:

Service quality can be defined as the differences between customer expectation of service and perceived service. If expectations are greater than performance, then perceived quality is less than satisfactory and hence customer dissatisfaction occurs [Lewis (85)].

Quality evaluation as perceived by the customers stem from a comparison of what the customers feel that the organization should offer i.e. their expectation and their perception and of the performance of the organization providing the service [Aldridge (2)].

Parasuraman, Zeithanil and Berry developed SERVQUAL, a conceptual model of service quality, from their work on the area of retail marketing. It is based on the assumption that satisfaction is found in situation where perception of service quality meets or exceeds customer's expectations [Ruby (140)].

The use of this technique was made by Ruby (140) in assessing the quality of student services provided in ten institutions providing general education. The services included academic records, admissions, career services and financial aids. The exercise resulted in finding gaps between the expectations and perception of the students for various areas in these services. The study demonstrated that this assessment model could be used to assess students' satisfaction level and identify areas of improvement. The exercise did indicate that the students do in fact use different standards to evaluate quality dimensions based on service received.

The gap between expectations and experiences of the customer is referred as 'service gap' and would include following:

Gap 1: This is the gap between customer expectations and the perceptions of the management of the institution (understanding gap). This may be due to lack of customer focus, inaccurate perceptions or improper communications between the institution and the customer, i.e. industry.

Gap 2: This is due to improper translation of the customer's expectations into appropriate specifications/ operating procedures/ systems (procedural gap). This sometimes happen when the management of the institution believes that customer requires something whereas this may not be entirely accurate.

Gap 3: This is the gap between the quality specifications/ systems and the quality actually delivered (behavioural gap). This is mainly due to incorrectly handling of the processes by concerned persons. These may relate to transfer of knowledge, development of skills and attitude.

Gap 4: This is the gap between service delivery and what is communicated about service to the customers (communicational gap). There may be inaccuracy in describing the service offered/ delivered due to lack of communication between different functions in the organization, e.g. between placement officer and the teaching staff.

Gap 5: The final gap is between the actual performance or the quality delivered and the perception of the customer regarding the service (perceptual gap). This results from the

presence of different gaps in the delivery of service and results in satisfaction or dissatisfaction.

The above-referred gaps are indicated in figure 2.5.

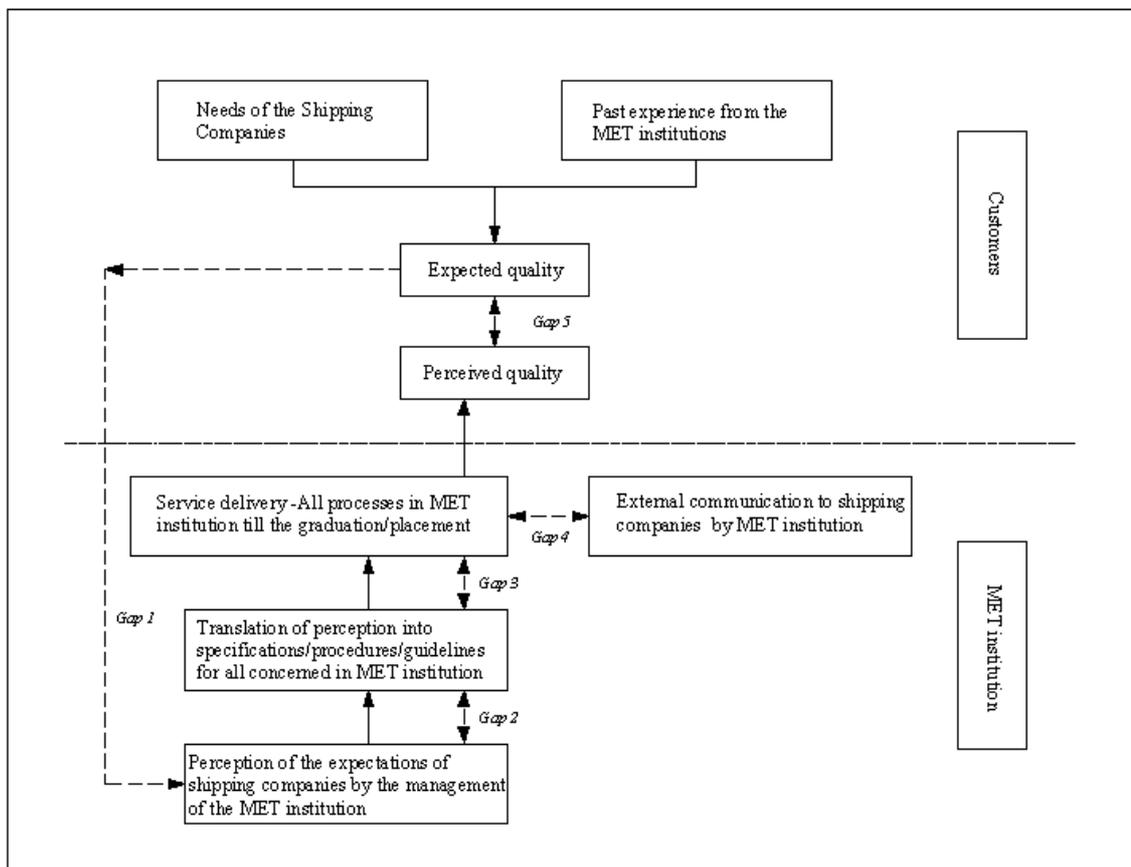


Figure 2.5 – Gaps in service quality in MET institution [adapted from Edvardsson (36)]

Wisniewski (180) has noted that service quality is a concept that has aroused considerable interest. He further identified difficulties in both defining and measuring service quality with no overall consensus emerging on either.

As per Hair (55) SERVQUAL measures how well the service delivered ‘disconfirms’ customer’s expectations. Cuttbert and others have used SERVQUAL model in higher education. In all these cases assessment of the fine underline dimensions was made. However, it was established that some other dimensions might also contribute to the measurement of service quality.

