

Strategic total quality management—transformation process overview

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Abstract *This paper presents new dimensions for management of quality which is based on a philosophy known as strategic total quality management (STQM). STQM is based on the premise that quality should be determined on the basis of the overall performance of the firm and not solely of the product. STQM therefore takes into account criteria such as product quality, environmental safety, integrity and social responsibility. The new dimensions of quality are introduced as well as a transformation process to achieve STQM.*

Introduction

In today's global economy, total quality management (TQM) is the key to being competitive. Customers are increasingly instrumental in product design, they specify their product design needs and also demand that these needs be satisfied free of defects at affordable prices. It is no longer prudent to associate high quality with high costs. Quality gurus like Deming and Crosby have demonstrated that, in the long term, product cost decreases as a result of quality improvements. In particular, the popular Deming chain reaction shows that improved quality will lead to a decline in costs as a result of less rework, fewer mistakes, delays and snags, and more efficient use of time and materials. Subsequently, productivity is improved and markets are captured with better quality and lower priced products. Most importantly, the company survives and remains in business. This implies that the company is able to provide jobs—an important social responsibility any company can offer to its community. Figure 1 presents a modified version of the plan-do-check-act (PDCA) cycle.

STQM transformation process overview

Achieving total quality is not simple. A firm must undergo a transformation process in order to change from its traditional management approach to TQM. This transformation process must be initiated by top management and must be strategic in scope. We refer to this initiation of quality improvement changes as strategic total quality management (STQM). STQM is a quality philosophy that views product quality from the overall performance of the firm. For example, how responsive is the firm to its immediate and extended environment?

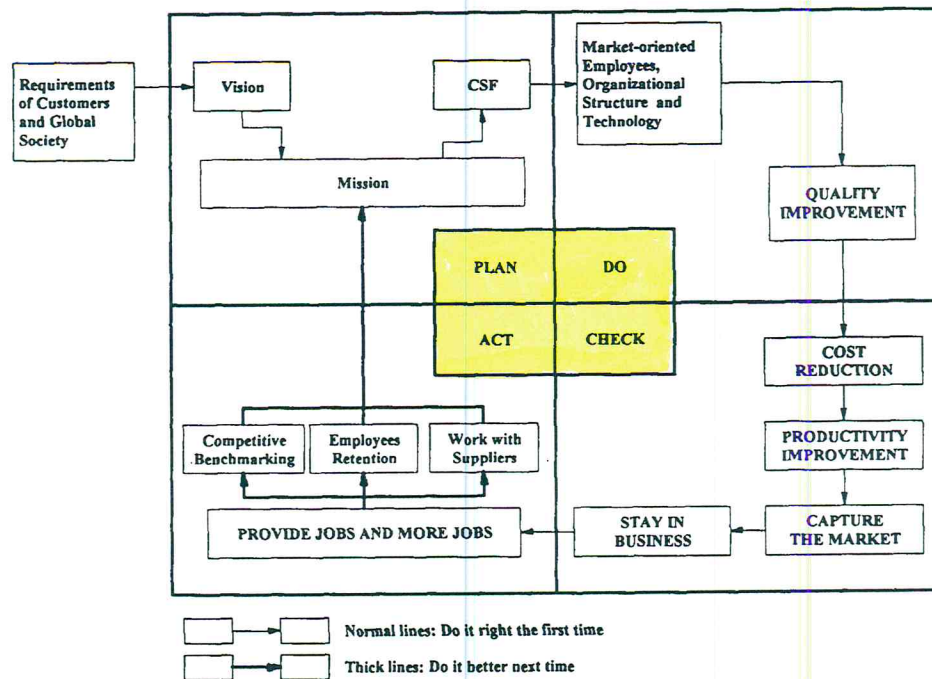


Figure 1. Strategic views of Deming's chain reaction and plan-do-check-act cycle.

Is delivery of the products by the firm environmentally safe? How do the customers perceive the firm's operation? This new view is necessary for the following reasons.

