Build a Two-Tier TQM Model Beyond ISO 9000

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Abstract

This paper provides a preliminary model of an approach to develop a total quality management (TQM) system that utilizes ISO 9000:2000 quality management systems as a base, in which we reduce ISO9000:2000 unproductive requirements and expand ISO 9000:2000 with vital competitive initiatives. We discuss a TQM model implemented with the purpose of increasing customer satisfaction, lower quality cost, broader domains of activities and higher employee commitments. Finally, we suggest some general measurement indexes that used as pivotal factors for improving the quality, thus providing competitiveness.

Index terms: ISO 9000, two-tier TQM model, quality management principles, ambidextrous approach, exploration innovation, exploitation innovation

Background

In today's increasingly global market place, ISO 9000 (eye-so nine thousand) quality management systems have widely been accepted worldwide in over 80 nations and over 90,000 organizations. Over 75% of ISO 9000 certificates have been certified for European companies. Despite the widespread growth of ISO 9000 and other quality programs, European companies still lag behind American's and Japanese’s on the quality front. However, now that the ISO 9000 system is increasingly becoming widely accepted internationally around the world, there is a tone sound in the heart of place where ISO 9000 was born to question the effectiveness of ISO 9000 as a tool to drive quality [1]. And that has sparked a storm of controversies in the European Union over how best to utilize quality methods to breed international competitiveness.

Due to low successful rate of application of the TQM system and with the current interest in ISO 9000 standards, some organizations have sought to replace or modify their improvement programs to meet the ISO standards. This has brought an apparent reduction in interest in TQM initiatives. Does this allow organizations already ISO 9000-certified to consider that ISO 9000 registration is a final stage in their quality journey? Will the application of the ISO 9000 provide quality and increase the competitiveness? Do ISO 9000
quality management model will discourage innovation. Studies show us that successful certification to ISO 9000 may not mean the organization will provide good quality products or services that satisfy customers' needs, nor it means the organization showed improvement in productivity, competitiveness and responsiveness. Other studies recommend [2] that companies need to balance two types of activities: improving current operations to be competitive in short term, and exploring for new knowledge for the future. Too much process management across all levels of organization make it easier to implement but can be obstacle to the breakthrough innovation. And, it is difficult to focus on systematic, continuous improvement in quality, cost, delivery if the entire organization is focused on exploitation innovation for the future. Organizations using ISO 9000 must concentrate on the implementation and operation of a quality management system that help them to tie to business [3].

**ISO 9000’s Limitation and Opportunities**

Holding a registration certificate means that a company now views quality as a system and has that system under control, but it does not imply that the company's quality focus is a part of its strategies, that it has a strong concern for its customers' satisfaction, nor that it is attempt to improve the working environment for its employees so that they will be more effective in facilitating the company's success. According to the critics, ISO 9000 standards are static and inflexible. Juran [8] has issued warnings to companies that are focused to ISO 9000 that if the companies devote too much attention and place too much value on the actual certification, focus is shifted away from continuous process improvement, which is essential for TQM. According to Juran, a few important aspects are overlooked in the ISO 9000 standards: The criteria do not lead to spectacular improvements; they give no information about the corporation of the company's lower levels, and they fail to look at the leadership's characteristics. ISO 9000 does not address the strategic management frameworks on which quality management must be based. The standard is only a tool. ISO 9000 can help a company develop and maintain efficient production practices. ISO 9000 creates an orderly organization. Once it is in place, TQM will be easier to implement. ISO 9000 is considered as the minimum requirement for a TQM system [4]. But, how does a company move its quality system from ISO 9000 compliance to a state where quality methods are central to how it reaches its business objectives? Specifically, how does a company go from being newly ISO 9000-registered to having a quality system based on the principles of TQM? What are the effective ways that a company should do in maintaining the ISO 9000-compliant system in an order that the system can be based for a best performance in doing business? All of these questions require answers that ISO 9000 quality management systems should enhance and incorporate some kinds of TQM transformation factors [5].
ISO 9000- A Base for Continuous Improvement