Sherry (152) conducted a study in the UTITEC Institute of Technology, Auckland, New Zealand to assess the expectations and perceptions of the students and eventually to find

the gaps. This was also done on the basis of SERVQUAL technique and the maximum gap was found in the ‘assurance’ dimension followed up by the ‘responsiveness’.

There was no evidence found that this technique is used in maritime education for assessing the service quality provided by maritime education and training institutions and especially determining the gaps in service quality.

2.8 Quality awards:

In recognition of the initiative of the organizations and individual different quality awards have been instituted worldwide. Certain salient points of these are mentioned below with an objective that they can also be considered while implementing TQM.

2.8.1 Malcolm Baldrige National Quality Awards (MBNQA):

This award is named after the late Secretary of Commerce of USA, Malcolm Baldrige and was established by the US Congress in 1987. The award is given to encourage US companies to adapt total quality concept by moving towards customer satisfaction and continuous quality improvement. The award is managed by the US Department of Commerce and administered by the American Society of Quality Control [Baldrige (10)]

The success of this award and its wide acceptance by the industry led to the development of a similar award for the educational institutions. For this assessment Baldrige Education Criteria for Performance Excellence was developed wherein key questions in following seven categories were included:

1. Leadership – This aims at senior leadership, governance and social responsibilities. The leadership should be able to create a student-focused, learning-oriented environment where needs of all stakeholders is considered. All aspects of social responsibilities of the institutions should also be covered.
2. Strategic Planning – This covers both strategy development and also deployment. It includes issues like the strengths, weaknesses, opportunities and threats of the institution.

3. Student, stakeholders, and market focus – In this category questions are asked as to how the organization determines the needs, expectations and preferences of the students, stakeholders and markets. The questions further aim to determine the main factors that lead to the satisfaction of all concerned.
4. Measurement, analysis, and knowledge management – It addresses how the organization selects, collects, analyzes the information and carries out the performance measurement and analysis, what is also significant that how this information is conveyed to all concerned and used thereafter.
5. Faculty & Staff focus – This deals with the faculty management system including motivation, performance evaluation and the satisfaction of the faculty.
6. Process Management – This aims at the key learning-centered processes, including other support services and operational planning and management.
7. Results – In this category all results are included. These are for all key aspects and include student learning outcomes; faculty and staff outcomes financial results; operational performance etc.

For each of these categories certain points are allotted with a maximum of 45% to the seventh category namely, results. This system therefore allows numerical assessment for almost all the activities of an educational institution.

Juran (73) has written that a government agency reviewed twenty companies that were among the highest-scoring applicants for the Baldrige Quality Awards and concluded that in nearly all cases improvements were noticed in employee relations, customer satisfaction, productivity, market share and profitability. The main contributing factors were customers' focus, leadership, employees' involvement and empowerment etc.

2.8.2. European Quality Awards:

These awards were launched in 1991 by the European Foundation for Quality management. Originally they were aimed at large or medium-large business organizations

and the scope is now extended to include public service providers. The awards are based on criteria, which provide equal weights to enablers (leadership, people, resources etc.) and results (outcomes) [Juran (75)]

2.8.3 Rajiv Gandhi National Quality Awards:

These awards were launched in 1991 in the memory of the Indian prime minister Late Rajiv Gandhi. It is promoted by the Indian Government and administered by the Bureau of Indian Standards. There are awards for promoting quality in industries, including commendation certificates for service sector including education. The awards are based on guidelines and criteria that can also be used to assess the quality improvement efforts of the organizations [BIS (19)].

2.8.4 IMC Ramkrishna Bajaj National Quality Awards:

These awards are given by a trust under the Indian Merchant Chambers and cover six categories including education. The criteria are similar to the Malcolm Baldrige National Quality Awards of USA [IMC (63)].

2.8.5 Golden Peacock Awards:

These have been instituted by the Institute of Directors in 1991. The Golden Peacock Awards signify corporate excellence and the guidelines provide a checklist for improvement and self-assessment in areas of quality, Innovation, training, governance, environment management and corporate social responsibility.

The Awards are bestowed annually and are designed to encourage total improvement in each sector of our business [Golden Peacock Award (48)].

2.8.6 Deming Prize:

The Deming Prize committee of the Union of Japanese Scientists and Engineers manages this prize and its guidelines. The award aims to encourage companies to work for successful achievement of organization wide quality control [Deming (28)].

Dr. Deming taught basics of statistical quality control (SQC) in Japan and this formed the basis of quality assessment by using different techniques of SQC. In fact the technique was referred as Total Quality Control (TQC) and the same is translated to TQM in western nations.

The Deming Prize is given to individuals who have made outstanding contribution to areas related to TQM. Deming Application Prize, on the other hand, is awarded to a company that has achieved distinctive performance improvement through the application of TQM practices suitable to the management principles, type of industry, and business scope.

The focus is on the quality achievement by using the Deming's 14 points. As per Natarajan (114), the 14 points is a complete philosophy of management and covers more scope than the quality management. The Demings' PDCA cycle too, aims at constant improvement so as to reduce the difference in the requirements of customers and the performance of the process.

2.8.7 Canada Awards for Excellence:

This was established in 1990 and recognizes quality in education, government, health care, entrepreneurship, innovation, manufacturing, services etc. A common set of criteria is used that is based on quality principles and practices.

2.8.8 Quality awards and improvements:

It is not important to judge which award or accreditation system is good or better than others. The important point is to accept what is really good for the particular situation and then built over it. The system should be able to provide continuous feedback to the management on the process and identify opportunities for improvement.

John (71) informs that the John B. Lacson Foundation Maritime University is a leading institution in Philippine and serves as benchmark for the practice of total quality management by adopting the Malcolm Baldrige Education Criteria for Performance Excellence. This is achieved by quality management audits, academic and financial audits; and accreditation. To validate this institution conducts periodic surveys among

student, service providers and other stakeholders to draw suggestions, recommendations and other data exigent to the improvement efforts.