- An increasing number of people are becoming more aware of their environment (i.e. 'greening' of the environment), the role of corporations in policy issues and the viability of their communities with regard to the firm's ability to provide jobs and well-designed work environments.
- During the past 10 years, TQM in the workplace has led to dramatic changes in manufacturing practices. Many firms have also greatly improved their quality and a large number of firms are now adopting philosophies such as six sigma, zero defect and 'just in time'. If these applications are successful, then product quality may soon cease to provide a competitive edge to any firm. New strategies must then be adopted to be competitive. These new strategies must include marketing and technology innovations, and none of these can be achieved without focusing on issues that customers care about, i.e. the 'greening' of the environment, social responsibility and integrity; these issues must be brought to bear on the reputation of the product and the firm. The approach to quality is, therefore, holistic.

The transformation process starts by focusing on the customers and their environment. There are questions that must be addressed at this initial stage, including the following:

- How do customers react to their environment?
- How does the environment influence the customers' perception of quality?
- What effect does 'integrity' have on a company's product and the customers' perception of the company?

Manufacturing excellence is often claimed as a means of achieving competitiveness. This is true if everyone understands that manufacturing excellence is not limited to the product

itself. Recent studies by Madu and Kuei (1993a, b) and by Vandermerwe and Olive (1990) show, for example, that an increasing number of customers are focusing on environmentally safe products. Even with the present higher costs of 'green' products, customers are willing to pay extra to protect the earth. Japanese manufacturers have already noticed this new market niche and are investing tremendously in research and development (R&D) of 'green' technologies. For example, Madu and Kuei (1993b) presented a listing of some of Japan's 'green' technology industries. Virtually all industries in Japan are taking measures to develop environmentally safe technologies.

Manufacturing excellence, therefore, cannot be achieved without looking at the overall performance of the firm and its products. This is what distinguishes STQM from TQM, as outlined in Madu and Kuei (1993a). It is clear that this new philosophy of quality emphasizes integrity, environmental protection and social responsibility as key elements of quality management. The discussion of each individual criterion shows their importance.

Integrity

Integrity deals with the issue of trust. A company must instill trust in its customers in order to survive. If the company lacks trust from its customers, it cannot expect to serve them efficiently. Furthermore, if TQM is to be a truly customer-focused approach to quality, then companies must be conscious of how they are perceived by their customers. Many recent events have shown how integrity can significantly influence the customers' perception of a particular industry.

For example, the Savings and Loan scandal has led to the collapse of many savings and loan banks and has also caused many customers to close down their accounts at the banks involved. The lack of confidence in this industry has spiraled into a huge social cost to the society which has had a detrimental impact on the economy. Taxpayers have lost heavily; many have lost their jobs and means of livelihood in addition to suffering financial loss.

The insider trading scandal on Wall Street a few years back led to the collapse of many brokerage houses, to skepticism about the stock market, and, of course, to fewer job opportunities for stock brokers. The check over-drafting problem of some members of the US Congress affected voters' confidence to the point that many of those involved in the scandal lost their seats in the House and Senate in the 1992 election. Thus, the integrity of a firm or corporation is also brought into question when wrong decisions are made. This is clarified further by a review of some environmental problems.

Environmental protection

Among the most recent environmental disasters are the Exxon Valdez oil spill on the Alaska Coast and the Union Carbide disaster in Bhopal, India. These accidents might have been prevented if appropriate action had been taken to design quality at the process design stage; their occurrence, however, led to a loss of customers' confidence in the affected corporations. In addition, they had to pay compensation to the victims, clean up the pollution they caused, and, often times, were subject to heavy fines by environmental protection agencies. All these factors have increased their manufacturing costs, product liability costs, and ultimately have led to the loss of the customers' goodwill. Chemical companies and industries that produce pollutants often argue about the cost of safely disposing of toxic waste. At the same time, however, they claim to be striving for TQM.

