Chapter-Four

STUDY OF TQM IN
HIGHER & TECHNICAL
EDUCATION IN INDIA

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4.1 TQM IN HIGHER & TECHNICAL EDUCATION

The quality philosophy and principles have become central to international educational reform efforts in nations such as Canada, Australia, Japan, the United States and the United Kingdom, Wiklund, Klefsjo, Wiklund and Edvardsson, (2003)\(^1\). The attraction of TQM philosophy is mainly because of its successful record in the world of business in producing quality products and services. In fact, TQM provides a structured and comprehensive delivery system which may lead improvements in education, Wiklund and Edvardsson (2003). TQM recognizes students as both customers and employees of the education system, Maria Fredriksson, (1992)\(^2\). Therefore the roles of students must be recognized by involving them in their own learning process. Furthermore, students’ evaluation in TQM is very important and should be carried out throughout their studies so that corrective measures may be enforced continuously (Weaver, 1992). As discussed about defining of what TQM really is and its components, however there were several applicable and useful points that can be used by every institution in this definition to improve their quality work. Now the second phase of a

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TQM approach i.e. implementation phase will be described. For the implementation of TQM a model will be presented in order to make the TQM applicable for every institution.

4.2 **TQM IMPLEMENTATION IN HIGHER & TECHNICAL EDUCATION**

As we know, TQM has been used primarily in the industry but there are some reasons that TQM should be applied in educational institutions. First, necessitate for change has not been accepted by the institution most of the time. Second, is the hazard to the faculty’s individual autonomy therefore in TQM we need to have customer involvement and teamwork, **Fisher (1993)**. Finally, existing process will be improved by TQM. It cannot promote radical change Fisher (ibid), **Marchese, (1993)**. When the applicability of TQM in education is accepted, the procedure of its process should be addressed. In fact, many institutions have reviewed the applicability of TQM in higher education and there are some proposed models to prove its applicability. **Fincher, C. (1994)** have suggested five

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step model that they believe is applicable to every institution. This model has five phases: deciding, preparing, starting, expanding and evaluating.

TQM model proposed by Green, D. (1994) is well defined and is clearly describing what should be taken into consideration for TQM implementation. However, by looking at these phases and going back to the Deming cycle we will find similarities between them. To us the founded similarities means that we can put the phases defined by TQM model into Deming cycle, then the new created model will have more efficiency.

In fact, one may claim that Deming cycle is for continuous improvement and proposed TQM model is for improving the quality. Therefore, combination of this model and cycle with some changes will offer model for continuous improvement of the quality, even though TQM is about continuous improvement for quality by itself. For this purpose, the phases defined by the TQM model will be set up in Deming cycle with some changes. The proposed model here will be a four-step cycle, which its components are as follow:

Plan step in Deming cycle is divided by two parts, first part is called Studying. This part is about doing a research of what TQM really is and top management should fully understand the concept, its objectives

and they must accomplish their plan. The next part in plan step of this cycle is named preparing, and is about performing an internal assessment of the quality work and defining values, methodologies and tools. Furthermore, there must be some clearly defined objectives and visions.

Do step in Deming cycle is about starting and in another word plan and implement solutions. In this step, there must be some training to all levels about terms like Quality, TQM, Core Values, Methodologies and tools, and distribution of some customer surveys to both internal customers and external customers is desirable. Furthermore, Quality Council must be formulated and some quality improvement teams should be formed. Finally, some measures must be established and the university board should perform a benchmarking in order to recognize and reward improvements. Check step in Deming cycle has been regarded as evaluation step. This step has to do with evaluation of the plan and do steps. Here, the most effort should be set up for checking the actions that we have done and making sure that we are in a right direction to achieve our objectives. Act step in Deming cycle is divided by two parts. In the first part, if there were found some problems according to checking step, changes must be applied to the system. Accordingly, those solutions and actions done well should be standardized. This will prevent from unwillingness changes within the defined systems.
4.3 PRINCIPLES OF TQM IN HIGHER & TECHNICAL EDUCATION

The investigation of the “soft” side of TQM resulted in the identification of nine (9) key principles most commonly found in quality management literature. The first of these principles is that TQM, in contrast to previous quality management initiatives, involves everyone in an institution. It is widely accepted that the increase of employees’ participation in the overall quality strategy brings an increased flow of information and knowledge, and contributes in the “distribution of intelligence” to the bottom of the institutions for resolving problems, Pounder (1999)\(^7\).