The survey from Belgium [6] also shows that the motive for the ISO 9000 implementation is to improve the internal organization. The most important internal change is moving to a well-defined system of organization's internal processes and procedures. ISO 9000 just provides us with a basic set of standards. ISO 9000 does not make any statement as to the quality of the products or services produced. ISO 9000 does not bring significant improvements in organization communication, employee commitment, or quality costs. The standard did not address or addressed simply the competitiveness factors a company should focus on. These factors include: leadership and business strategy, customer service, information sharing, cycle time and responsiveness, public responsibility, human resource development, innovation, etc. It is important to point out that the ISO 9000 does not limit the scope of your quality system only to specific requirements that are addressed in the ISO 9000 standards, the organization and/or company has an opportunity and options to have a broader scope of the quality system [7]. Companies using ISO 9000 quality system must understand that a true TQM system must go beyond the requirements of ISO 9000.

ISO 9000-based TQM with Competitiveness

Although many companies and/or organization, due to business point of view, see ISO 9000 certification as a final objective, and not as a means to increase competitiveness, there is still great interest in the practice of TQM among the development and service sectors but little implementing strategy well known to the public to be used to support such activities. A TQM model with its strategy actions is developing and conducting in the Electronics and Opto-electronics Laboratories of the Industrial Technology and Research Institute (EOL/ITRI). The main purpose of this TQM program is to solve its major problems:

- Numerous customers complaint about the project quality and on-time deliveries;
- Ratio of customers who are willing to cooperate in project development is decreasing;
- High attrition rate of employees.
- Needs to deal with innovation

It was proven that these problems are continuously improved by introducing a TQM system in which we deal with not only external customers but also with employees who are considered as internal customers.

Draw out a two-tier TQM model

All what we should do are building a TQM system in which ISO 9000:2000 play as a nucleus, and avoid the static and inflexible operation of the ISO 9000, take the concepts embodied in Deming's 14 points of total quality management philosophy, carry out continuous improvement, insist heavily on customer satisfaction, emphasize defect prevention and the
reduction of variation, put the cycle – plan, do, check, and act (PDCA) into action and translate them into day-to-day quality management and use existing ISO 9000 quality management systems as a catalyst for the review of the quality policy and for changes where needed. The construction of this model of TQM should be based on the TQM philosophy that have been pointed out and should be implemented through company-wide quality improvement program which encompasses two tiers of different aspects:

- Organizational level
- Individual level

The expectation outputs of this TQM model is increasing customer satisfaction, internal transformation of organization culture to customer driven culture, higher employee satisfaction, more competitive, more efficient and better performance.

**Implementation of the quality improvement program**

TQM today emphasizes the roles that both managerial level and employee level people play altogether in ensuring customer satisfaction, quality improvement, and quality cost reduction. The behaviors of these people during the quality improvement program are major factors for the success of the TQM model. It was assumed that the quality improvement is a process of continuous changes by individuals and organization. Behavioral change toward quality improvement requires a change in attitudes, values, and commitments of all various levels of people. At the organizational level, this is reflected by organizational culture. Therefore, continuous improvement in organizational outcomes must be supported by a change from the organization's existing culture to a quality improvement culture. And in individual level outcomes, quality must be seen though personal changes.

**Procedures for Implementation of the quality improvement program**

Below are descriptions of the procedures for the implementation of the strategy of this TQM model that have been carrying over four years in the OES/ITRI.

**At the organizational level:**

- Continuously implement, simplify and/or enhance the ISO 9000 system
- Periodically carry out quality internal audit and management review
- Continuously implement mechanism for improving and solving all company-wide corrective and preventive action items.
- Continuously focus on the simplification and effectiveness of all quality system documentation procedures.
- Extensively use computer management system to promote all aspects of quality
knowledge and sound to all levels of people in the whole organization about commitments and strategy of the top management.