As shown by Madu and Kuei (1993b), environmental technology is a multi-billion dollar industry that many countries, notably Japan, are embarking on. Pollution automatically implies inefficiency because no resources should be wasted. It shows truly the lack of quality

in some industries. Pollutants should be treated and recycled just the same way paper bags, bottles and newspapers are being recycled and put to other uses. It is true that this requires technology. However, this need must be recognized and R&D resources must be channeled into it. Obviously, companies that produce pollutants lack integrity. Their image and reputation suffer and they are not able to compete globally. If this occurs, they lose market shares and may not be able to invest in R&D. Such companies continue to generate negative publicity from interest groups, pay high fines and pollute their potential labor force and supply for raw materials. It follows that if labor and raw material inputs are polluted, subsequent outputs will be polluted, too. Workers will be unproductive because of high absenteeism as a result of illnesses they or members of their families may suffer, and also as a result of poor quality of life. Quality can, therefore, not be achieved in the long term if there is no integrity and the natural environment is blatantly polluted.

Social responsibility

Drucker (1991) and Deming (1986) have emphasized the need for social responsibility. Social responsibility involves the creation and expansion of the job base. It is, perhaps, the most important function of any firm in the community. However, the job base cannot expand if productivity and quality are not simultaneously improved; it follows therefore that productivity improvements lead to increases in quality and, subsequently, to an expansion of the market share. This translates into more investment in terms of capital expansion and research and development. As a result, jobs are created.

An aspect of social responsibility that should not be overlooked is the fact that low productivity and low quality in any one firm or industry affects all firms and industries that depend on it. For example, the productivity and quality of a manufacturer is significantly affected if a supply of low-quality parts are received from a vendor. Likewise, all companies and/or customers that depend on the output of the manufacturer suffer. Therefore, the production of inferior products leads to a chain reaction that ultimately affects the entire national economy. Productivity indices provide a good indication of the economic health of the country. If this indicator falls, there is cause for concern because resources are not being optimized and jobs will be lost.

Social responsibility often goes beyond the production of goods and services which reflect a firm's concern with the social needs of its employees and the society as a whole. A 'caring' organization should be socially sensitive to the needs, concerns and problems of its major stakeholders (i.e. employees, customers, community). The organization should learn from its stakeholders and show sensitivity to issues that are important to them. Such a 'caring' organization will position itself as one that is ready to learn and share ideas with these important stakeholders.

Figure 2 shows that the traditional organization must undergo an overhaul; a total system transformation process that involves changing the manufacturing and process technologies. In addition, relationships with suppliers and customers must be changed. In a very real sense, a cultural transformation process that demands retraining and re-educating of the labor force to manage new structural changes and understand the STQM philosophy must be gone through. This means that the traditional organization needs to be redesigned in terms of its information and communication patterns in order to achieve STQM successfully.

The new organization that emerges after this transformation may or may not be a STQM factory. However, there must be guidelines to ensure that the new organization will be better than the original organization that is being transformed. The following questions must be asked.

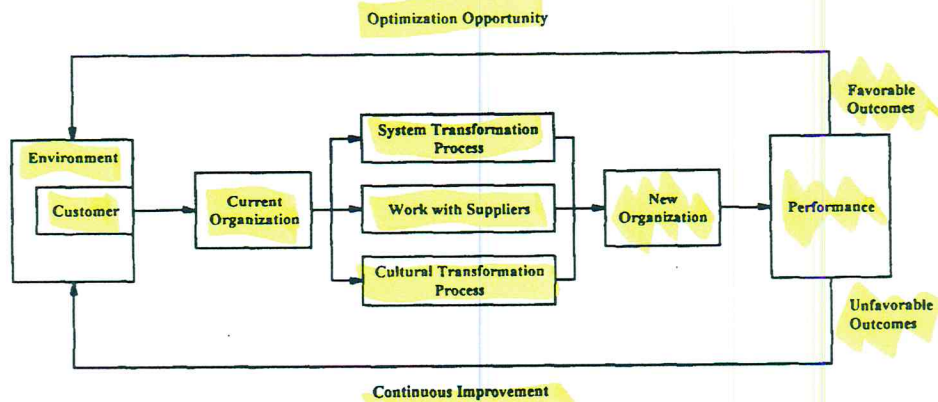


Figure 2. STQM transformation process overview.