As Oakland (1989)\(^8\) note, the “total” element of TQM implies that every institutional member is involved in quality improvement processes. In addition, he points out that “TQM is essentially a way of organizing and involving the whole institution; every department, every activity, every single person at every level”. “Soft” TQM Concepts Identified in Quality Management Literature are:

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<th>TQM Concepts</th>
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<td>Total Employee Involvement</td>
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Continuous Training & Learning

Teamwork

Empowerment

Top-management Commitment and Support

Democratic Management Style

Customer Satisfaction

Culture Change

The second principle is associated with continuous improvement. According to TQM theory the best way to improve institutional output is to continually improve performance, Dale (1996); Goetsch & Davis, (1994); Ho & Fung (1994)\(^9\),\(^10\),\(^11\). Quality improvement is not a task that has an end, as it is not static. The emphasis is on seeking improvement opportunities, not just holding the status quo. The focus is on planning, prevention, and anticipation (Dale, 1996).

According to Oakland (1989)\(^12\), in order “to maintain a wave of interest in quality, it is necessary to develop generations of managers

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who…are dedicated to the pursuit of never-ending improvement in meeting external and internal customers needs”. In addition, Juran (1988)\textsuperscript{13} notes that quality improvement requires the establishment of a quality council, which is the driver, to ensure that improvement is continuous and never-ending. Quality improvement can be achieved if an institution develops a management philosophy of continuous improvement, and provides the necessary supporting institutional practices (Juran, 1988, Ibid). Quality experts like Deming, Juran, Scholtes, and Crosby state that institutions must approach quality improvement from a long-term perspective: They also warn us that achieving some quality improvement can breed complacency, Longenecker & Scazzero, (1996)\textsuperscript{14}.

A third principle of TQM is related to the concept of teamwork (Conti & Kleiner, 1997; Hill, 1991; Lawler, 1994; Waldman, 1994; Wilkinson, Marchington, Goodman, & Ackers, 1992). Within the context of TQM, teamwork is an important outcome and a condition for continuous improvement, Coyle-Shapiro, (1997)\textsuperscript{15} Teams are generally viewed as more powerful and effective work entities than individuals. Teams, according to Lawler should be catholic, including employees from all the


hierarchical levels, layers, and from all the departments of the enterprise. Scholtes (1992)\textsuperscript{16} argues that teams are needed for all institutions in order to make them work more flexibly and to develop mutual trust among members. In traditional management approaches each department needs to take care of its own problems. In a TQM context the whole institutions needs to care about quality improvement and not just in a departmentalized way. In this respect, institutions need cross-functional work groups that will deal with inter-departmental management problems. Empowering the employee is another important principle of TQM.

According to Besterfield et al. (1999)\textsuperscript{17}, Empowerment is an environment in which people have the ability, the confidence, and the commitment to take the responsibility and ownership to improve the process and initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve institutional values and goals. Wilkinson (1998)\textsuperscript{18} argues that TQM offers ways in which empowerment of employees can support an institutions’ efforts not only in quality improvement, but in empowerment as well. Its approach places the responsibility for an institution’ processes in the hands of those who

know these processes best, and helps them to participate directly in the institutions’ mission or purpose. In particular, the plan-do-study-act cycle lies at the heart of the improvement process and represents the key to employee empowerment in that process.

According to Cleary (1996) while employers seek the commitment and empowerment of their employees, increased control over the work process is a cornerstone of TQM. Under TQM, continuous improvement is undertaken by those involved in a process and this introduces elements of bottom-up issue identification and problem solving. As a result, TQM may empower employees by delegating functions that were previously the preserve of more senior institutional members and as a result institutionalize participation on a permanent basis, Hill, 1991; Vouzas, (2004). Teams within institutions help employees become involved in issues that were previously top-management’s responsibility (Morgan & Murgatroyd, 1997, Ibid). Gatchalian (1997, Ibid) argues that empowered employees know how to better incorporate their skills in day-to-day work tasks, and thus, they can exercise better judgment and a sense of responsibility.