Detert (32) conducted a study in schools in USA, which claimed to have implemented quality initiatives. The aim was to receive information regarding on-the-job practices and behaviour about various practices. Five major concepts were selected for the study viz. parent focus; leadership; studying, educating and using data to assess teaching and learning; systems thinking; and training effectiveness. This study was in different phases and though more concepts were considered initially, work in different phases eventually focused on the referred five concepts. The study resulted in establishing direct relationship between these concepts and the items included in the Baldrige Award. Correlation was found among these concepts with highest being between the leadership and training effectiveness. It is pertinent to add that ISO 9001:2000 requirements need to demonstrate training effectiveness. Obviously leadership ultimately has the responsibility to provide adequate training to the employer through a system of identifying the training needs and therefore provide the required training.

2.9 Accreditation initiatives in India:

2.9.1 National Assessment & Accreditation Council:

NAAC of the University Grants Commission (UGC) was established in 1994 and assesses and accredits colleges and universities in India and for this certain methodology is in place in the form of an assessment instrument. Now based on the feedback from various stakeholders this instrument has been modified and the new version is in force since 1st April 2007. [NAAC (116)]

The criteria for assessment focuses on curricular aspects; teaching-learning and evaluation; research, consultancy and extension; infrastructure and learning resources; student support and progression; governance and leadership; and innovative practices. Numerical differential weights are given for these criteria that can result in an overall figure for the institution. The criteria cover all aspects of operations of an educational institution, including physical, financial and human resources and also the processes and sub-processes.

Kurup (82), in his paper, writes that institutions at times exaggerate their achievements, including information in various aspects of its operations in the self-study report. Similarly there are instances where important documentary evidence regarding some of the key issues may not be made available. The composition of the peer team that visits the institution may not always be appropriate with some members not undertaking this important validation process very professionally. Considering these issues, it is pertinent that the evaluation is more focused and careful so that eventual objective is achieved.

Madhukar (88) states that awarding grades after the assessment and accreditation by NAAC has always been difficult and more of a dilemma. The earlier system was based on letter grading with 'A' being the highest. There was, at times reluctance to give 'A' grade even to good institutions because it was felt 'A' should be given only to exceptionally good institutions, or what grades to be given to a better institutes etc. This therefore led to a system of star rating ranging from a * to a *****. This system also resulted in some difficulty as it was felt that it was not correct to offer ***** rating to institutions achieving an overall numerical figure of 75% and above. Further the development of 'star' culture was also not liked in the educational community. This led to development of nine categories ranging from C to A++ with grades for every 5 score values. While this was an improvement over the earlier mechanism, certain criticisms were observed. These include differences between grading and the highly positive report by the peer team; 'we have better facilities than the other institutions who got a better grading' etc. NAAC has taken certain initiatives to reduce this dissatisfaction among the institutions.

Madukar (88) concludes that till date no specific advantage of the grading has been noticed and the students are usually not in a position to make a choice of institution based on grading. The mechanism of grading should be viewed as a healthy competition, however, it seems that it leads to over emphasizing the grade achieved rather than the true spirit of the whole exercise.

Till 31st March 2007, NAAC has completed the assessment and accreditation of 3, 652 higher educational institutions [Shakuntala (148)].

Shakuntala (148) informs that the main changes in the April 2007 version are in the instrument, grading system and the format of peer team report document. Each key aspect of different criteria has been focused into assessment indicators that are both quantitative

and process indicators. The old system of nine grades from C to A++ has been reduced to only three, being very good, good and satisfactory. Grade D is unsatisfactory and in this case the institution is not accredited. The grading system has also been revised for the percentage system to Cumulative Grade Point Average (CGPA) system with a maximum of 4.0 and a minimum acceptable of 1.51. The new methodology is expected to offer more clarity and better reliability and validity. Institutions with an overall score of less than 55% are not accredited. Manjunath (96) has commented that funding agencies uses accreditation decisions of NAAC.

NAAC recommends establishment of an Internal Quality Assurance Cell (IAQC) as a post-accreditation strategy to sustain and enhance internal quality of performance. One of the major outcomes of this would be the internalization and institutionalization of quality so that the institution strives to excel in serving learners [Soundararaj (159)].

2.9.2 National Board of Accreditation:

One of the main objectives of the National Board of Accreditation (NBA) is to encourage educational institutions to continually strive towards the attainment of excellence. For achieving this NBA has established an evaluation process that is based on eight broad-based criteria. All principal activities and processes of the institutions get covered in this scope.

These criteria are organization and governance; financial resources, allocation and utilization; physical resources – infrastructure; human resources - faculty, staff and students; teaching-learning process; supplementary processes like extra and co-curricular activities; counseling, entrepreneurship development etc; and research and development. Each of the above-referred criteria has certain specific parameters and certain numerical weight is allocated to each thereby leading to an eventual figure for the institution [NBA (117)].

Appropriate and reliable accreditation and evaluation are needed to reassure the public that the programs offered meet acceptable academic and professional standards [Stella (163)].

2.10 Quality and academic audits:

Audits are activities that are conducted to verify and confirm compliance against set standards.

As per Newby (119) any external audit system aims to answers ‘tell me if what I am doing is wrong?’ The internal assessment system should ask, “Am I achieving what I should be?” Therefore the internal system would not only assess if the outcomes are met but would anticipate a range of learning situation-affecting outcomes.

The ISO 9000:1994 standards were based on the quality assurance approach. However the revised 2000 version is a more demanding standard where the focus is on the quality management.

The assessment of the functioning of quality management system of the organization during the audits is to be performed with great care and auction. The principal challenge is to recognize that these are not audits of compliance to specific standardize requirement, but are in-depth evaluations of organizations excellence [Laszlo (83)].

Today, quality measurement is not just an academic debate about how to best understand the measure program quality; it is an organizational problem about how to best organize information system to respond to both internal and external demands or information about the performance of program and services [Welsh (178)].