- How well does the new organization perform compared with its competitors?
- How well are organizational resources (i.e. human resources and process capacity) being utilized?
- What are the vision and direction of the new organization?
- What are the market response and acceptance of the products and services offered by the new organization?
- What level of quality is being achieved?
- What new strengths, weaknesses, opportunities and threats are being encountered?

These questions and many more must be answered in order to evaluate the performance of the new organization. A favorable outcome implies that opportunities and resources are being optimized. Irrespective of the outcome (favorable or unfavorable), continuous improvement is an ongoing process that must be maintained in order to respond swiftly to the complex and dynamic global environment.

Dimensions of STQM

To build a STQM factory effectively, top management must have a clear idea of the changes to be implemented. The dimensions of STQM outlined here complement the focus on TQM. New dimensions are added to allow for a systemic view of quality. In other words, these dimensions allow us to view quality from the overall performance of the firm. Clearly, with the focus of many firms on achieving a six sigma factory, product quality may not be the critical factor in determining viability of the firm in the future. Together with the emerging issues outlined above, customers are likely to develop a holistic view of quality. In order to understand STQM totally, top management must be able to appreciate the importance of the following dimensions.

- **Customer needs.** The first objective should be to identify customer needs. Evidently, products and services are produced to satisfy needs. Customer needs must be identified and appropriate product designs instituted to satisfy those needs. Management should not focus completely on Wall Street and the stockholders, but also on customers, society and the environment. Through marketing surveys, customer needs can be identified. A systematic approach, for example the quality function deployment, can then be used to link customer needs and the firm's strategic plan or to translate customer needs into specific designs and specifications. Daily management

techniques can also be used by the firm and its suppliers to meet customer needs, as shown by Moran (1991).

- *Capabilities and weaknesses.* This is the process of linking resources to market demands. Here, it is necessary to identify the strengths in terms of process technology, human resources—skilled labor and management—and also the weaknesses and how they influence the ability to satisfy customer needs. Internal scrutiny and environmental scan at both business and functional levels are needed to identify a firm's strengths and weaknesses and its business opportunities and threats. For environmental scanning at a business level, Porter's five-forces model (i.e. new entrants, suppliers, rivalry, buyers and substitutes) will be a very useful tool to apply, as shown by Hax and Majluf (1991). Also, Porter's value chain model can be applied for the internal scrutiny.
- *Design specifications.* Appropriate design specifications are developed with targets and performance measures. The role of each operator is also made clear and the operators are given the necessary tools to achieve the quality goals. Performance and appraisal measures are also made obvious to those involved.
- *Appropriate process technology.* Appropriate process technology must be in place and should be capable of meeting the design specifications, tolerances, target levels and product conformance requirements.
- *Management commitment.* Top management must be committed to the goal of quality improvement. This must be clearly stated and management actions taken to ensure that quality improvement goals are achieved. Top management should also lead quality teams to ensure that the defined objectives and design specifications are achieved. Top management participation will help to deal with common causes and operators will have the incentive to deal with special causes.
- *Organizational vision and mission.* The organization's vision, mission and value system must be based on TQM.
- *Management of change.* Strategies to manage and cope with change should be adopted to maintain order. Change should be seen as inevitable and it should be planned for, in order to minimize the associated risks. Organizational culture and structure must be adapted to change if the quest for continuous improvement, innovation and creativity is to be successful.
- *Organizational flexibility.* The definition of change implies the existence of organizational flexibility. The organization should not be static and should encourage the flow of new ideas and information to improve the management of quality. A new organizational form is made up of clusters of working groups. Each working group is responsible for the production of a specific product. A typical group on the shop floor includes quality engineers, maintenance people and mechanics.
- *Multi-disciplinary background.* Management must develop a multi-disciplinary background through education, training and hands-on experience. This exposure to different functional areas will help to incorporate the functional goals into those of the organization. The cross-functional background will help management to understand the importance and the implications of quality in each functional area in achieving total quality.
- *Teamwork.* Quality circles or quality teams must be established to share information on work in process. These teams should have the power to make work-related decisions. Team members should have the cross-functional background needed for effective decision-making.
- *Employee motivation and organizational cultural change.* Employees have to be motivated

to perform their tasks successfully from the start. In order to achieve this, organizational culture has to change to acknowledge the importance of quality and group work.