The fifth basic concept of TQM is continuous training. Oakland (1989) believes that training is the single most significant component in trying to improve quality. He points out that “quality training must be continuous to meet not only changes in technology, but also changes involving the environment in which an institutions operates, its structure, and perhaps most important of all the people who work there”. According to Dale (1999), continuous training contributes to the establishment of “a common language throughout the business”. A study by Mathews et al. (2001) found that “top managers and shop-floor workers receive more training in the areas of “soft” quality tools, quality awareness and customer focus than in statistical approaches. Middle managers and quality specialists receive most quality-related training”. Furthermore, effective TQM implementation calls for a training policy, which will be part of the overall quality strategy and aims at improving the necessary skills for continuous quality improvement (Brown, 1994; Marchington, Dale, & Wilkinson, 1993; Patel, 1993; Walley & Kowalski, 1992, Ibid). According to Motwani, Frahm, & Kathawala (1994), the future of training on issues related to quality should emphasize better training evaluation processes. Institutions spend a lot of money on training and, thus, need to check whether training is meeting strategic goals. He also supports the view that training can be evaluated by specific indicators like customer satisfaction, market share, and employee performance.
The sixth element is customer satisfaction. In a total quality context customer satisfaction is the driving force for an institution to improve its performance, *Moore, Hopkins, & Hopkins, 1998 (1998)*\(^{22}\). Juran (1993) argues that there are two different kinds of customers: the external (clients, government regulatory bodies, and the public) that defines the quality of the service delivered and the internal (employees, different departments) that defines the quality of the processes associated with the delivering of services. Both external and internal customers have needs. A contemporary approach to quality such as TQM stresses the importance of satisfying those needs (Centre for the Evaluation of Public Policy and Practice, 1992). According to Rampersad (2001)\(^{23}\) “to realize customer satisfaction, everyone within the institutions should consider continuous improvement as something normal” and urge institutions to make an inventory of customers’ data, customers’ complaints, and benchmarking in order to improve the customer orientation. Lagrosen (2001), states that although customer focus is revered, methods for developing a deeper understanding of the customers’ situation are not sufficiently integrated into TQM.

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The above principles of TQM require top management commitment and support. Dale (1999) argues that top managers “have to take charge personally, lead the process, provide direction, exercise forceful leadership, including dealing with those employees who block improvement and maintain the impetus”. In addition, Torrington and Hall (1998) argue “senior managers need to define the quality objectives of the institutions to provide direction and clarity and to communicate these continually within the institutions”.

According to Ahire and O’Shaughnessy (1998), companies with high top management commitment have the ability to produce high quality products, in contrast with firms with low top management support. Beyond management’s commitment and support to TQM, an open and democratic/participative management style is identified. The importance of management style in TQM has been pointed out by Crosby (1979). Later authors argue in favor of a more democratic management style. For example, Morgan and Murgatroyd (1997) note that the fundamental difference between TQM and other management approaches “is that it is

more democratic”. Additionally, Goetsch and Davis (1994, Ibid) claim that the most appropriate style of management within a TQM context is the participative one, which “…involves soliciting input from empowered employees”.

Finally, a supportive institutional culture is the common denominator of all the “soft” aspects of TQM, Van Donk & Sanders, (1993)27. In other words, quality culture binds together all of aforementioned TQM concepts. As Hill (1991) points out it nurtures high-trust social relationships, and it develops a shared sense of membership as well as a belief that continuous improvement is for the good of everyone within the organization. Similarly, Corbett and Rastrick (2000, Ibid) argue that institutional culture affects and alters employees’ actions and perceptions of all aspects of their work in order to include quality. In addition, Sinclair and Collins (1994)28 support the view that culture acts as a force for cohesion in institutions and therefore can support or inhibit the process of change towards TQM application.

In conclusion we can argue that in exploring the concept of TQM we can identify two major components: the “what” and the “how” of

TQM (Goetsch & Davis, 1994, Ibid). As the component of “what” diverges in almost every single study and textbook, the “how” component distinguishes TQM from other quality management approaches and includes basic principles that are generally accepted. These principles and concepts comprise the “soft” side of the TQM approach. Nevertheless, as Wilkinson, Redman, & Snape (1993, Ibid) argue, the TQM gurus focused on the “hard” side of TQM by emphasizing the importance of statistics and operations in the quality assurance process within organizations. In this respect, TQM is a whole management theory that includes both “hard” and “soft” aspects.