The University of Louisville, USA has developed. QMS2000, as a quality measurement system for higher education [Welsh (178)]. This system manages complete information including outcome assessment survey, of students, employee, alumni, academic outcomes including students learning outcomes etc. Annual assessment results are used to monitor university’s program review progress. In spite of significant costs for developing this system, this initiative has been an extremely cost effective method of generating information for accountability and quality improvement.

Accreditation Board for Engineering and Technology (ABET), in USA has been a pioneer organization in designing and implementing accreditation for engineering programs. As per Natarajan (114) ABET evaluation became increasingly dependent on

rules and was giving less consideration to evaluate innovative curriculum responses to a changing world. Considering various difficulties, ABET identified three key issues, namely excessive length of the accreditation criteria; difficulty in attracting quality professionals to take part in the accreditation process; and complexity of the accreditation process.

Academic audit is the process of verifying and validating the extent to which the predetermined standards in an academic institution are in accordance with a defined set of procedures and methods [Verma (176)].

The external audits are the requirement of the ratifying agency, viz. NAAC, NBA, CRISIL, organization awarding ISO 9001:2000 certificates etc. The internal audit, except in the case of ISO 9002:2000, is a voluntary action by the institutions. Person who is adequately trained for this should carry this out and the management should make necessary arrangements for such training.

Any audit mechanism can only be successful if there is genuine involvement of the people and they have awareness of the quality system and the benefits of such audits. They must understand and acknowledge the need and benefit of such system. Development of appropriate organizational culture for quality improvement is essential [Verma (176)].

Benchmarking is a system of assessing various processes and sub-processes in the organization and compare them with those of another organization. This allows external focus to internal activities and operations. The goal of benchmarking is to provide an external standard to measure the quality of internal activities and to help identify where opportunities for improvement may be [Kirpal (80)].

Accreditation based by set standards by an external agency is an extrinsic method of benchmarking which helps in developing a sense and need of quality among all concerned in an institution. However, when pre-determined standards of quality are imposed from outside 'benchmarking' does not become intrinsic to the process of quality improvement [Kirpal (80)].

The intrinsic method of benchmarking is when all concerned in an institution, including the senior leaders and management, feel the need of assessing what is being done better in other institutions. This results in establishing the gaps in its performance. Adoption of the findings to address these gaps and improving the institution is the primary goal of benchmarking [Kirpal (80)].

2.11 Total Quality Management:

TQM is simply a brewed concept of already existing management concepts plus technologies which have precipitated as a blended synergy for providing a pervasive approach to improving the effectiveness and flexibility of business as a whole [Jha (70)].

Organizations that have personnel educated in quality subjects and where TQM methodology is already implemented belong to the group of learning organization. [Aizpurielis (1)].

Hines (59) informs that SPC was implemented in Techneglas, a market leader glass manufacturing company in USA in late 80s and in a more organized way in early 90s. The company then started concentrating on TQM as another step after SPC. Techneglas incorporated new methods and systems of operations and supervision with management setting individual and organizational goals. The gradual implementation took many years and eventually was successful.

Hwarng (62) suggests that the underlying principles of TQM are meeting customers' requirements, continuous improvement, communication, and teamwork.

Malek (95) conducted a survey of 60 institutions in Malaysia about implementation of quality system, including TQM. The survey indicated that 50% of the institutions were, in one way or the other, implementing TQM with 67.7% giving importance to meeting customer expectations. Some barriers observed were lack of commitment, insufficient knowledge and the fear of failure.

As per Kennedy (79), excellence is achieved by implementing the concepts of total quality management namely, leadership; customer focus; people management; benchmarking; continuous improvements; and best practices.

In the 80s Takashi Osada developed the concept of 5-S as five principles of total quality environment. These with their English meaning are Seiri (organization); Seiton (neatness – efficiency); Seiso (cleanliness); Seiketsu (standardization); and Shitsuke (discipline). The clauses of ISO9001:2000 have a synergy with these principles which also emphasize constant review and regular maintenance. Thus the implementation of the 5-S philosophy can be yet another step towards TQM [Pheng (128)].

TQM was applied in USA in the 80s in some prominent industries like Texas Instruments, Xerox Corporation, Motorola etc. This enabled these industries to excel in their fields and this initiative was also adapted in institutions of higher education.

An ASQ survey of American universities and colleges, valuable benefits for the use of Total Quality Management were reported. These included, increased employee empowerment, customer satisfaction, teamwork and culture change [Tong (170)].

2.12 TQM in education:

Not everyone agrees that TQM can be applicable in education activity. TQM may be useful in support and administrative areas, but classroom norms seem to violate the assumptions of TQM, There are quite a few instances where attempts have been made to use TQM philosophy with an objective to improve operations. However, in academic field most of the early TQM applications have been in the support or administrative areas, not in the classroom. This is changing. Many recent applications of TQM in higher education have focused on the core issues involved. There is a need for a complete model for all the activities of an educational institution.

Owens (124) conducted a survey among the faculty members of 6 departments of 10 colleges in USA. The enthusiasm for the survey among the teachers was enormous and their comments reflected deep commitment to excellence in teaching. The survey also brought about considerable hostility between the administration and faculty members with 49% disagreeing with the statement ‘my institution is managed effectively’.

TQM is most powerful when supported and initiated from the top of an organization. This would allow faculty and students to view the educational process more holistically, rather

than a collection of courses without attention to the processes in which they were put together [Sommi (157)].

If TQM is not in place in the institution, individual faculty can still utilize the principles of TQM for individual course work [Sommi (157)].

TQM is both philosophy and a set of guiding principles that represents the foundation of a continuously improving organization. It involves the integration of all functions, processes and personnel within the organization with an aim to achieve the continuous improvement of the quality of service [Thore (169)].

Critics suggest that application of TQM in administrative functions is possible and acceptable however, not in teaching and learning system [Andrews (5)].

In a study to assess the use of TQM in higher education in colleges and universities in USA, Vazzana (175) found that there was a fairly high usage of TQM in non-academic functions of the institutions. About 45% of the respondents indicated that TQM was applied in administrative issues. Only 16% of business schools used this technique to improve the core learning process. It was of course encouraging noting that 78% of the respondents had information on TQM in their curricula. Interestingly 25% of the institutions did not have any strategic plan.