- Continuously focus on efforts to provide essential guidelines for quality awareness to people who are critical to quality in the organization.
- Continuously provide enough and effective training programs
- Develop mechanism to maintain efforts in below domains of actions:
  1. Quality planning
  2. Resource allocation for people who are critical to quality program
  3. Management attention for people motivation from top management
  4. Maintenance of peer pressure for quality activities, awareness and sense
  5. Maintenance of ISO 9000 quality system
  6. Deployment of top management (CEO) vision, quality goal and objectives and commitments
  7. Use of computer tools for quality

- Develop the performance measurement index values
- Consolidate ISO 9000 basic organizational implementing structures
- Define management areas of quality concerns

At the individual level:

Employees were trained to pursue quality through personal changes and to acquire skills and create a change of attitude in quality awareness, customer driven thinking, statistical techniques and all aspects of company’s people management. As to senior managers, they should learn and put in to practice eight principles of quality management, which were introduced by and derived from collective experience and knowledge of the international experts who participate in ISO Technical Committee ISO/TC 176. Eight quality management principles are described below [11]:

1. Principle 1 – Customer focus
2. Principle 2 – Leadership
3. Principle 3 – Involvement of people
4. Principle 4 – Process Approach
5. Principle 5 – System approach to management
6. Principle 6 – Continual Improvement
7. Principle 7 – Factual approach to decision making
8. Principle 8 – Mutual benefit supplier relationships

These principles can be used by senior management as a framework to guide their organizations towards improved performance.

In detailed level of implementation of the quality improvement program toward both customer satisfaction and competitiveness, below considerations must be included:
Enhance the procedures of ISO 9000 clauses

No any statements in the standard stop a company in going farther in the construction procedures that go beyond the requirements of each clause. Corrective and preventive actions are good examples for expansion and enhancement. In this context, customer satisfaction measurement is one of the pivotal indexes that provide a company measurement on how effective its quality system is. But what stands behind the index? What is the process to proceed the survey? What are the human resources in supporting this activity? What a company has to do after experiencing the results of survey? People can prepare a long list to be done after the survey. The elements of the list may encompass from human resources involved, processing procedure, performance setting, corrective actions, training and educating, etc. ISO 9001’s 8.5 clause just required procedures for investigating causes of nonconformity, take action to solve and prevent reoccurrence [9]. From this requirement, a company can do some actions or can do lot of works in response to the results of the survey. What they should do totally depend on the intention and realization of the management staff.

A similar approach should be taken to examine all other clauses and procedures as the business environment is changing. Finally, a list of action plans for updating, deleting, revising and creating related processes or procedures are prepared. Since processes or procedures can be conceived at various levels of details, consideration as to what constitutes key process is important. A few examples of criteria used by management staff for expansion, simplification and/or enhancement of processes or procedures are:

- Processes or procedures that are related to company's business focus and competitive edges
- Processes or procedures that are the most concerns of the company, ex. Innovation, etc.
- Processes or procedures that are classified as requirements of ISO 9000 document system
- Processes or procedures that produce important records
- Processes or procedures that direct linkage to external customers and suppliers
- Processes or procedures that collectively include the work of most of the people.

Set Performance measurement index values

The installation ISO 9000 is an implementation of a series of processes. The performance metrics must design into the process so that the process performance can be measured. The process has to have predetermined results. ISO 9000 requirements to keep and review records is a foundation on which to build an increased scope of what is collected, analyzed and reviewed. A good quality process can be measured by comparing the outputs against predetermined quality objectives. If these objectives are achieved, the process is considered to be good and meets the requirements. According to Juran [8], these indexes can
be expressed by a simple generic formula:

\[
Quality = \frac{Frequency}{Opportunity}
\]

Where: \(Frequency\) takes forms as number of defects, number of errors, hours of rework, dollar cost of poor quality, numbers of field failures, etc. and \(Opportunity\) takes forms as number of units produced, total hours worked, dollar of sale, number of units in service, etc.

The resulting unit of measurement of the forms such as percent defective, percent errors, percent reworks or cost of poor quality per dollar of sales, and ratio of field failure to units in service, etc. should be based for objective management.