### 4.4 Methodologies & Tools of TQM

**Quality Function Deployment:** In fact, the main goal for increasing quality of a product is fulfilling customer’s needs and expectations and attracting more customers. By focusing on customer’s needs and different competitors, quality function deployment was introduced by Shigeru Mizuno and Akao during the late 1960s. Quality Function Deployment (QFD) is a methodology that steadily identifies customer needs and expectations on service specifications and design parameter and transfers these needs to service characteristics and additional to the service process. Moreover, it is an efficient methodology for communication and participation. In this case, it needs group members to work together in order to achieve a fundamental basis for continuous and integrated service
improvement. To achieve and implement QFD, we have to follow four steps. First is doing a market analysis in order to understand customer requirements and expectations. Second is identifying and at the same time estimating the competitors’ ability to fulfill customers’ expectations.

Third is recognizing key success factors of institutions’ product on the market. Finally, the fourth step is transferring these key factors in to product and process characteristics in relationship with design, improvement, and manufacture. The objective of QFD is to interpret the expectations of customers into product and process specifications by continuously permitting the wants being replicated at every level of product improvement process.

In fact, the four phases of QFD are product planning, product design, process design, and production design. In product planning phase, the needs of customers are transmitted to product’s characteristics. Product design points out the optimal way of design, which exceeds the objective ideals. In the phase of process design, the attributes of production functions and procedures for process control and development are recognized. Production design refers to designation of production instructions.

Another important concept in Quality Function Deployment is that in order to get successful in business objectives, satisfaction of both internal and external customers is necessary. For instance, in an institutions or company for product development, fulfilling the wishes of internal
engineers, manufacturing workers, suppliers, business stakeholders, and end customers is vital. Nevertheless, QFD in higher education institutions aims at satisfying all stakeholders’ needs. Since external stakeholders of a higher education institution are first students, presenting high quality of training attracts more students and at last result into prosperity for that institution. However, this methodology in higher education emphasizes on satisfaction of internal customers such as professors, workers in different departments of for instance a university, and client customer which is society, Bo Bergman, Bengt Klefsjo (2003, Ibid).

**Policy Deployment**

Another concept which is applied in institutions and introduced in Japan is Policy Deployment. As a matter of fact, policy deployment includes systematic planning, utilizing, and observing management systems for improving institutions presentation. Policy Deployment works on strategic objectives and daily control of the business to manage continuous improvement and reach business results. Akao (1991, Ibid), has established a general policy deployment movement. Besides, policy deployment combines planning and implementation in a company in an efficient way. Many institutions use management by control strategy. Management by control considers problem solving rather than planning. Problem solving is necessary for short-term endurance, but it is not enough for long term development. Long-term improvement needs systematic management
processes for scheduling, organizing, and performance monitoring indeed. Management by control focuses on problem solving, opinions and sense, while policy deployment focuses on planning, deploying facts and data, and complete communication. Moreover, policy deployment emphasizes on teams and learning, whereas management by control considers individual work and training. Therefore, Policy Deployment is more efficient than management by control in most of the institutions. To sum up, institutional learning, which is vital for competitive advantage, is prospered by using both Quality Function Deployment and Policy Deployment. Quality Function Deployment gains information on external customer needs and the processes and capability of the institutions by customer research, investigation, and planning. Policy Deployment provides the systematic feedback processes essential to continue learning until it becomes time to duplicate the Quality Function Process, depending on the forceful of the industry. Sometimes, policy Deployment maybe introduced without a strategic planning. Quality Function Deployment or other strategic planning must have a controlled process for employment and management commitment in order to be useful, Bergman and Klefsjo(2003).

In higher education institutions, like other institutions implementation of Policy Deployment and QFD complete and speed up reaching the goals. Hence, implementation of both Quality Function
Deployment and Policy Deployment in higher education institutions is complementary.