The first application of TQM in education in USA was in the Fox Valley Technical College which resulted in improvement in placement, employer satisfaction etc. [Kanji (77)]. In UK too, there was signs of increase of interest in TQM and quality system standards since 1993 [Kanji (77)].

Kanji (77) presents a view that TQM can be used to achieve continuous improvement in an educational institution. TQM implementation is influenced by principles and core concepts that become critical to the success of the institution.

The consideration of TQM in higher education started in USA in 90s with terms like 'Customer focus', 'employee empowerment', 'continuous assessment' and Deming's 14 principles started appearing regularly in education journals [Felder (42)].

The importance of reaching a common understanding of what the complete group as a whole is trying to achieve with the students is paramount. This was acknowledged by Newby (119) when he warned that if quality is to be achieved then the culture of individualism must be challenged.

The key task in implementing TQM is to unite the total organization behind this strategy [Soni (158)]. Higher education institutions are complex organizations with a strong sense of tradition and a distinct culture. They either do not have a mission statement or it is vague. One of the strong values of the academic component is the "academic freedom" where it may not tolerate any interference from outside sources [Soni (158)].

Lamar University in Beaumont, Texas used a team approach to TQM implementation and showed improvement in getting potential students to apply for admission earlier and improvements in staff. Similarly at Babson College, USA, TQM was integrated in curriculum and used as a way to run the institution. Auburn University has used TQM to restructure programs and services in its student affairs division. Several universities, colleges and junior colleges have used quality circles to increase their effectiveness in areas of residential life [Soni (158)].

Gyani (54) while comparing the ISO 9000:2000 with TQM says that the ISO 9000:2000 is process oriented standard; consistent; management oriented; and system based. The TQM on the other hand is a culture; customer oriented; competitive; leadership and people oriented; goes beyond systems; and learning based.

Today quality measurement is not just an academic debate about how to best understand and measure program quality; it is an organizational problem about how to best organize information systems to respond to both internal and external demands for information about the performance of programs and services [Welsh (178)].

Institutions should have a concept of co-production that requires the involvement and cooperation of educators, students, parents, and industry to achieve the quality outcome of the educational service [Tong (170)].

Traditional colleges work on plan-teach-test model. However with application of TQM the model should be on plan-teach (do) – check – act basis, which is the Deming's PDCA

cycle. The 'check' step deals with collection of measurement results and analysis to lead to outcomes that can help in making corrective and preventive measures [Tong (170)].

Mueller (110) conducted a study in UK in the organizations that have had experience with Total Quality Management. The views were quite varied e.g. "TQM is certainly used, sometimes we don't realize that it is part of the culture"; TQM has had an impact in the way we approach things'; 'I don't think it actually changed much other than increasing awareness of how things were done'; 'The management said big things like customer focus, teamwork etc but they were not committed to TQM'; etc. This therefore reflects that the outcomes of these initiatives may be different depending on the sincerity of its application.

Mahadevappa (90) suggested a conceptual model for TQM that is based on the different elements of the Baldrige National Quality Award Criteria. The main theory behind this model is that 'leadership drives the system that creates results'. The hypotheses that 'leadership predicts system' and 'system predicts results' were supported in a survey that was carried out in many colleges.

2.12.1 Advantages of implementing TQM philosophy:

TQM gives people a voice and enhances morale, gives sense of value and purpose and changes attitudes. This eventually affects the overall environment of the organization. TQM also increases cooperation among different departments as people become process owners and they work together. TQM focuses on causes rather than symptoms and this leads to specific corrective and preventive solutions [Hazzard (57)].

Many industries that have adapted the quality management model have also established quality circles within the organizations. This mechanism enables the key stakeholders to have confidence in monitoring the quality in the functioning and management of the outcomes [Sharma (151)]. The quality circle is a small group of highly committed and motivated employees who meet regularly and discuss a quality related problem and try to find solutions for that. This is achieved by collecting problems in the organization, prioritizing them and selecting the most important one first and others later. The problem is then analysed using different quality tools, and different possible solutions are envisaged. The optimum solution is then presented to the management as

recommendations. Post implementation follow up is also carried out after the solution is accepted and implemented.

Sharma (150) writes that 62% of the quality circles studied were successful which reflects that they are helpful and feasible. For this initiative to be successful it is imperative that the team members are selected carefully, they are adequately trained and the activities are suitable monitored and due encouragement is given by the leaders and the management.

Shrivastava (153) tested a hypothesis that TQM has a significant and positive impact on organization performance. It was found that the customer satisfaction is significantly influenced by pro-active business orientation, competitive assessment and participatory orientation. Pro-active business orientation emerged as the strongest quality dimension.

From various studies it is identified that seven concepts constitute TQM. These are visionary leadership; internal and external cooperation; learning; process management; continuous improvement; employee fulfillment; and customer satisfaction [Boggs (15)].

Boggs (15) writes about implementation of TQM in a church in USA, which resulted in transformation in the organizational culture of the church. This successful initiative led to a survey that concluded that TQM implementation can lead to a balanced competing values framework profile and that both TQM principles and managerial ideology of TQM implementation can influence specific changes in the culture profile.

A survey of 500 companies by Arthur D. Little, 36% indicated that TQM was having significant impact on their ability to compete. Similarly a survey by A.T. Keavney of 100 British firms indicated that 20% believed that their quality program had achieved tangible results. In spite of this it was also felt by many that TQM is just a fad and adaptation and implementation of TQM is not a guarantee of success [Singhal (154)].

Singhal (154) in his study compared the profitability and the stock movement of the quality award winning companies with a benchmark company in the same sector. It was found that the companies implementing TQM were performing better.