**Standardize operation of quality system**

The total interaction of procedures with one another composes of a live quality management system. By rebuilding the interaction of each ISO 9000 clause, each procedure and by ingredient them with competitiveness elements and with PDCA improvement actions, the ISO 9000-based system will eventually become a living, rudimentary and dynamic TQM system. The operation of this system should be standardized by following steps:

1. **Define management areas of quality concerns**

   There are two types of points of concerns that are related to the effectiveness and comprehensiveness of this TQM model: Performance elements and Management elements:
   - **Performance elements**
     This varies from company to company and is relating to the setting of performance measurement index values used to measure the effectiveness of the TQM model. Performance elements are related to customer service, continuous improvement, information sharing, cycle time and responsiveness and quality planning, etc.
   - **Management elements**
     This will be in various forms depending on the management style, goals, organization, industries of each organization and related to strategy on quality planning and the philosophy of executive management staff. Some elements can be listed here such as leadership and business strategy, public responsibility, human resource development, information system, quality assurance system, organization communication, employee commitment, organization training system, knowledge management and/or quality costs, etc. These elements can be developed by following the criteria of some country’s national quality awards such as Malcom Baldridge award of the USA, Australia, Japan and/or Taiwan national quality award, etc.
   - **Organizational elements**
     Now-a-day, Innovation is becoming a focused consideration in the operation of an organization. Some people start to suspect that many organizations widespread process management initiatives such as ISO 9000, Sig Sigma over past few years have reached the limits of improvement [2]. To balance the overweight of the process based initiatives toward
innovation initiatives, some organization start working to become “Ambidextrous” approach. [10], where managers in a business unit can specialize in either more process oriented functions with benefits of Six Sigma, etc or more innovation oriented without the constraint of Six Sigma. In some organization, they start to proceed managing process management and innovation simultaneously.

2. Put PDCA cycle into practice
   Companies that expand its basic ISO 9000 to meet broader TQM requirements should have following steps in its daily management works:
   • Model the business
   • Relate and keep good requirements in ISO 9001
   • Identify critical performance measurement indexes
   • Establish priorities and quantitative goals for process improvement
   • Track continuous improvement in all levels of organization
   • Analyze periodically root-cause of system non-conformities
   • Company-wide support for standardizing of work procedures, starting at the top management
   • Make organization becoming “Ambidextrous” approach, in which not only all activities, team and processes related to exploration innovation are implemented, but also activities, team and processes related to exploitation innovation are sharpening.
   • Create a culture of respect for employees and their ability to improve business processes.
   • Implement rigorous framework for product realization, in which each organization can define the framework according to their own way and/or adapt to some well-known model such as CMMI etc.

3. Document all “best practices”
   All “Best Practices” are concerned and should be prepared, reviewed and approved by management staff. These “best practices” play essential role in sharing experience and knowledge management.

4. Provide training programs
   Adequate training programs have to be conducted periodically to various levels of people in the organization. The below ideas are suggested:
   • Quality assurance programs
   • Reliability techniques
   • Quality awareness
   • ISO 9000 series
   • Human resource programs
   • Customer-driven quality promotion.
   • Quality management principles
Creativity techniques and tools such as Six Sigma, FMEA, DFSS, TRIZ, etc.

5. **Consolidate ISO 9000 basic organizational structures**

   - Executive managers' forum

   As the quality system was being patterned after the ISO 9000 model, there was a forum existed, in which executive management sat down together to define the quality policy, approved initiatives, and reviewed the progress of the expansion efforts of ISO 9000, etc. Whatever its format may be, this forum was the place where the executive staff address the quality issues. This forum has to be conducted effectively, periodically and should be considered essential to the ISO 9000-compliant system. And it has to be merging into one of managerial meetings of the company.

   - Information deployment structure

   During the ISO 9000 registration effort, there was a communication structure whereby employees were informed of the quality management system. Whatever the communication structure may be, people should be easily to receiving information about quality efforts by some means. This kind of information communication structure has to be effectively used to deliver the information.