**Process Management**

Originally, process comes from “processes and procedure” which means advancement and move ahead. Process is a network of activities with a recognized beginning and end, using the resources of an institution, with a purpose of creating value for internal and external customers repeatedly. Each process has got characteristics. Moreover, it has got supplier and customer. An institution is formed by different kinds of processes: individual process done by individuals, vertical processes related to a department or unit, and core processes that cut through the company across several functions or departments. In all institutions, we have main processes, which have the duty of fulfilling external customer, support processes, whose task is providing resources for main processes, and management processes whose task is to make decisions on the goals and strategies and implement development in other institutional process. There are several steps for process management methodology. The first step is organizing for improvement. This step considers the process owner and a team who work for process improvement. Second step understands the process which shows the customers, suppliers, work flow, and interfaces of a process. In this stage, mapping the process is efficient, because in this case different activities are identified. The third step is observing the
process that emphasizes on control and measurements of the process. Fourth step is continuous improvement of the process by applying feedback from measurements.

As a matter of fact, for efficient improvement, three aspects of processes must be continuously developed. These three aspects are quality, efficiency, and adaptability. Quality of process clearly refers to the process qualifications in fulfilling customers. Process efficiency points out to the efficient utilization of resources in institutions, and adaptability considers adaptation of process with changes.

Important roles in process management are process owner, process manager, and competence supplier. Process owner is responsible for process resources. Process manager is responsible for operation of the process in the case of quick decision making in critical time. In fact, process manager assists process owner. Competence suppliers provide the processes with competence, Bergman and Klefsjo (2003, Ibid).

**Benchmarking**

Generally, benchmarking is introduced an effective methodologies for continuous improvement of quality. Benchmarking was understood to be the act of imitating, but it refers to innovation and learning from the others more than imitation, Goetsch, D., & Davis, S. (1994)\(^2\).

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Benchmarking is a process for self-evaluation and self-improvement through the organized and mutual comparison of practice and performance with competitors in order to identify own strength and weaknesses, and learn how to improve and adapt with changes, **Crosby, B. P. (1979)**

A lot of businesses and institutions apply benchmarking; hereby they have been using this as an important method for improvement. For instance, benchmarking was applied in higher education in North America and England in the early 1990s. The method was applied to the management of services like library, facilitates, estates, energy and treasury, but the useful technique applied by the other education institution rapidly. In higher education institutions, benchmarking is used to compare the performance of universities with their international competitors and learn from them, Dattakumar and Jagadeesh (ibid).

**Deming Cycle**

Dr. Deming that is one of the famous gurus in the context of quality drew the diagram shown on the blackboard during his first meeting with the Japanese union of scientists and engineers. Deming Cycle, although, this diagram is known as the Deming Cycle, he called it Shewhart Cycle. This diagram graphically describes the action steps that we use every day to manage our lives and our businesses, and is considered as

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a methodology in the frame of TQM references. Nowadays this cycle is almost an active part of the quality work in every institutions and institution.

The Tools of TQM

These seven management and planning tools are:

- Affinity diagram/KJ method (Jiro Kawakita method)
- Interrelationship digraph
- Tree diagram
- Prioritization matrices
- Matrix diagram
- Process decision program chart (PDPC)
- Activity network diagram

Some of these tools will be described in more detail;

Affinity Diagram: This tool collects bulky amounts of language data such as opinions, issues, and ideas and classifies them into groupings based on natural relationship between each item. It is a creative rather than a logical process, The main base for affinity diagram is brainstorming. It is used when we want to ignore old solution for problem solving and we want to know how the others think about the problem, Ho, S., & Fung, C. (1994)\textsuperscript{31}.

**Interrelationship Digraph**: This tool puts a central idea or problem and works out the reasonable or chronological links between related items. It is also a creative process and based on brainstorming. Multidirectional thinking is used in this tool. It is used when the problem is too complex and it is thought to be the root cause for many other problems. Besides, it is used when there is enough time to complete the repeated work pieces including making interrelationship digraph, adjusting, and evaluating it again, Brassard (1996).

**Tree Diagram**: This tool, maps out in increasing detail the full range of paths and tasks, which needed to be accomplished in order to achieve a primary goal and every related sub goal. It is used when the implementation is complex or there are serious consequences for missing main tasks.

**Prioritization Matrices**: This tool prioritize tasks, product, or service characteristics by using a known weighted criteria and a combination of tree and matrix diagram. The main usage of this tool is when decision making is important for the survival of institutions. It is used when the options have got strong interrelationships, Micheal Brassard (1996).