2.12.2 Constraints/ Barriers:

Implementing TQM takes time and extensive training. Finding and implementing new ideas is time consuming as traditionally people resist change. Reaching consensus on ideas is difficult and major change in organizational culture would be necessary. The educational institutions are usually divided in isolated groups as departments and have no experience of working as a team. Therefore the main difficulty remains to be the human related issues [Hazzard (57)].

The barriers to TQM may be failure to accept that everyone in an institution has a customer whose requirements change. The other difficulty is not knowing what and how to measure what needs to be monitored. Yet another problem is that enthusiasm in TQM wanes slowly as old habits take over [Telsang (168)].

Tamimi (167) identified, after a detailed survey, 25 barriers to total quality management. Out of this 14 are related to the strategic planning, human resources development and management. This underlines the importance of integrating the human resource practices, strategic initiatives, with the complete working of the institution. Importantly the survey was primarily for the manufacturing firm, with some service organizations, the findings are also valid for the maritime education and training institutions

In his paper Hwarng (62) concluded that one of the main difficulties in application of TQM to service environment setting is the issue of subjectivity as service parameters are qualitative by natures.

Owlia and Aspinnell had concluded that there appears no apparent reason for rejecting the applicability of TQM in higher education as a general philosophy. If there are problems with its introduction, their roots should be sought in the system itself rather than in the philosophy [Mohitkar (105)].

2.12.3 Cultural barriers to TQM in higher education:

The application of TQM is a slow process and can only be affective if it is adapted in all areas of the operation of an institution. While it is much simpler to change the operating condition of equipment and machinery, it is quite challenging to bring about change in the

way people carry out their work. Therefore there would be barriers to the proper implementation of TQM in an institution. Such barriers could be the following:

1. The management culture within the MET institutions.

Different types of culture exist in different institutions. This is due to the fact that management styles are different, the objective too may be different, and more importantly the affect of operational bureaucracy may be different in different MET institution.

Newby (119) suggests that this type of barriers can be due to the squeeze on corporate budget and funding per student thereby insistence on saving.

2. The culture of the higher education sector.

This probably is the most significant barrier as the teachers some how are not able to accept the educational process as a service industry and students as customers.

2.13 Improvements by application of TQM:

The traditional administration system in educational institutions is being replaced by state-of-art management system based on TQM methodology. This new approach embraces customer satisfaction strategy, leadership and partnership policies, process management and continuous improvement methodology [Aizpurietis (1)].

Recognizing that the involvement of all in an organization is necessary for the success of TQM, Naveh (118) developed a 3D model for TQM implementation. The levels in 3D were individuals, teams and organization. This was based on the presumption that quality improvement is a process of culture change by individuals, teams and the organization itself. Further the change in attitude and behaviour at these three levels is influenced by factors that are cognitive, including informative, skills etc; motivational, including intrinsic and extrinsic rewards; and socio-dynamic, including group interaction, management support etc. The development of this model recognized that betterment in organizational performance has to be supported by a change from the existing culture to a quality improvement culture. This model was implemented in a manufacturing firm and after 16 months substantial improvement was noticed in all aspects of operations. The inventory costs reduced by 11% and accident rate came down by 62%.

TQM could serve as a paradigm for improving every aspect of collegiate functioning from fiscal administration to classroom instruction. TQM is a collective strategy and is meaningful if it is agreed upon and implemented by all in the institution. Applying TQM to only teaching learning process for only one course by one teacher is a good improvement exercise and a good experience to the student, but it is not TQM [Felder (42)].

In a survey Kemenade (78) found that engineering course and course in applied economic science were responding to the core TQM skills required in the professional world. In one class the PDCA cycle was explained by demonstrating the degree to which improvements were made as per students' evaluation of the courses.

The practice of TQM in higher technical education will entail accountability in all level of work as monitoring and analysis of performance of all concerned and quality of end product will be carried out in a systematic way [Gupta (52)].

Grant (50) conducted a study of published articles in USA in 2002 to assess the understanding and level of implementation of TQM in higher education in USA. The study was aimed at assessing the integration of three prime aspects of quality namely design, conformance and performance. The study covered nine recent articles that dealt with quality management in US higher education. It was found that while each of these articles focused on the quality of design and most of these on the quality of conformance, only one aimed at the quality of performance. It was felt that this was probably due to lack of knowledge and awareness of performance measures. This study is valid even today, and especially in the maritime education scenario, where there is substantial emphasis on the design of the system and ensuring conformance with the requirements. The assessment of the eventual results and the performance outcomes remain a neglected area thereby limiting the eventual aim of implementing quality management.

An ASQC survey of American universities and colleges reported valuable benefits like increased employee empowerment, customer satisfaction, teamwork and culture change for the user of TQM [Tong (170)].

The University of Louisville, USA has developed QMS2000, which is a quality measurement system for higher education [Tong (170)]. This system manages complete

information including outcome assessment surveys of students, employers, alumni, academic outcomes including students learning outcomes etc. Annual assessment results are used to monitor University's program review progress. In spite of significant costs for developing this system, this initiative has been an extremely cost effective method of generating information for accountability and quality improvement [Tong (170)].

Prasad (134) suggested the adoption of a five-stage strategy for successful implementation of best practices in an educational institution. This covers the identification, implementation, institutionalization, internalization and dissemination of best practices. Such methodology will result in not only implementing these practices as integral part, but more importantly be accepted by the users in the institute with suitable dissemination of such practices for wider application in the system.

2.14 Quality and costs:

An exercise of establishing a quality management system eventually leading to TQM cannot be complete till understanding financial issues and the cost of quality. These must be then incorporated in the system. The aim of the organization should be to reduce failure costs by investing/ increasing expenses on appraisal and prevention costs.

The activity based costing includes the cost of production activities, preventive activities and finally corrective activities. The cost of prevention and correction activities indicates the cost of quality with specific dimension as costs of conformance and non-conformance respectively [Beheiry (12)].

Quality costs are the costs associated with preventing, finding, and correcting defective work [Kaner (76)]. The cost of quality is about 25% of total sales for many organizations. Though the difficulty is that the cost accounting system does not recognize this concept and therefore these are never discussed or raised to the attention of top management who any way mostly is not aware of these.