- *Training and retraining.* Workers need to be trained and retrained continuously in the different aspects of quality, especially the cost of quality and its relationship to the viability of the organization. They need to be frequently reminded of the importance of satisfying customer needs and specifications in order for the organization to survive.
- *Education.* In-service training should be instigated to educate workers in the application of quality techniques such as statistical process control, robust quality designs and quality philosophies, in line with organizational quality objectives. Workers should be trained to use statistical charts and financial planning so they can position their firm in a financial grid and compare its success with that of competitors.
- *Continuous improvement philosophy.* A policy for continuous improvement must be adopted. The goal should be to seek quality improvement continuously. There is always room for improvement. Also, everyone must participate in the achievement of high quality.
- *Environmental sensitivity.* There must be a sensitivity to the environment. How does the organization's performance affect the environment (e.g. ozone depletion) and how do the significant interest groups react? Forecasting future needs and reactions of consumers to certain operations is also important. This entails environmental impact assessment.
- *Benchmarking.* The organization should always compare itself with its competitors in the same industry and should always aim to out-perform its competitors. Functional benchmarking (looking outside one's industry at best of class in a given function) should also be used to improve the organization's performance. To use benchmarking effectively, one must have a good understanding of the industry and be willing to learn from world-class competitors.
- *Cost analysis of quality.* The aim of a strategic approach to quality should be to increase profitability and market share, and to become more competitive. These goals can be achieved if top management understands that the high cost of poor-quality items diminishes profit margins and market share. Social costs should also be considered as part of the cost of poor quality. For example, what cost is incurred through litigations when a car manufacturer installs a braking system that fails under normal use and contributes to loss of life and destruction of property?
- *Organizational commitment to employees.* The organization must show concern for its labor force and its immediate environment. Workers must feel that their jobs are secure and that they have a future in the corporation. There should be no limit to their organizational achievements. They must perceive themselves as having equal opportunities in terms of organizational aspiration. The organization should operate as a team with each member actively seeking means to improve quality.
- *Image building and social responsibility.* The organization should invest in good causes. It should participate actively in its immediate environment in worthy causes, especially those of importance to the majority of workers. The organization has to show sensitivity to critical issues that are not immediately related to work and provide self-identification to its employees and the community. Drucker (1991) notes that "raising the productivity of service work is management's first social responsibility".
- *Communication among workers.* Effective communication among workers should be stressed, and barriers that limit such communication should be broken down. Top management should communicate even to the floor level and should not always expect

a bottom-up approach. Top management should also solicit and hold meetings with employees to identify problems at work before developing corrective measures.