   - Promotion personnel

   There was a group of people responsible for the ISO 9000 registration project. Usually, this is a cross-functional team whose members had the responsibilities within their own department for promoting and guiding employees in implementing the system. This team organization has to be maintained and operational. The more active the team organization is, the more effective the system will be.

### Efforts for maintaining of ISO 9000 quality system

Once the organization or company has been registered, the maintenance of the quality system is of equal importance. Efforts should be focused in two directions with minimum efforts and cost: strategy and mechanism:

**In the Strategy domains:**

The total quality management system must not be viewed as a snapshot of company's operation. Rather, it should be maintained as a living system. Top management staff of the company has to pay attention to and try to maintain the balance of some vital factors. By grouping these factors into domains of Planning, Resource Allocation, Management attention and Training and Education and examining the weighting of development of each domain that are relative to others. The progress is made only when these domains occlude and are balanced.

- Planning

   The implementation of ISO 9000-based quality system should be considered as a special
project of the organization. That means the management of this project should go through systematic and well-prepared planning. An implementation and maintenance plan is developed to include every activity that is required for successful implementation. Each task must be identified, assigned and provided with proper resources, scheduled and undergone through phase-by-phase sequences. Tracking methodology and communication regulations for people inside and outside the team should be defined and operated.

The project plan should be reviewed periodically.

- Resource allocation

A lacking or insufficiency of resources domain is expected to reduce the level of motivation in the company. A lacking of manpower resource in supporting the operation of the ISO 9000-based system would undermine the conformity to the requirements of the standards. Or a lacking of money and staff will give rise to the reluctance of investing in training.

- Management attention

Management commitment and participation in the improvement and maintenance of the quality system play important role and are considered as vital driving force in the company or individual departments. A lack of management attention and motivation will affect the enthusiasm of the company in the improvement and maintenance of the quality system.

- Training and Education

Training and education are regarded as essential factors in the maintenance and improvement of the ISO 9000. Companies have to enforce and reinforce the quality system that is existing by all ways possible such as seminars, workshops, discussion, audiovisual training materials, working instructions, guidelines, etc. Failure to do these would lower the level of quality awareness and may lead to confused, frustrated and careless people who are easy to work toward nonconformity to the requirements of the organization and the customers.

In the Mechanism domain:

The periodical maintaining actions are done, in minimum, by three fundamental building blocks of the ISO 9000 standards. These are 1) Management review; 2) Internal audit; and 3) Corrective and preventive actions [9]. Through the execution of these building blocks, the system is in the basic maintenance mode. Once registration is granted, the thrust should be the improvement of the quality management system and ensure it is effective, not only to satisfy the requirements of the ISO 9000 standards, but also to tie competitiveness to company business.

Summary

By proper use of ISO 9000:2000, and modifying it to a larger scope to build a TQM environment, we expect to gain competitiveness in our organization. We demonstrated the
way to continuous improvement by “doing things better tomorrow than we do today”. That means changes, and changes required commitments by all levels of people in the organization. Quality in business (production or service) is not one thing or another; it is everything to a company or an organization. As Dr. Deming said “Life is not compulsory,” quality means everything in a business life, we can not be alive without quality concerns and awareness. Customer will only come back if we meet their expectations, not just their specifications.

By building this two-tier model, we think there are a few factors that need to be considered in order to stay alive in the business world:

- Run ISO 9000 in an effective way by simplifying it.
- Regard ISO 9000 as a building block to implementing a TQM which is suitable to the organization itself.
- View ISO 9000 as safeguard to complacency in quality activities.
- In views of competitiveness, customer satisfaction, continuous improvement and quality cost reduction, ISO 9000 must not be implemented alone, it should be supported by all quality improvement programs that are operated through organizational level and individual level.
- View training and education of employees as an essential part of TQM, in which education of people to the concepts and belief of a customer driven environment is a necessity.
- Focus on and start corrective and preventive processes quickly in all levels of people in organizations.
- Organization should apply process management principles where most appropriate, and consider to loosen their constraints in innovation environments.

References

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