Yao (184) has suggested that full-time faculty members in the university work between forty-five and fifty-five hours a week. This includes the teaching load but also include preparation load (estimated to be 2-4 hours for each class room hour). Most of their time

is spent on appraisal and preventive activities. He also opined that the teachers often look to classroom hours as the primary measure of performance.

Normal financial accounting system does not recognize the cost heading as reflected in cost of quality. This ignorance results in overlooking these significant aspects that could be used for effective management control. The cost of quality technique is a tool for management in its pursuit of quality improvement and profit contributions. The strategy of quality costs is based on premises that each failure has a root cause; causes are preventable; and prevention is always cheaper [Campanella (20)].

University of Western Ontario had attempted to develop a system to assess quality costs in its Department of Finance. The main difficulty faced was to see this as a management tool as against financial tool [Campanella (20)].

Earlier studies had indicated that if appraisal and prevention costs were increased by establishing significant efforts, the failure costs would reduce. Eventually optimum total quality costs would be reached and any further efforts in increasing prevention and appraisal costs would not help. However, the new developments in all aspects of operation have resulted in an ability to achieve perfection and therefore as per Juran it is possible to reach the 100% quality of conformance with reduced total quality costs [Campanella (20)].

Aruchami (6) lists the costs of failure as loss of student enrolment, damage to the reputation of the institution, loss of opportunities, and beginning of the end of the institution's identity.

2.15 Key Performance Indicators:

Key Performance Indicators (KPI) is a performance measurement that can be in the form of statistical data and can be employed to measure success of an institution when compared to the past performance and also with the performance of the competitor institution. Ontario government incorporated a system of KPIs for the undergraduate studies. It was envisaged that these would provide evidence of the effectiveness and efficiency of education. The KPIs selected were required to have an appropriate balance

between external demands and institutional autonomy and improve internal processes [OUSA (122)].

KPIs are quantifiable measurements and provide snapshots of an organization based on specific predefined variables. Indicators are individual or composite statistics that reflects important features of a system, such as education, health or economy [Lee (84)].

Once an educational institution has analysed its mission statement; defined its goals; identified all customers; both internal and external; established all processes and sub-processes; it needs a system to continuously measure the progress towards achieving the referred aims.

Oregon University, USA, has identified KPIs as total enrolment, graduation rates, faculty compensation, philanthropy etc. In his paper, Lee (84) has further suggested 22 KPIs in the area of inputs (various resources to the program), processes (various sub-systems that create program), and outputs (consequences of the program). These were suitably prioritized after a survey.

2.16 TQM in Maritime Education & Training:

Asyali (7) has informed that a Problem Based learning system has been developed in the Dokuz Eylul University school of Maritime Business and Management. This is based on the principle of using problem as a starting point for the acquisition and integration of new knowledge. This provides an environment of self-assessment in order to reach superior quality.

Cooper (26) writes that strategic plan of the Australian Maritime College (AMC) now has undergone major change in developing a university culture while maintaining its vocational training component that is significant in the MET concept. He suggests that the compliance-based quality system as prescribed by the ISO 9001:2000 and the outcome-based quality system have many operational characteristics that are similar. However, both are distinctly different in approach. The outcome-based avoids the emphasis only on audits and is therefore more with a need of self-review. The Australian Universities Quality Agency (AUQA) utilizes this approach and slowly the Australian Maritime Collage; a premier MET institution in Asia Pacific is adopting this system.

World Maritime University (WMU) (181) is the apex institution in maritime sector and is located at Malmo, Sweden and is under the auspices of IMO (65). Being part of the UN system it is outside any national or European system. It receives funding from various international sources and realizing its quality commitment to its stakeholders it started a system of quality assessment and monitoring of its procedures in 1999. Browne (17) in his paper writes about the quality initiatives of WMU. The first quality audit was done in 1999 by a team from the Association of European Universities (CRE, a French acronym). The auditors also met donors, graduates and their employers. The audit report is available on the website of WMU and many improvements were made after this audit. The second audit was done in 2004 by the European University Association, which is a successor of CRE. This report comments, “a culture, which calls for explicit, but hopefully not bureaucratic, procedures, had been grafted on to WMU’s original informal, organic and constantly multi-cultural family culture”.

Survey conducted by Chugani (24) indicated that there are many marine engineering faculty members with more than 30 years of experience in shipping field and most of them have taken to teaching only after retirement from the service. While these people may have extensive managerial experience, it is doubtful if they have the teaching skills and more importantly if they have kept themselves abreast of latest developments. The survey also indicated that it is quite difficult to find suitable faculty members in professional subjects like marine engineering.

GlobalMET (45) Conference statement of outcomes recorded that the salaries of maritime teachers is not attractive as compared to the other jobs in shipping and because of this many are not attracted to this profession. Further the course fees are high because the substantially higher operating costs due to exhaustive infrastructure that is required to be in place for an undergraduate program in marine engineering.

Horck (61) in his paper states that one cannot have quality shipping without a quality crew that is able to work together and communicate without hindrances. Further referring the cross-cultural scenario in the present day shipping, Horck (61) states that education is needed in order to understand how people react in a group in general and how it is done in multi-cultural and multi-lingual setting.

Solanki (156) states in his survey, that the seafarers have been influenced by short-term motivation like salaries, foreign travel and adventure. With the passage of time the satisfaction level slowly drops from 3.8 to 2.7 on the Likert scale. Further the satisfaction level was found to be higher for the trainees than for the officers. Presumably family and option of other jobs create this situation. The recent incidents of criminalization of seafarers with criminal proceedings against them after an accident have further resulted in seafarers leaving sea life fairly early.

2.16.1 Suitability of quality management system to MET

The requirements of an MET institution are slightly different than a traditional educational institution. MET is more like a vocational training with substantial educational inputs. The industry influence is also rather high. The quality management system therefore has to be developed keeping these issues in mind.