- *Human input in work.* Human input should be encouraged to increase the self-esteem of workers. They should actively participate in designing their jobs and in measuring job performance. Incentive schemes should be developed to reward them accordingly.
- *Supplier relationship.* Suppliers must maintain quality guidelines instituted by the manufacturer. Suppliers should be innovative and employ cost-cutting strategies to improve quality and meet deadlines. In order to provide a higher quality product or service to the society, a firm must communicate and work with its suppliers in order to satisfy customer needs and expectations.
- *Reduce gap between top management and lowest paid employees.* Employees should not see the salary scheme as unfair. For example, top executives should not be rewarded with large bonuses when redundancies are likely. Also, the gap between top executives' salary and bonuses and that of the operators should be minimized if equal devotion and dedication to the job is to be achieved.
- *Strategic information system.* The maintenance of an information base system that will provide critical environmental information to management and make the information operational to all the employees of the organization is desirable.
- *Functional strategies.* Functional strategies such as information technology, human resources and manufacturing and marketing strategies are key ingredients for the successful implementation of a strategic plan. The present focus of strategic planning on business and corporate units should be extended to include functional strategies. When a functional strategy is developed, Porter's value chain model can then be used to identify project opportunities and risks.
- *Focus on value strategy.* In addition to cost leadership (i.e. lower cost product provider), product and service differentiation, and innovation strategies, more and more people are interested in the 'value' of products or services. Such values include fair prices for the products or services, better quality, and sales services.
- *Redesigned business process.* Information and advanced manufacturing technologies are important for achieving consistent quality. The application of these technologies enables things to be done in novel and more efficient ways. Presently, many existing businesses are not fully exploiting these opportunities. Business process redesign is, therefore, necessary to integrate these new technologies. For example, the *Economist* reported that Ford redesigned its invoice process after it benchmarked Mazda's invoice process. As a result, Ford has achieved major improvements: a reduced head count in accounts payable by 75%, the elimination of invoices and improved accuracy (1990). A firm should 're-engineer' its business by using modern information technology to re-design business processes radically to achieve improvements in the firm's performance.
- *Redesigned business network.* In order to create or maintain a strategic advantage, many firms today link their computer systems with those of their customers and suppliers so that real-time responses to customer requirements are possible.
- *Working smarter.* Drucker (1991) identified five steps for working smarter: (1) defining the task; (2) concentrating on the task; (3) defining performance; (4) management forming a partnership with the people who hold the jobs; and (5) continuous learning and teaching. Clearly, these steps help to put the focus on the job and may contribute to quality improvements.
- *Organizational learning and sharing.* This dimension is based on 'hear, see, do and share'. A firm 'hears' a new concept or a new technique to improve quality. The firm

Table 1. *New management focus and target for STQM*

Strategic target	Focus on global issues	Focus on strategic planning
Customer	Benchmarking	Customer needs; never-ending philosophy of quality improvement
Company : system transformation	Appropriate process technology; design specifications; management of change; image building and social responsibility; strategic information system management; environmental sensitivity analysis; redesigned business processes	Strengths and weaknesses; organizational mission and vision; organizational flexibility; teamwork; focus on value strategy; functional strategies; cost analysis of quality
Company : culture transformation	Management commitment	Multi-disciplinary background; employee motivation and organizational cultural change; training and retraining; education; organizational commitment to employees; communication among workers; human input into work; reduced gap between top management and the lowest paid employee; working smarter
Supplier	Redesigned business network; organizational learning and sharing	Supplier relationship; work with supplier

'sees' it in action, then the firm applies this concept ('do') and 'shares' its experience with its suppliers and strategic alliances.

Managerial focus

In the STQM factory, top management must refocus its energies. New strategies and actions must be developed. Table 1 discusses the new focus of management. It is intended to give direction to top management on vital issues that will lead to STQM.

Top management strategies for quality improvement

- (1) *Management development, employees retention and leadership.* Top management should take the lead in the STQM transformation process. The 'critical mass' (i.e. workers)

at the floor level must be taught the importance of organizational change and transformation. They must consider their stakes at risk and view the success and survival of the organization as theirs. They must be made aware that their performance and contributions to the organization are significant in shaping its future. By management taking steps to include and value the responsibilities of its employees, a link is established between STQM and company vision. A STQM culture is developed to motivate employees from 'within'.