Besides, it is applied when limited resources such as money, manpower, and time are available for implementation. In the case of using tools, the first steps is designing a criteria matrix, and compare
relative importance of each criterion with other criterion and score based on the comparisons. After that, the criteria in the company will be compared with each other using the designed criteria matrix.

**Seven Quality Control Tools**

In fact, for improvement in every aspects of work in an institution, we need data and after data collection, data analysis. Besides, participation of everyone is necessary in improvement work. Therefore, Dr. Kaoru Ishikawa introduces the seven quality control tools for quality improvement. These tools are data collection, pareto charts, stratification, control charts, histograms, cause and effect diagrams.

**Pareto charts;** The Pareto charts are used when we want to decide in which order problems must be solved. In fact, pareto chart makes serious problems visible. When the most serious problem is solved, we can go to the next problem, Bergman and Klefsjo (2003).

**Cause and effect diagrams;** Cause and effect diagram, which is also, called Fishbone diagram and Ishikawa diagram focuses on finding the root causes of quality problem. Cause and effect diagram was introduced by Dr Kaoru Ishikawa in 1943 in Japan. The construction of Fishbone diagram is like a fault three. In the case of using cause and effect diagram, first we consider and explain main causes of the problem. Then, we break each cause and describe it in to more details.
An efficient cause and effect diagram must have many bones. As a matter of fact, quality problem is usually caused because of lack of correct management, not experienced operator, usage of inappropriate tools. Moreover, machine and material problems, not accurate measurement devices, and environmental effects on the final products are main reasons for quality problems, Bergman and Klefsjo (2003).

Important Notes in Application of Quality Control tools and Methodologies; According to Bunney and Dale (1997) for using and applying Quality Management Tools (quality control tools) and methodologies, the some notes must be taken into consideration by every institutions to achieve good results, these some of notes are :—

Identifying stages of improvement, introducing appropriate QMTs for suitable function, considering available resource are important factors in AQMT.

Recognition of the combination of appropriate tools for specific application, along with adequate training is essential for implementation of QMTs.

To overcome difficulties regarding to the status improvement process, QMTs should be used to solve well-defined problems.

Understanding of tools within well-suited group of people relating to their positions will cause QMT to become a part of daily activities within the institutions.
Providing adequate training to the right people at the right time, along with well-defined QMTs is vital for successful improvement process.

**ISO 9000;** In fact, ISO 9000:2000 is described as a quality management system to direct and control an institution with regard to quality. A quality system is a tool for controlling and improving the quality of the company’s products and processes. The system must be documented, because documentation of the system is a foundation for quality audit. The international institutions for standardization, which is responsible for ISO 9000, has different names in different countries. For instance, the term ANSI is used in USA, JISZ9000 in Japan, and BSEN ISO 9000 in Great Britain. ISO9001, ISO9002, and ISO9003 contained needs for quality systems in different contract situations.

These three groups of standards can be classified as requirements standards. ISO 9001 was the most comprehensive part; including ISO9000 family makes a distinction between the requirements for quality management systems and requirements for products. The ISO 9000:2000 standards: the quality management system in ISO 9000 series is based on “eight quality management principles”. These eight principles are:—

**Customer focus:** in fact, main purpose of a company is satisfying customers with different needs. In this case, the institutions can prosper and reach to its business goals.
Leadership: leaders have vital role in conducting the institutions through objectives.

Process approach: Involvement of people: all the people in an institutions must be involved in quality work. In this case, their ability and talents will be used effectively for gaining success and benefit in the institutions.

System approach to management: in a system identifying, managing interrelated processes can help the institutions to reach its goals in an effective way.

Continual improvement: institutional continual improvement is an important principle in surviving the institutions among competitors.

Factual approach: to decision-making: important decisions in the institutions are made in the case of analyzing and interpreting related and useful data and information.

Mutually beneficial supplier relationships: an institutions and its suppliers are dependent and a relationship, which improves the benefit for both supplier and company, will lead to success in achieving company goals.

An institutions should establish, document, maintain and continuously develop a quality management system according to the requirements in the standard.
Process identification; the sequence of these processes, process control, checking the availability of resources and information, and analyzing, measuring, and monitoring of the processes are special requirements for implementing a system according to standards. Also the standard is built on the four main areas. These areas are management responsibility, resource management, product realization and measurement, analysis and improvement.