2.16.2 Present initiatives

The above-referred initiatives have been developed based on the requirements felt at a certain time. Most of the initial ones require a formal establishment of a quality management system and the institutions could get certified after demonstrating compliance with the standards. However, as referred earlier, this eventually developed into an isolated work with only few, especially from the quality department becoming involved whereas others took this issue as a necessary paper exercise. It was generally felt that as long as required forms and checklists were available and the auditor was satisfied the objective was achieved.

It is felt that serious implementation of the revised ISO 9001:2000 standards would change this attitude and ensure that the organization is continually working for achieving higher scale of quality. The TQM on the other hand aims to change the complete thinking of the organization. There is no certificate to look for and thus the motivation has to be genuine for setting a quality management system. While implementing TQM in a MET institution is not easy, it is sincerely felt that this provides the best opportunity for an institution to demonstrate to the industry its commitment towards quality.

The Directorate General of Shipping, Government of India, has recognized the need of institutes to go beyond the adoption of quality management system. It has directed the MET institutions in the country to go for grading system. Organizations like CRISIL and ICRA have been suggested for receiving this grading. It is envisaged that this step will further take MET institutions towards providing better quality.

It can be appreciated that while some work has been done on TQM and quality, it appears that no specific work is available in the application of TQM philosophy and techniques in the area of maritime education and training. This has provided the motivation for working in this area of quality management.

2.16.3 Quality Management System at Tolani Maritime Institute

As per the requirements of Regulation I/8 of STCW Convention and the subsequent guideline issued by the Directorate General of Shipping, the quality management system at TMI was developed in 1999 based on the ISO standards. Initially the system was according to the ISO 9002:1994 standards. The system required maintenance of a quality manual and certain procedures and work instructions. The system also allowed periodic internal audits and yearly surveillance audit by the certifying authority Indian Register Quality Systems.

The system was process dependent and required fulfillment of necessary documentation ensuring compliance with the requirements of the system. However, it is an accepted fact that compliance to procedural system may not necessarily result in quality outcomes.

The standards by ISO were amended and the Quality Management System of TMI was accordingly restructured as per the requirement of amended ISO 9001:2000 standards. These standards addressed some of the difficulties of the earlier version and reduced too much emphasis on the procedural compliance. The system has now been functioning as per new standards since last six years and it is felt that it is still substantially compliance based and it is imperative that change is necessary if we have to achieve the objective of inculcating quality in all activities of TMI.

2.16.4 Choice of quality management system

The TQM experiment was extremely successful in some major industries in USA namely, Texas Instruments, Xerox etc. This encouraged the adoption of this philosophy by some educational institutions also in USA, including some universities. While implementing TQM in these institutions different modals were established which were aimed at representing inter relationships between different quality dimensions. These obviously were different for different institutions. Therefore it is imperative that adoption of TQM is structured based on the specific activities and environment of the institution.

TQM is broadly about management behavior and practices and has to be adopted by the management in its thinking, structure and various operational processes. The top management has to be personally involved in the process of putting TQM in place and must be able to visibly demonstrate its commitment to this philosophy. The senior staff members should have confidence in this philosophy and be committed to this idea and therefore induce and motivate other faculty and staff members to accept and follow the new way of functioning.

An environment would have to be created where the faculty learns and enjoys working. The employees need to be empowered to manage activities in the institute and take decision in the management of these processes as explained above. This would require guidance, motivation, and development of trust between all personnel. The 'blame culture' normally prevalent in any organization would have to go. Every mistake should be viewed as an opportunity for improvement.

Of course all this is not going to be easy. Change is not accepted easily, especially considering the traditional method of working which most of the staff would have been following for last many years. Some employees personally would have a negative outlook towards the requirement and development of TQM. An extra effort would be required to work on these people.

What is really required is an extensive session of introductive program on TQM and its benefits to the institute and the employees. This should be followed by many interactive workshops where the importance of their involvement should be highlighted besides the discussion on the tools of TQM. In this training the organization and especially the senior

staff have to be careful not to convey the feeling that only the suggested way is the best way to improve quality. Creativity has to be developed and encouraged.

Today, TQM is viewed variously as a philosophy, which emphasizes that quality is responsibility of everyone in an organization; as a process for managing change; as a strategy to improve organizational competitiveness and effectiveness; as a value system that emphasizes striving for quality in product or services; and an approach to doing business that covers the whole organization [Soni (158)].

TQM has been also described as a management "unification" process that emphasizes teamwork and employee empowerment. Employees at all levels are organized and motivated with knowledge and responsibility for managing and improving organizational processes [Soni (158)].

As per Soni (158) TQM is far more than simply statistical quality control and quality assurance and is concerned with changing the fundamental beliefs, values and culture of a company, harnessing the enthusiasm and participation of everyone. With higher education becoming an international service, the demand from stakeholders to evaluate the higher education is increasing Stella (162).

In education, the total quality management means the meeting of the changing demand of students, employers, knowledge producers and society. It is a system of continuous improvement, empowerment and autonomy of people concerned, process orientation, and adoption to the ever-changing environment [Soundararaj (159)]. Further more TQM consists of continuous improvement activities involving everyone in the organization in totally integrated efforts towards improving performance at every level.

2.17 Objectives of the study

The broad objectives of the present study were as follows:

To study the application of Total Quality Management in various areas of maritime education and training.

To identify and establish relationship in the admission performance and the eventual performance of the student in the MET institute.

For fulfilling these objectives the model of the quality management system and the processes and sub-processes of TMI are studied and possibility of implementations of TQM is assessed and various measures are suggested.

The quality system should be outcome based that avoids emphasis on audits and focuses on the outcomes of all relevant processes. Such system should lay more emphasis on the proper utilization of the quality cycle e.g. PDCA. Both quantitative and qualitative data needs to be assessed and quality improvement initiative put in place as necessary. Marine engineering profession is highly competitive and the graduates from TMI are competing with students from other colleges, both from within and outside India. It is therefore imperative that good practices may be adopted.