- (2) *Total customer focus.* Process changes should always be viewed from the perspective of the customer. How will change in technology or work process improve services delivered to customers? These improvements may relate to product satisfaction, reduction in the emission of dangerous gases or to the building of trust and confidence in the firm's services. If these are not achieved, the organization is not purely customer focused.
- (3) *Entrepreneurial spirit.* Workers must be motivated to think positively about change—it will enhance their work and make them more productive. Generally, people are reluctant to change, especially when they are used to routines. However, in order to become more productive and to improve continuously as suggested by the STQM dimensions, change will be inevitable. It is more important to implement new ideas that have the potential of improving organizational performance than to rely on experiences that have only a marginal contribution. Top management must, therefore, encourage workers to develop entrepreneurial spirit.
- (4) *Implementation focus.* Organizations often fail in their TQM transformation because they lack appropriate implementation. The 'check' stage of Deming's PDCA cycle should be the focal point in the evaluation of any process of change.
- (5) *Commitment to education.* Corporations must adopt a long-term focus with regard to their extended environment. It is all right to train and retrain and educate and re-educate their present workforce. However, if the educational system in the US is not significantly improved through the joint participation of corporations and school systems in developing new curriculums, then the aims of the whole TQM and STQM process will only be short-term. Human resources remain the greatest asset of any nation. Our companies cannot be competitive if the importance of STQM is not instilled in the future labor force.
- (6) *Customers and society empowerment.* Top management should empower and educate the whole society and particularly its own customers. The customers are the fabric of any organization and they must see the value of STQM in order for the company to survive, add value to their products and services, and improve the quality of life. When they are aware of their importance, customers are able to support STQM company policies and provide inputs into the company.
- (7) *Disaster planning and crisis management training.* Of course, the rapid proliferation of new ideas and the dynamism in the environment suggest that management must be responsive to disaster planning and crisis management. The workplace is facing new problems that were not anticipated a few years back. Now, the issue of how to manage acquired immune deficiency syndrome (AIDS) in the workplace is being confronted by many managers who are, in most cases, not prepared for it, as discussed by Banas (1992) and Madu *et al.* (1993). Productivity as well as quality are going down as a result. According to Deming's cycle, it is apparent that declining productivity and quality will not help any company and certainly not the community that depends on it for jobs. So, something must be done to tackle these problems.

Table 2. Top management strategies for quality improvement

Top management strategies	Reasoning
Awareness	STQM is seen as the key to global competitiveness and the long-term viability of the firm. Top management and employees begin to see their future in the organization as dependent on the firm's viability. They begin to adopt measures to achieve STQM goals.
Customer-demand focus	A new product strategy such as the one initiated by Aisin (a Japanese firm that twice won Japan's Quality Control Medal) must be developed. This new strategy is based on merchandise planning. Focus should be on the identification of the kind of merchandise that customers really want.
Management philosophy/quality attitude/quality environment	Appropriate management philosophy such as the win-win philosophy, profound knowledge, long-term commitment and continuous improvement are important in creating a quality environment and in developing a 'quality' attitude.
Organizational vision	Top management develops a clear business vision that articulates the strengths, weaknesses, opportunities and threats of the organization as well as its internal and external environment. Appropriate criteria, standards and priorities are established for achieving customer and environment-driven quality plans.
Quality/reliability vision	Quality and reliability issues are seen as interrelated and influential in determining the quality of the product and services offered by the firm. Plans are adopted to improve the quality of products or services rendered by a firm and the reliability of the process technology. Measures such as statistical operator control and statistical process control are adopted for products and services and process maintenance planning and policies are adopted for the process technology.
Organizational mission drives quality	Quality is seen as customer and environment driven. Management develops policies that will utilize quality function deployment to identify customer needs and applies the seven management tools in assuring quality improvement.
Organizational message must be communicated to everyone	Top management sees the need to develop corporate quality programmes. Organizational communication becomes important in assuring that organizational focus is clear and well understood by everyone in the organization. Quality improvement is seen as a continuous process and the only means to remain competitive.
Resources and commitment	Top management commits the time necessary to achieve STQM, encourages team work and develops reward systems based on quality and team achievement. Necessary resources such as continuous training of employees are provided to achieve STQM.
Organizational learning	Only organizations that learn will stay ahead. A firm must keep up with changes in its environment. Critical information such as technological, quality, social and global trends must be obtained and thoroughly analyzed before a long-term plan can be developed.

A succinct discussion of top management strategies to develop STQM and the reasoning behind such strategies is presented in Table 2.

Conclusion

In this paper, we developed a new outlook on quality. This new outlook discusses STQM as an extension of TQM. STQM views quality on the basis of the overall performance of the firm. It emphasizes the importance of the natural environment, social responsibility and integrity in achieving quality. New dimensions of quality are presented. Continuous improvement remains an integral part of STQM as seen from the STQM transformation process overview. These discussions are intended to offer guidelines to quality managers and concern the critical factors that will affect the successful implementation of STQM.

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